will need no other argument to convince them of the strength and ability of the pier I have endeavored to describe.

New York city. ENGINEER.

For the Scientific American.

HOW A SNOW FLAKE IS BUILT.

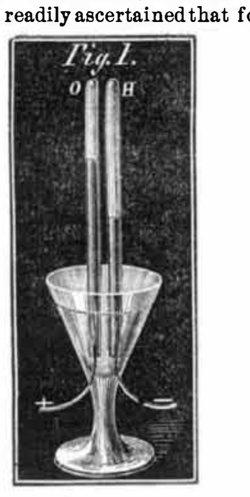
BY PROF. GUSTAVUS HINRICHS.

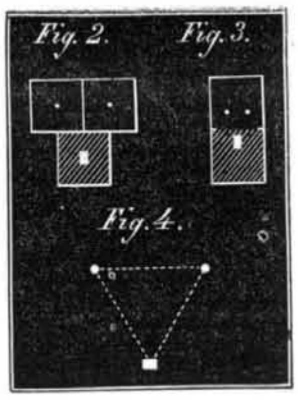
In No. 8 of the SCIENTIFIC AMERICAN (Feb. 22) a beautiful plate of snow flakes is inserted in the report of the admirable lectures of Prof. Tyndall on heat and cold. The figures, although of course but a very poor imitation of the actual beauty of the snow flakes, nevertheless will enable the numerous readers of this journal to understand how Tyndall in the same lecture can say: "Snow is one of the most wonderful and beautiful things in the whole world."

I believe that Kepler, the great astronomer, is considered the first who called the attention of scientific men to their beautiful and most regular form. Since then they have been studied very accurately; many hundred plates filled with the various forms observed have been published. But never has the cause of these forms been satisfactorily accounted for in a simple manner; indeed the explanation of these forms has hardly ever been attempted. Still, every one in beholding these forms, cannot help being convinced that they are the expression or the result of some grand universal law, just as the spherical form of the heavenly bodies is the expression of the law of gravitation.

In my "Atomechanics," published last year for distribution to the various institutions of learning in this country and in Europe (see the London *Mechanics' Magazine*, Dec. 27, 1867)) these forms find their simple explanation in connection with the other crystalline forms exhibited by matter everywhere. It may not be without interest to give a somewhat more detailed, simple account of this explanation here. The explanation is based upon the known chemical composition of the substance itself; and as this may not be sufficiently plain to all of the readers, we shall present a concise account of that also.

Snow is crystallized water. But what is water? By passing a galvanic current through water, Nicholson and Carlisle discovered in 1800 that water was decomposed into two different gases. Fig. 1.) The gas collecting above the positive pole was found to support combustion; a glowing taper immersed into it bursts into a bright flame; hence it is oxygen. At the negative pole there collects a gas which burns with a pale bluish flame, producing water again as the result of this combustion; it is therefore hydrogen. Furthermore, it is readily ascertained that for every one measure of oxygen





produced in the one tube, O, there are exactly two measures of hydrogen evolved in the tube, H. Water is by this experiment proved to consist of oxygen and hydrogen in the proportion of one measure of the former to two measures of the latter. This has been represented in Fig. 2, where each measure is represented by an equal square, and H standing for hydrogen, O for oxygen.

Now matter, bodies, are made up of parts; the smallest parts or particles are often called atoms. The atoms themselves cannot be supposed to change; hence, since the size of the bodies, particularly gaseous bodies, changes very much, expanding and contracting often to an enormous extent, the atoms themselves are considered to be relatively at great distances from one another. Thus in Fig. 2 the two squares represent the two measures or volumes occupied by two hydrogen atoms; these particles themselves actually filling but a minute portion of this space, as indicated by the dot in the middle of the squares. That the spaces between the atoms (or the interatomic spaces, Tyndall, tenth lecture on heat as a mode of motion) are really so great, we may readily understand if we remember that the water atoms contained in one cubic inch of water will occupy a cubic foot, or nearly two thousand times as much space when the water is converted into steam. We meet here the same fact as in astronomy; the space actually occupied by the sun and planets is entirely insignificant as compared to the space allotted to them for their motions; in other words, the universe is not densely populated by either cosmical atoms in the heavens or chemical atoms in any substance. The question, how the atoms manage to keep other particles out of their great domains, is usually answered, by the vibratory motions of heat; the atoms vibrating to and fro so energetically and rapidly that they actually would kick out any neighboring atom that might happen to get within the space allotted to them.

