

reference of all crystalline substances back to six primitive forms. The science of crystals soon commanded the attention of chemists, and an instrument was invented, called the goniometer, for measuring the angles, and for deciding to what class each mineral belonged.

Later researches seem to point out that there is an intimate relation existing between the crystalline form and the composition of a body, and we may some day discover the law by which we can arrive at the composition of a mineral or other salt, by measuring its angles, and without the necessity of subjecting it to analysis. But this is at present mere speculation.

The peculiar luster, cleavage, hardness, and other physical properties of minerals, have been studied, and something like an independent science has been established, founded upon these external properties. As our knowledge of chemistry has increased, and better methods of analysis have been invented, we are ceasing to lay so much stress upon the outward forms of minerals, and have commenced arranging them with reference to the bases and acids they may contain. Chemists have found that all minerals are composed of well-known elements combined according to the laws of atomic weights, and that they are in every sense chemical salts. For example, feldspar is a double silicate of potash and alumina, and can be made in the blast furnace and porcelain oven as readily as chloride of sodium or saltpeter in the laboratory. Calc spar and arragonite can be made, the one from cold, the other from hot solutions. Every year witnesses the artificial manufacture of minerals, and there is a fair prospect of our ultimately being able to make every stone there is on the earth.

The time does not appear to be very far distant when we shall make even the precious stones, the diamond, the ruby, or the emerald, as readily as we now do glass and porcelain. Professor Dana, in his unsurpassed book on mineralogy, gives the formula of all minerals so far as is known, and classifies them according to their chemical constitution, and thus virtually hands the science over to the chemist. It was not until minerals were made artificially that we were able to form a rational theory of their probable origin in the rocks. Nature's laboratory does not differ from man's inferior imitation, and as the laws of combination are constant, it is safe to infer that the same agencies were employed in producing the native minerals that we pursue in making them artificially. It is only when we treat minerals as true chemical salts that we can assign them their proper place in the universe.

In a recent German work on chemistry, by Professor Geuther, of Jena, we find a tolerably full list of chemical compounds, and among them a large number that occur native, and are known as minerals; for example, under magnesium, potassium-magnesium chloride is described as carnalite; calcium-magnesium chloride as tachydrate; calcium-magnesium carbonate, as dolomite; calcium-magnesium silicate, as augite, and so on through a long catalogue of substances. The crystalline form, solubility, hardness, specific gravity, general properties, and formulas of all salts are given with the occasional observation that this or that compound is found in nature as a mineral, but without any break in the order of discussion on account of that fact.

In this way mineralogy becomes incorporated with chemistry, and rocks may be defined to be chemical compounds that occur ready made in nature, just as carbonaceous substances are traced back to living organisms, and are treated of under the head of organic chemistry. It would not occur to any one to bottle up gases and to regard them as entitled to found a separate science, or to speak of metals, gases, or liquids as we do of chemistry and physics. Gases are a part of chemistry, and so are metals and minerals.

We have called attention to this subject in order to afford our readers some knowledge of the great progress made in the extent of our acquaintance with the crust of the earth, and of the formation of minerals, since chemistry was impressed into the service of explaining the nature of the forces that must have been at work to produce what we see around us. It was not until the acid character of silica was made known by Berzelius that we were able to manufacture glass in a rational and scientific manner, and glass is in fact an artificial mineral very much like what we find ready made in volcanic craters.

The manufacture of porcelain, of soluble glass, of saltpeter, and of many other useful compounds, is conducted in imitation of what is going on in nature, and is now founded upon strictly scientific principles. The total number of minerals thus far described does not exceed 700, while the different salts of potash alone amount to nearly as many, so that the study of potash in all of its relations involves nearly as much labor as the examination of all the minerals that have thus far been found. It will thus appear that the relation of mineralogy to chemistry is of the most intimate character, and that minerals can only be studied philosophically when regarded as chemical salts.

AGRICULTURAL pursuits are beginning to absorb the attention and energies of the population of Colorado, which is favorable to the development of the resources of the territory. That prosperity which depends upon the hazards and uncertainties of mining is at best but spasmodic, and it is only where agriculture is made the fundamental interest that the population assumes a settled character and industry is attended by permanent rewards.

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NEW BOOKS AND PUBLICATIONS.

THE CABIN ON THE PRAIRIE. By Rev. C. H. Pearson, Author of "Scenes in the West," etc. Illustrated. Boston: Lee & Shepard.

