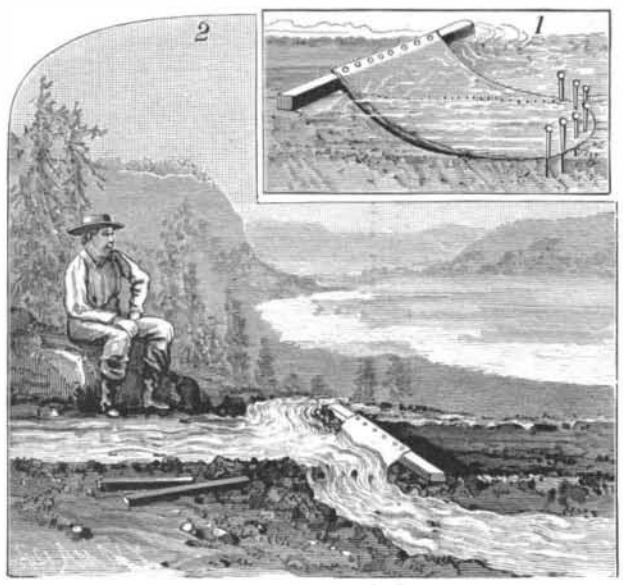
IMPROVED DAM FOR IRRIGATING-DITCHES.

In the engraving Fig. 1 is a perspective view of the dam, and Fig. 2 shows its position in the ditch. One end of a sheet of canvas, leather, or other suitable material is attached to a bar of wood, which is longer than the width of the canvas. This bar reaches across the ditch, the ends resting upon the banks, while the canvas lies in the ditch, with its free end extended up stream and secured by pegs driven through holes in it into the ground. The water pressing against the upper side of the sheet bulges the middle portion downward and presses the margins against the bottom and sides of the ditch, so that the sheet effectually dams the ditch in a most simple and ready manner.

By this plan the labor of building and removing the earth dams is saved, the only things necessary to do in this case being to lay the device in the ditch and drive a few pegs through the lower end when damming the stream; and for



BIGELOW'S DAM FOR IRRIGATING-DITCHES.

taking up the dam all that is required is to take the bar in one hand and pull up the pegs by the sheet.

This invention has been patented by Mr. William H. Bigelow, of Worthington, Minnesota.

Active Seasons with Inventors.

To those who have never given special attention to the patent business—many of whom incline to the belief that most of the great inventions of the age have been rather the result of chance than of reflection, study, and experiment—the statement that there are special seasons when the inventive faculty of the country is invariably most prolific, is not readily accepted. But when we show that this is so, and that it is only a legitimate manifestation of the natural relations between cause and effect, we destroy the theory that most inventions are the result of accident.

The records of our Patent Office for many years past show that there is always a great increase in the number of applications for patents when winter sets in, and the long evenings, during weather not suitable for outdoor employment, give the best opportunities for mental application; if at this season there likewise happens to come an unpropitious period in trade and manufactures, when workshops are closed, or running on short hours, and the times generally are hard, the activity of inventors is yet more marked, establishing conclusively the fact that, according as opportunity is afforded, do those in whom the originating, inventive, and constructive faculties are prominent devote themselves to the working out of ideas theretofore but dimly conceived or imperfectly apprehended.

And there is yet another fact even more strikingly contradictory of the idea that the generality of inventions are accidental, and showing that the bulk of those for which patents are granted result from earnest seeking after something to supply an acknowledged want. Great fires are followed by patents for a crowd of new devices in fireproof construction, for the extinguishing of fires, and for the escape of the inmates of rapidly burning structures. Memorable railroad accidents likewise mark an era of activity in the introduction of improved brakes, couplings, automatic switches and signals, and the thousand other improvements which have so effectively contributed to the development of our railway system.

In fact, a great want in anything which seems possible of attainment through man's ingenuity needs only to be widely known to call out earnest efforts to supply that want from inventors in all sections of the country. This, indeed, merely bears out the old saying, that necessity is the mother of invention; but it is only through the beneficent operation of our patent system that thinking men everywhere are encouraged, as occasion seems to call, to help in the working out of valuable inventions.

WORK on the Montreal ice palace began about the first of the year. Its size will be 100 by 150 feet; cost, $3,000.

The Dwight Life Insurance Case.