But furthermore, chemists consider it proved that all elementary atoms occupy equal spaces when the elements are in the gaseous condition. Thus the two volumes or measures of hydrogen obtained from the water would represent two particles or atoms of hydrogen; so also the one measure of oxygen will represent one atom of oxygen. In other words, we learn from the decomposition of water by the galvanic current, that each atom of water consists of two atoms of hydrogen and one atom of oxygen.

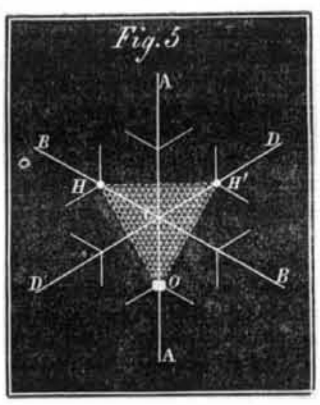
In Fig. 2 these atoms are represented as still uncombined, a mere mixture of oxygen and hydrogen; when actually combined to water-atoms it is known that the three measures have condensed to but two, as represented in Fig. 3. For we know that one volume or measure of oxygen weighs 16 times as much as an equal volume of hydrogen, while water, as steam, weighs exactly 9 times as much as an equal volume of hydrogen. If we call the weight of one measure of hydrogen 1, the weight of one volume or atom of oxygen is therefore 16, the weight of one volume of water=9. But one atom of water, consisting of 1 volume of oxygen (weighing 16) and 2 volumes of hydrogen (weighing 1 each), does weigh 16+2, or 18. Since now, one volume of steam weighs only 9, it follows that one atom of water or steam occupies two such volumes, as represented in Fig. 3. It is readily seen by a comparison of Fig. 2 and Fig. 3, that this chemical paradox, viz., that 2 volumes, H, and 1 volume, O, give not 3 volumes, but only two volumes of steam, may be understood by supposing the two atoms of hydrogen in the act of combination to be brought inside of one volume, which in being placed together with one of oxygen, gives the two of steam, Fig. 3.

In the preceding we have given nothing but the actual facts (excepting the last explanation of the reduction of the three to two volumes). This must enable us to explain the form of the snow flakes.

A snow flake is but a great collection of water-atoms, arranged according to the form of these atoms. What is that form?

We have seen that each water-atom (Fig. 3) is composed of three little particles, two being the hydrogen atoms, the third being an oxygen atom. But three particles always form a triangle (Fig. 4); and since two of these particles, H and H', or weights are equal, the third, O, will sustain the same relative position to either of them, or the triangle, H O H', must necessarily be isoceles; that is OH=OH'. And since now the atoms, even when combined, are at great distances from one another, the most complete position of equilibrium will be attained; that is, the equal sides, OH and OH', will be equal to the base, HH', or the triangle, H O H', is equilateral.

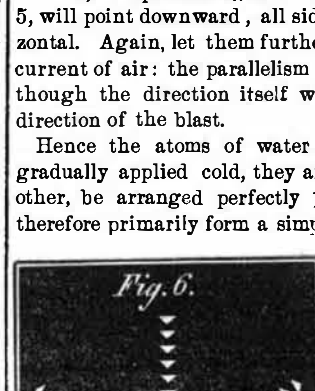
The form of a water atom is therefore necessarily an isoceles triangle, and probably an equilateral triangle. In the latter case it has three equal axes at angles of 60° in the plane of the triangle. This is represented in Fig. 5, where AA, BB, DD, are these three axes, dividing the plane of the water atom equally.