This is one of a series of stories called the "Frontier Series," now issuing by the above-named firm. It is a graphic picture of prairie life, full of varied stories, and to those unfamiliar with the scenes it delineates, unique incident. As a specimen of good healthy reading for youths of both sexes, it is unexcelled, while adults may peruse its instructive pages with pleasure and profit. The book is one calculated to secure a wide popularity.

MANUAL OF SOCIAL SCIENCE: Being a Condensation of the Principles of Social Science of H. C. Carey, LL.D. By Kate McKean. Philadelphia: Henry Carey Baird, 406 Walnut street.

We shall in a future issue review his book editorially.

We are indebted to the Hon. Horace Capron, U. S. Commissioner of Agriculture for a copy of his report for 1869. It contains a large mass of carefully compiled and valuable statistics, and many important papers on various subjects relating to American agriculture.

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Recent American and Foreign Patents.

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

COMBINED LOCK AND LATCH.—F. M. Ranous, Yreka City, Cal.—This invention has for its object to improve the construction of an improved gate latch, patented October 26, 1869, and numbered 96,147, so as to make it more convenient in use, and more effective in operation, enabling it to be used as a lock without interfering with its operation as a latch.

SAFETY VALVE.—J. Armstrong, Brookfield, Missouri.—This invention relates to a new and useful improvement in safety valves for locomotive and other steam boilers.

ANIMAL TRAP.—Ebenezer Oliver, New York city.—This invention has for its object to improve the construction of the wire traps, known as round or bee-hive traps, so as to make them better adapted for use.

MODE OF SECURING SHIPS' ANCHORS.—William Henry Barker, Windsor, Nova Scotia.—The object of this invention is the construction of some simple apparatus, by which the anchor can be hung to the catheads and instantaneously let go when necessary, and avoiding all the principal objections to any of the machinery now in use for that purpose.

METHOD OF COUPLING PIPES.—George C. Germain, Cuyahoga Falls, Ohio.—The object of this invention is to connect gas and water pipes, made of asphaltum or other suitable material, that the joints will be entirely water or gas proof, and readily applied.

CHAIR.—C. R. Long, Louisville, Ky.—This invention relates to a new and useful improvement in chairs, and consists in the mode of securing the seat to the legs, whereby the ordinary upper rounds and stretchers of the chairs are dispensed with, while the seat is made detachable, and the chair strong and durable.

WATER WHEEL.—Daniel W. Case, Garden City, Minn.—This invention relates to improvements in water wheels, and consists in the construction and arrangement of the bearing for the shaft, and adjusting apparatus therefor in the top of the case of the wheel; also, in certain improvements in the construction and arrangement of the chutes leading the water to the wheel and the gates therefor, and also in an arrangement for discharging the water from the wheel, partly through central and partly through vertical discharges.

CULTIVATOR.—Freeman C. Jewell, Rahway, N. J.—This invention has for its object to furnish an improved cultivator, simple in construction, easily operated, and effective in operation, and which shall be so constructed that it can be readily and quickly adjusted, as circumstances may require.

EXHAUST VALVE.—W. A. Carns, Malden, Mass.—The object of this invention is to prevent sparks and cinders from entering or being drawn into the cylinders of locomotive engines, when the motion is reversed.

WASHING MACHINE.—D. C. Harlow, Hannibal, Mo.—The object of this invention is to provide a simple and cheap apparatus to be used in connection with the common wash-tub for washing clothes, and consists in revolving a spring cylinder above a concave formed of rollers.

DRESSING AND FURROWING MILL-STONES.—James Lee Norton, London, England.—This invention has for its object improvements in apparatus for dressing and furrowing mill-stones.

CAR-COUPLING.—A. F. Street, Zanesville, Ohio.—This invention relates to a new and useful improvement in couplings for railroad cars, whereby strength, durability, and certainty of operation are secured.

SHOVEL PLOW.—Isaac A. Benedict, West Springfield, Pa.—This invention relates to a new and useful improvement in winged shovel plows, and consists in attaching the wings to adjustable arms and making the wings adjustable on the arms.

CLOCK-ALARM.—J. H. Davis, Chillicothe, Mo.—This invention has for its object to provide means whereby alarm attachments can, whenever desired, be secured to or connected with clocks of suitable construction. At present some clocks are provided with alarm attachments and others not. Those which have no attachments cannot, at present, be changed into alarm clocks. By the aid of this invention clocks of all kinds can be readily converted into alarm clocks, without the aid of experts.