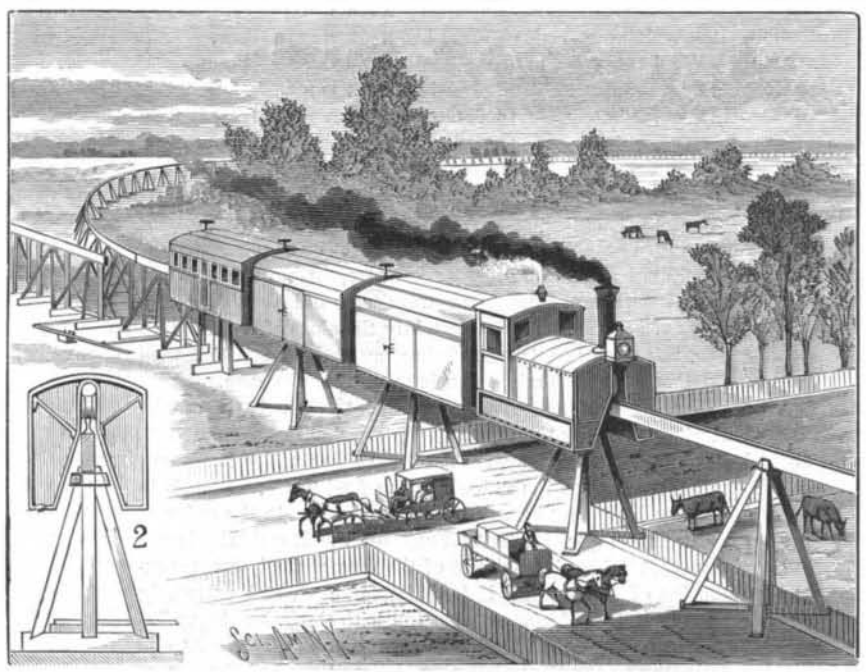
The expert testimony in the contest of the insurance companies to escape payment of the amount of the policies in this now famous case has not, thus far, been fully printed. Dr. Horatio C. Wood, a professor in the University of Pennsylvania, who was one of those experts on behalf of the life insurance companies, contributes to the *Medical News* a summary of the evidence. The professor says the experts were remarkably free from serious disagreement, that there was no evidence to show that overdoses of morphia had been given, and that no medical man ventured to assert that Col. Dwight died from other cause than strangulation. Col. Dwight's death occurred in November, 1878, at which time his life was insured for $256,000; only the first quarter's premium was ever paid on any of the policies, their annual maintenance would have cost over $8,000, the insured was at the time in bankruptcy, and the first premiums were paid with borrowed money. The most of the insurance companies have refused payment, claiming that Col. Dwight committed suicide; and although the courts have once given judgment against the companies, it is said they will appeal and further contest the case.

SINGLE RAIL ELEVATED RAILWAY AND TRAIN.

The rail may be the ordinary T-rail or a flat piece of iron or wood, and is fastened to a longitudinal string piece, which may be supported upon vertical posts rising from the ground at suitable distances. These supports may be placed on concrete bases or driven as pile supports. The girders are secured to the posts in any suitable way, and may be further strengthened by braces, which are placed in groups of four. The upper ends of the braces are cut away so as to form shoulders, affording a seat for the girder to rest upon. Two braces are brought together at the top and on each side, and are held in place by a band which passes around them and secured by a bolt. The lower ends extend diagonally outward, and are secured in plates attached to the posts. These braces are to be placed centrally between the posts, and prevent any lateral movement of the girder, as well as assisting to resist vertical strain.

The two sections to be used as a switch are adapted to move away from each other, so as to avoid moving one section to a great distance from the other, in order that the car can be switched. In this instance the supports and braces are placed on sills. Where the sections come together the sills are placed on grooved guide plates, curved sufficiently to allow the inner sills to move back and forth. The sections are secured to the supports about which they revolve by pivots or knuckle joints. On each section a horizontal bar is secured to the sills, and to which are pivoted the inner ends of two rods, the outer ends of which are pivoted to a lever that is centrally pivoted to a block. When the sections are in their normal positions the lever is parallel to the road, but when the levers are moved the sections move apart and afford room between them for the passage of a car.

The car is made in two sections, one on each side of the track, as shown in Fig. 2, the frame pieces being made of one piece of angle iron. The frame pieces extend above and below the rail. The body of the car is made in the usual way of tongued and grooved timber, the bottom resting on the bottom of the frames. The wheels have a double flange, and may be journaled in boxes secured to the upper or lower side of two beams placed in the upper bend of the frame.



SINGLE RAIL ELEVATED RAILWAY AND TRAIN.