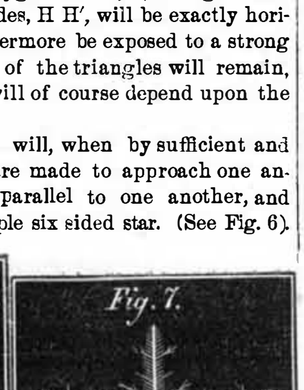


But after having obtained the form of the atom of water, the further question arises: How will the atoms of water arrange themselve when perfectly free to move? It must of course be remembered that they never are actually in contact, for the spaces between the atoms never are nothing.

Suppose, then, there were a great number of water atoms freely moving in space, that is, a space is occupied with little triangles (Fig. 4), the base, H H', of which weighs 2, the vertex, O, of which weighs 16. They will therefore, under the influence of any force whatever, be directed all parallel to one another. To illustrate this, take equal and equilateral triangles cut out of pasteboard, fix (by means of a little bees-wax) one shot at each of two of the corners, but 16 shot of the same size at the third corner. Now let these all drop—that is, be subjected to the force of gravity; all corners with 16 shot, or representing our oxygen corner, O, in Figs. 4 and 5, will point downward, all sides, H H', will be exactly horizontal. Again, let them furthermore be exposed to a strong current of air: the parallelism of the triangles will remain, though the direction itself will of course depend upon the direction of the blast.

Hence the atoms of water will, when by sufficient and gradually applied cold, they are made to approach one another, be arranged perfectly parallel to one another, and therefore primarily form a simple six sided star. (See Fig. 6).





But any atom in these atoms may again become the center for others, so that forms like Fig. 7 and all other observed forms of snow flakes result.

Even the solid, compact ice is built up in the same way. This has been shown by the beautiful experiment of Tyndall described in his fourth lecture on heat as a mode of motion. In thawing, he showed that similar perfectly regular six-sided stars are formed in the ice.

In conclusion, we will add the description of the snow flakes given by Tyndall in the sixth lecture referred to. By a glance at our figures it will be seen how well our theory accounts for their wonderful forms. Tyndall says:

"Snow, perfectly formed, is not an irregular aggregate of ice particles; in a calm atmosphere the aqueous atoms arrange themselves so as to form the most exquisite figures. You have seen those six-petaled flowers which form themselves within a solid block of ice when a beam of heat is sent through it. The snow crystals formed in a calm atmosphere are built upon the same type; the molecules arrange themselves to form hexagonal stars. From a central nucleus shoot six spicula, every two of which are separated by an angle of 60°. From these central ribs smaller spicula shoot right and and left with unerring fidelity to the angle 60°, and from these again other smaller ones diverge at the same angle. The six-leaved blossoms assume the most wonderful variety of form; their tracery is of the finest frozen gauze, and round about their corners other rosettes of smaller dimensions often cling. Beauty is superposed upon beauty, as if Nature, once committed to her task, took delight in showing, even within the narrowest limits, the wealth of her resources."

But there is still one point more which in this connection may readily be explained. According to my "Atomechanics," an oxygen atom—the part here considered solid, O, in Fig. 4 is composed of a group of 32 little particles; each hydrogen atom consists of only two such particles. Suppose now that the water atom represented in Fig. 4 was exposed to a rapid and powerful current of the ether, which according to Tyndall and modern physicists generally, occupies the space between the atoms. Then the oxygen atoms would be blown away in the direction of the current, just like the chaff is blown away from the grain; in other words, this constitution accounts for the decomposition of water by the galvanic current, the oxygen goes in the direction of the flow, or with the current, because its atoms offer the greatest resistance to that current on account of their structure.

It will be seen from this short exposition that "Atomechanics" explains "how the snow flakes are built up," explains a fact which all philosophers unite in declaring one of the most wonderful and mysterious in nature! And Atomechanics does this not by introducing at every turn some new auxiliary hypothesis; but by means of only one principle, that all elements are composed of one substance, pantogen. Perhaps we may at other times present some other points of Atomechanics to the readers of this journal.

Iowa City, March, 1868.

Improvement in Hand Printing Presses.

MESSRS. EDITORS:—I notice in the SCIENTIFIC AMERICAN of March 21st, an inquiry why there are no improvements in hand printing presses, by Mr. Gabe of Bloomington, Indiana. In reply, I wish to say that the proprietor of the *Gazette* office, at this place, and another gentleman, have perfected a very valuable improvement on hand presses, and it will soon be patented and offered to the public. The proprietor of the *Gazette* has attached the improvement to his double-medium Washington press, given it a thorough trial, and it proves a complete success. It greatly lessens the labor of press work, and doubles the speed of the same. The cost of the improvement is trifling, and it is capable of being attached to all hand printing presses in a few minutes. The patent is now being applied for, through your agency, I believe.

Adriance, Ind., March 23, 1868. K. L.

Improvement in the Manufacture of Molded Articles.

Patented by William B. Gleason, Boston, Mass.

"Having a matrix or mold of the form of the article to be produced, I take thin veneers or shavings and moisten them by hot water or steam. The veneers I lay in the mold, and then press into the space in the mold upon the veneer, any suitable plastic adhesive compound that will afterward set and become hard. The plastic material which is forced by the action of a press into the mold, acts upon the thin veneer as a punch or die, which is the reverse of the mold, and causes the veneer to fit all parts thereof, while, by reason of the plastic nature of the filling or backing, the contact between it and the veneering is made perfect, and at the same time the adhesive nature of the compound insures the union of the facing to the backing.

In some cases, where, from sharp angles or abrupt projections or depressions in the mold, there is danger of breakage or separation of the veneer or shaving, I make use of more than one thickness, which increases the chances of there being at the points of breakage at least one unbroken portion of wood. When the veneered object is dry and hard, all of the shavings, where more than one thickness is used, that come immediately into contact with the filling, will adhere to the filling and the layers not adhering may be removed. I am aware that thin substances have been shaped to form by the action of hard, solid punches, which press such substances into molds suited to the punches, which forms or shells have been afterward backed or filled with plaster or other material. My invention, however, differs from the matter just referred to, and it may be said to consist in the process of forming in molds articles which are covered with an adhering pellicle, by pressing the pellicle into the mold by an adhesive plastic substance or compound, as well as in articles so molded."

Curious Habits of the Chlamyder.

Among the recent French publications is a highly entertaining work by M. Pouchet, Director of the Museum of Natural History of Rouen and correspondent of the Academy of Sciences. The book is a disconnected collection of curiosities in nature, which our author has compiled and published with the comprehensive title of "The Universe." One of the most interesting parts of M. Pouchet's work is that which treats of the architecture of birds, and under this head appears a somewhat marvellous description of the habits of a peculiar species of the feathered tribes, who apparently prefer elegance of external adornment in their nests rather than shelter for the protection of their brood. The speckled chlamyder is an exotic bird, resembling our partridge, but distinguished from it by its deep color relieved by clear spots, and by its neck, which is adorned with a red collar. For the location of their nest, the couple choose an open place exposed to the sun and to the light. Their first care is to make a path of round pebbles; when they deem it to be sufficiently thick, they begin by planting in it a little avenue of branches. They are seen for this purpose to bring from the country slender shoots of trees of about the same size, which they thrust solidly by the thick end into the interstices of the stones. These branches are disposed in two parallel rows, converging a little in such a manner that they form a miniature shrubbery. The plantation is a yard in length, and is sufficiently wide to allow the two birds to walk alongside of each other in the interior. This grove being finished, they devote themselves to embellishing it. Each starts out forag ing in the fields, and brings back all the sparkling objects it can pick up—pearl shells, birds' feathers, all that charms the eye. These trophies are suspended at the entrance to the grove, which soon begins to shine in the sun like a palace of the Arabian Nights. In the places frequented by the chlamders, if a traveler loses his watch, his knife, his seal, he does not spend his time looking for it on the ground; he knows where to find it. The discovery of these facts appeared so extraordinary to Mr. Gould, who first described them, that he feared to meet in Europe only with unbelievers. To answer beforehand all objections, he had one of these wonderful shrubberies taken up, and succeeded in transporting it to the British Museum, where it can be seen to-day. A little later, a living chlamyder was brought to the zoölogical gardens of London. He was placed in a large room in the midst of all the materials necessary for his constructions; but the poor exile only made a shabby work of it. He scarcely touched the branches, to plant a few here and there in a heap of stones. He wanted the air and the sun; he wanted especially a companion.