The exterior sides of the frames are vertical, the interior being bent outwardly from the track. This throws the weight outward from the roadway and prevents the oscillation of the car. The greatest weight is brought below the rail, the strain comes upon the wheel and rail, and derailment is prevented. The engine will have a boiler and fire box on each side of the rail, and the driving mechanism can be placed at each side of the beams, or in any suitable position.

This invention has been patented by Mr. E. S. Watson, of Water Valley, Mississippi.

IMPROVED GATE.

The gate is of any ordinary construction. The lower end of the rear upright has a pivot formed upon it which works in a socket in a plate attached to the hinge post by a bolt. The upper end of the upright is made round, and has a tooth or projection formed upon its forward side, and is surrounded by a bar, the middle part of which is bent into circular form and has three recesses formed in its inner side, one recess being in line with, and the others at right angles to, the gateway. The recesses are designed to receive the tooth and hold the gate in place when closed, or when opened to either side. The circular bar is provided with a bolt by which it is held to the post.

To the inner side of the latch post is attached a plate having an angular slot formed in it, with a flange along its inner edge. The flange serves as a stop and guide to the end of the fastening bolt as the gate swings shut, the bolt entering a deep recess in the angle made by the slot. The ends of the bolt slide in bearings between the upright bars of the gate, and is held forward to engage with the catch plate by a spiral spring placed upon its rear part. To the middle part of the bolt is pivoted a bar whose lower end is pivoted to a bar in the gate. To its upper end, which projects above the gate, are fastened two ropes that pass around guide pulleys attached to the outer ends of two arms secured to the hinge post. The ropes cross each other at the rear of the post, and are kept in place and from contact with each other by guide pulleys. The ropes then pass over pulleys attached to the lower side of arms projecting from the upper ends of posts set in the ground at suitable distances from the hinge posts. Handles are secured to the free ends of the ropes.

HAMILTON'S IMPROVED GATE.

When either end of the rope is pulled the bolt is drawn away from the catch plate by the pivoted bar, the gate is raised, withdrawing the tooth from the forward recess and releasing the gate, so that the strain upon the rope will swing it open in a direction away from the operator. The gate is held open by the tooth, which drops into one of the side recesses. After the operator has passed through he pulls upon the other rope, when the gate swings back. The strain on the rope is continued until the gate is between the posts, when the latch is shot out by the spring and the gate drops so as to let the latch enter the slot.

This invention has been patented by Mr. William James Hamilton, of New Boston, Iowa.

Irrigating a Vineyard.

The vineyard of Governor Stanford at Vina, Cal., consists of 10,000 acres, planted in vines of different varieties. The irrigation of this vineyard is, perhaps, the most complete in the world. At regular intervals through the vineyard avenues are cut which are forty feet in width. Through these avenues are run irrigating ditches, with a driveway on each side. The blocks thus formed by the irrigating ditches are about fifty yards wide, but extend a great length and contain about one hundred acres each. In this way the system of irrigation is made complete, and all the land receives an equal proportion of water. Every two of these blocks are planted to a different variety of grapes. The main ditches run east and west across the field, and where the field is uneven intersecting ditches are made. In some cases it has been necessary to construct flumes to carry the water over lower lands. A flume 1,800 feet long has been built to carry water over the alfalfa fields.

Vaccination in India.

The total number of persons operated upon during the year was over 4,400,000. Generally speaking, the treatment appears to have been successful, the ratio ranging as high as 98·39 per cent.

The Chinch Bug.

In a late number of the SCIENTIFIC AMERICAN was a short article saying that the chinch bug had made its appearance in Eastern grain fields, and in such numbers as to excite alarm. The cause for alarm is well founded if the pest named has showed itself, for Western farmers have had but few enemies so destructive and difficult to contend with as the chinch bug. When it works at all, it works so rapidly and in such myriads that but little effective opposition can be made. Wheat is the grain which suffers first, as a general rule; but when the conditions are favorable to the pest, it is liable to extend its ravages to all other grains, not excepting corn. More than once have I seen a fair sized piece of corn wholly ruined by the chinch bug. In such cases the stalks to the height of a foot and a half, or more, would look as if they had been flooded with muddy water which had left its filth behind on retiring. All the sap channels of the stalk would be cut through, leaving the grain and beans to wither away in absolute worthlessness. The bug only thrives in dry, hot weather; a wet season is one in which it can do no harm. Any means which can keep the ground about the grain roots cool and damp operates to check its ravages. Many have saved their wheat by sowing clover with it. Salt is thought by some to have a good effect from its tendency to attract moisture. Barley and rye generally get out of the way before the weather is hot enough to bring out the bug in full force; the outcrop is so dense and moist as usually to escape unharmed. A thin crop of spring wheat on a lumpy soil is the bug's delight on a hot July or August day. The bugs winter among the refuse of fence corners, and decaying logs and brush, and find good conditions in a field well covered with stalks and lumps of earth. The clearing up of such refuse and the rolling of the ground so as to leave a smooth surface have a preventive effect. The location of a nest of bugs can often be determined by the whitened heads of the grain in a particular part of the field. It is a good plan to try at once and destroy the nest, which can usually be done by stamping and pounding the ground down hard. Fire has but little effect on the bugs, that is, such fire as burning straw over them would make; they are more afraid of water. Some of our farmers have protected their fields quite effectively from outside invasion by sowing Hungarian grass around the outer edge of the field, for about a rod in width. C.