DISSOLVING ANILINE COLORS.

For the application of most of the aniline colors, more especially blues and violets, consumers are obliged to make use of special solvents either to prepare them for the dye-bath or for printing. The solvents mostly employed are alcohol, wood spirit, and acetic acid. These solvents, seeing the quantity one is obliged to use (from two to five gallons per pound of color), are very costly, and the best means ought to be used either to diminish the quantity employed or dispense with them altogether. Many ways have been proposed. The first consists in modifying chemically the colors, especially blues and violets, by the action of concentrated sulphuric acid or the action of alkali.

The action of alkalies has given birth to the isolation of the bases of violets and blues of aniline and the formation of soluble salts by the saturation of this base with an acid.

The action of concentrated sulphuric acid has resulted in the following processes:

Nicholson heats one part of blue or violet of aniline with four parts of sulphuric acid 66° Baumé to 230° Fah., and keeps it at that temperature till the color is entirely soluble in water; the time is generally about 45 minutes.

Clavel pours (a little at a time) Nordhausen fuming acid upon the colors, stirring all the time. After the repose of half an hour the mixture is run carefully into water saturated by an alkali which precipitates the color completely soluble in water.

M. Monet, of Lyons, mixes one part blue of aniline with one part sulphate of aniline; he takes one part of this mixture or one part of violet insoluble in water, and adds it to six parts of sulphuric acid 66°, heats gradually to 160° Centigrade, takes out the fire, and adds alkali till an alkaline reaction is shown, and the color precipitates. After washing one part of this color is soluble in 200 parts water.

The second means consists in replacing alcohol by vegetable emulsions, or by solutions emulsive of special products much less costly than alcohol.

These means have originated the processes of M. Gaulbier de Clanbry and of MM. Lailler and Dumesnil, of Rouen. The process of M. Gaulbier de Clanbry was patented in England and France in 1864, and according to his patent a large number of substances give to water the property of dissolving the colors which to that time could only be dissolved by alcohol or substances as inconvenient. His invention consists in the substitution for the alcohol and other solvents hitherto employed for dissolving the coloring matters obtained from aniline which are insoluble in water, such substances or any substances which shall possess the property of forming a mucilagenous, gelatinous, or sopanaceous solution when mixed with water, or of thickening water so as to render it mucilagenous, gelatinous, sopanaceous, or sirupy. As examples of such substances, especial mention may be made of the following: Starch or other fecula, gums, gelatine or glue, concentrated decoctions of the bark or rind known in Panama (*guillaya saponaria*) of the rose tribe, the soapwort of Egypt, the root of the marsh mallow, mucilage prepared from the plants or the seeds of the mallow, lily and orchis tribes, from lichens, fucus or sea wrack, and the seeds of the quince. He also mentions that other substances, though not possessing the properties of rendering water mucilaginous, gelatinous, or soponaceous or sirupy may be employed, such as glucose and glycerin. The dyeing is effected by the solutions hereinbefore described, in the same manner as when alcohol is used, but with the advantage in favor of the improved mode of preparation that the solvents do not volatilize like alcohol, and uniformity of tint is readily obtained. In the baths the fibers take up by their own action the colors which remain constantly in a state of solution, and consequently fabrics or fibrous substances dyed by this process do not lose any of their color by friction.

It is said that M. Gaulbier de Clanbry has ceded the working of this process to the house of Coly, of St. Denis. For dyeing or printing this process is probably more adapted to the violets than the blues, and has not yet acquired a very large practical importance except in the manufacture of lakes, to which it appears specially suitable. As a solvent for the aniline colors employed for this purpose gums and glue, etc., have been extensively used for some time in this country as well as in England and France. The process of MM. Lailler and Dumesnil is somewhat similar to the preceding.

The third means was patented in England and France by Mr. Leonhart, of Manchester, in 1864, and consists in reducing the colors of aniline into a state of extreme division and introducing them in this state into the dye-bath without any solvent. To obtain this result the colors are completely dissolved in alcohol. The alcohol solution is run drop by drop into cold water, which is rapidly agitated. The precipitated mass is drained or filtered and well washed and the liquid is distilled to recover the alcohol, which can be used again and the paste can be employed directly in dyeing or printing.

The last plan is due to the intelligence of MM. Rangod, Pechiney and Ach Bulard. They dissolve in cold sulphuric acid of 66° blues and violets of aniline, one part of color to six or twelve parts of acid. When all is dissolved this solution is poured into a quantity of water sufficient to determine the total precipitation, about fifteen or twenty times the weight of acid employed. The water must be well agitated and kept cool during the mixing. The precipitate, separated from the liquid and well washed, is used in the state of carmine and is applicable direct to dyeing and printing.

It is well known that the process of Rangod, Pechiney, and Bulard has given excellent results in dyeing quantities of wool, and it is truly inexplicable that the process is not yet generally applied. That the employment of alcoholic solvents, so very costly, is not abolished, is not the want of a means to arrive at the result, but only the non-application of that means.

Editorial Summary.

A NEW OIL TESTER.—For testing the relative value of various oils used as machinery lubricants, there is, as far as we know, no perfectly reliable instrument in existence. Until a recent period the specific gravity alone has furnished a guide in determining the value in this respect of standard oils, but of late years the nearly interminable variety of oils that have been introduced, causes the test to be nearly useless. An English patent has lately been granted for a new apparatus, constructed on the principle that the best oil is the one which allows the greatest number of revolutions to be performed by a shaft with the least possible increase of temperature of the bearings, and that all others may be graded on a descending scale as to value, according as they fail to approach the standard.

RECIPES FOR WELDING IRON AND STEEL.—For welding iron and steel a composition has lately been patented in Belgium. consisting of iron filings, 1,000 parts; borax, 500; balsam of copaiva, or some other resinous oil, 50; and salammoniac, 75. They are mixed, heated, and pulverized. The process of uniting the iron and steel is as usual. The parts are heated to a cherry red, covered with the preparation, brought together, again heated and welded.

Another composition for the same purpose is 15 parts of borax, 2 of salammoniac, and 2 of prussiate of potash. Being dissolved in water, the water should be gradually evaporated at a low temperature.

TELEGRAPHING BY TOUCH.—A correspondent, a telegraph operator, proposes to have the blind taught to read telegraphic signals by touch and sound, and those who are deaf as well as blind by touch alone. His plan appears to be feasible, and this widening of the bounds which now hem in our suffering fellows would no doubt meet the approval of those who have the care of them. We do not think, however, that reading telegraphic signals by touch is novel; as we have several times seen the feat performed. But its introduction into our deaf and dumb asylums would be a work of mercy. The apparatus, as our correspondent shows, would be simple and cheap, and it might be applied to a variety of uses.

A VALUABLE FOSSIL.—Professor O. M. Marsh has secured and presented to the Yale College Cabinet, probably the largest fossil elk in existence. Some sixteen years ago, there were imported from Ireland the fossil remains of four of these gigantic, post-tertiary animals. On their arrival in this country, these fossils were stored in a commission house in Philadelphia until a few weeks since, when they were sold at auction. The one secured for the Yale collection measures in the span of its antlers, thirteen feet, two inches. The others were of smaller size, and were sold, one to the Smithsonian Institute, one to the Philadelphia Academy of Natural Sciences, and the remaining one to Prof. Marsh.

IN the open air, under ordinary pressure, sound travels at the rate of 1,090 feet per second, while in tubes $3\frac{1}{4}$ feet in diameter, the rate is found to be 1,083 feet, and to decrease rapidly with the diameter.

MANUFACTURING, MINING, AND RAILROAD ITEMS.

In Southern France the railways are seriously embarrassed every winter by snow drifts filling the deep cuttings, but the past season a section of the line of railway from Saint Etienne to Annoway, has been kept open by the judicious planting along the banks on either side of the track of pine trees a system of treatment previously adopted in arresting the *dunes*, or inroads of sea sands, which in many parts of France used to annually cause great damage.

A correspondent writes that the yield of the Catasauqua furnace, 240 tuns of iron in one week, has been surpassed by three furnaces in New York State. The "Fort Edward Furnace" has frequently made ever 280 tuns per week, while one of the Messrs. Burden's Furnaces, during the month of March, 1867, averaged 269½ tuns per week, mostly of soft iron.

The hydrographic survey now going on in Maine, has already shown that the State has 1,955 sites of water power, with a working energy of 300,000 horse power, equal to a force of 4,000,000 men, and nearly twice that of the working energy, both by steam and water, of Great Britain and Ireland. This water power is scattered through every section of the State. Owing to the body of water in the 1,568 lakes, which form large reservoirs, and cover 2,441 square miles, the force of the streams flowing from them is more uniform throughout the year than elsewhere in the United States.

The Sierra Nevada mountains are crossed by the Central Pacific railroad, 100 miles from tide water, at an elevation of 7,042 feet. There are in the passage fifteen tunnels, and the blasting powder alone for the rock exeavations has cost $1,000,000 in gold.

A company has just been organized in Chicago for the purpose of constructing two blast furnaces near that city, with a capacity of fifty tuns per day. The iron ore of the Lake Superior region will be smelted with the coal recently discovered in Central Illinois, which has been tested and found to be well adapted to the purpose of iron working.

Utah Territory is known to abound in many of the useful, and it is believed also, precious metals. Coal of fair quality and a considerable quantity, has been found in various parts of the territory, and iron has for years past been mined in the Southern counties. On the western slope of the Wasatch mountains, about twenty-eight miles from Salt Lake City, is a canyon known as "Little Cottonwood." Valuable ores of iron, principally magnetic and hematite, abound in this canyon, but as yet no attempts have been made to work them into mines. There are also found argentiferous galena, fahlerz copper, silver gland, and other ores of silver. One ledge of argentiferous galena, called the "North Star," has been prospected by a tunnel 60 feet in length, from which about 400 tuns have been taken out. The vein is about ten feet thick, and carries galena which assays $100 per tun. The ore produced in this and neighboring ledges may be readily reduced by smelting, and requires no preparatory roasting.

The new railroad from Logansport to Union City, Ind., ninety-two miles in length, has, it is said, only four curves on the entire line. It forms the connecting link in a new and through route from Chicago to the Atlantic cities

It appears that at the close of 1867, four miles and 5,035 feet of the Mount Cenis tunnel had been completed, leaving two miles and 4,018 feet still to be pierced. The distance pierced in 1867 was 5,040 feet, as compared with 3,416 feet in 1866, 4,079 feet in 1865, and 1,144 feet in 1860. The outlay, during ten years, upon the work, amounted at the close of 1867 to about $8,000,000. The year 1871, it is expected, will witness the completion of the tunnel. Its total length when finished will be seven miles, 3,773 feet, and its total cost is estimated to reach the sum of $12,000,000, or something more than $1,500,000 per mile.

Recent American and Foreign Patents.

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

PROCESS FOR REMOVING IMPURITIES FROM MALT LIQUORS.—George Storey, Wheeling, West Va.—This invention relates to a new process for removing the impure and decomposing properties of malt liquors, by means of freezing.

HAY RAKER AND LOADER.—Orrin Luce, Virgil, N. Y.—In this invention an improved adjustable device is employed for clearing the teeth, and conveying the hay to the elevator, and in connection with it other novel devices are employed for raising and lowering the teeth and the clearing apparatus.

LIMB AND BASKET HOLDER.—Wm. Richardson, Baltimore, Md.—This device is a cheap and convenient instrument by which the fruit-gatherer can draw a distant limb near to him, and confine it in that position till he has secured its fruit. When not thus in use it can be employed to hold the fruit basket.

MACHINE FOR TONGUEING, GROOVING, ETC.—Alexander McCreight, Tranquility, Ohio.—The present invention relates to a machine, the construction and arrangement of which is such that wood, properly fed into the same can be tongued or grooved, for producing either plain or fancy, or figured moldings, for use upon wood work of all kinds, or for forming panels or door frames, finishing sash frames, and, in general, for all purposes of ornamenting or relieving the surface of wood.

ARTIFICIAL LEG.—Albert Strasser, Montgomery, Ala.—The present invention relates to artificial legs, when the leg is amputated at or above the knee.

LAMP CHIMNEY.—William Onions, and Henry Roberts, St. Louis, Mo.—This invention relates to a new and improved lamp chimney, of that class which are composed of glass and metal—a glass lower portion, and a metal upper portion. The invention consists in a new and improved means for securing the metal to the glass portion of the chimney, whereby the latter is prevented from breaking under the expansion of the former, a contingency of frequent occurrence with chimneys of this class.

SHUTTLE.—Ezra P. Marble, Sutten, Mass.—This invention relates to a new and improved application of a spring to the spindle of a shuttle, whereby the spring is fully concealed, and entirely out of the way, so that when the shuttle is in use the spring cannot catch and cut or break the threads either of the warp or filling.

CARRIAGE WHEEL.—Levi Adams, Amherst, Mass.—This invention relates to a new and useful improvement in the construction of carriage wheels, whereby a wheel much stronger than usual is obtained, and one which will effectually preclude the locking of vehicles together, when coming in contact in passing each other.

DRAFT REGULATOR.—Jos. W. Branham, Franklin, Ind.—This invention relates to a new and improved method of constructing dampers or draft regulators for furnaces, whereby the draft is more nicely regulated, and whereby they are more fire proof.

LEVER PURCHASE.—J. B. Case, Fletcher, Vt.—This invention relates to a new and improved method of constructing a support for the fulcrum of levers, and of combining the lever therewith, whereby a motion of the arms o a lever is permitted in any direction.

BACK AND ABDOMINAL SUPPORTER.—Mrs. John Ford, Salem, Oregon.—The present invention relates to a supporter for the back and abdomen, and is more especially intended for use by women, both before and after confinement, as well also as a means of relief and cure for the falling of the womb, and other similar diseases with women.

MATCH BOX.—J. Kirchfeld, and F. Heyl, Riegelsville, Pa.—This invention relates to a new and improved match box for the use of tobacco smokers, and designed to be carried in the pocket for the purpose of holding friction watches and a fuse. The box is also supplied with a cutter for chopping the ends of cigars preparatory to lighting them. The invention consists in a novel construction of a box, the peculiar application of certain parts to it, etc., whereby a very convenient article for the purpose specified is obtained.

MEANS FOR INCREASING THE PRODUCTION OF HONEY WITH THE ORDINARY BEEHIVES.—A. J. Smith, and H. C. Reed, Decorah, Iowa.—This invention relates to a new and improved means for preventing the frequent swarming of bees, and, consequently, securing an increased amount of surplus honey from them.