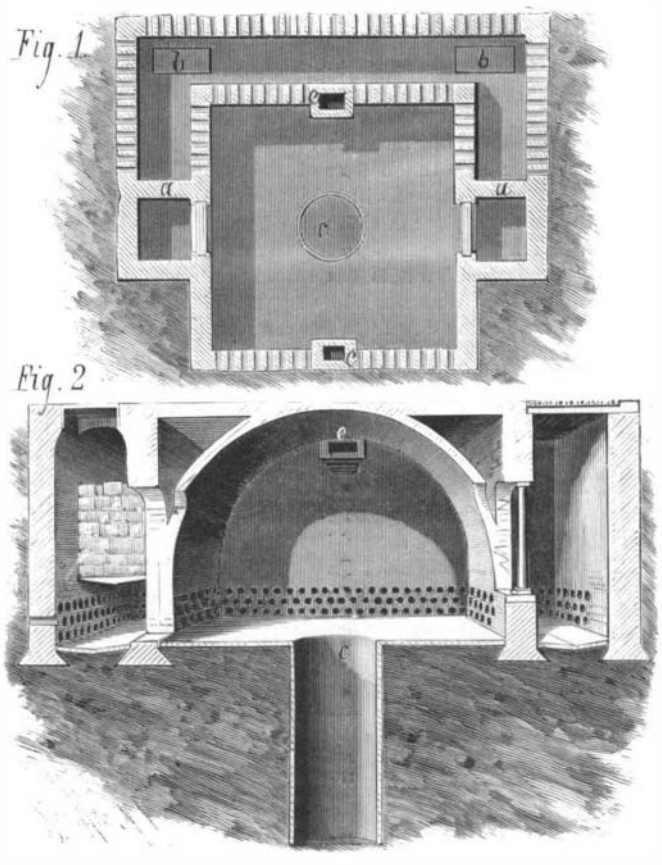
CONSTRUCTING, VENTILATING, AND COOLING CELLARS.

A current of cool air is caused to pass from the earth, stones, or gravel outside of the cellar walls through the cellar upward or outward into the open air. By means of tubes open at each end and extending through the walls, the air is obtained from the earth, where it naturally exists wherever the soil is porous, light, or sandy. The ends of the tubes toward the earth may bear either directly against the earth, so as to appear to be stopped up, or, as is preferable where the nature of the soil will admit, they may be inserted in holes bored in the earth a short distance, or, when that is not practicable, the earth may be removed from the immediate vicinity of the ends. By the last two methods there will be less danger of the tubes stopping up with earth and thereby lessening the draught of air thus obtained.

The filling of the tubes with porous soil will not destroy the draught of air, but may to some degree impede it. When the cellar walls are surrounded by a heavy clay soil, a well may be made outside of and adjoining the walls; this well should extend parallel with the wall, and may, if necessary, go entirely around the walls. The object of the shaft in clay soil is to afford a receptacle for sand, gravel, stones, or porous earth, from which the cool air is to come by means of the tubes through the cellar walls. Instead of tubes, openings of any sort may be made in the walls, but terra cotta tubes are preferable. The tubes may, if advisable, be inserted in the bottom of the cellar through the impacted earth of the floor down into the looser and more porous earth below.

This plan is also applicable to beer and other cellars where ice is used in hollow walls around the cellar to keep it cool. In such cellars the air is first taken from the earth in the manner described, and passed by tubes or openings into a vault or cell made cold by ice; then it is passed by another set of tubes into the interior of the main cellar, so that the air obtained from the earth is made cooler by being drawn through the ice cell. The ice rests upon a grating just above the currents of cool air. In beer cellars, where it is necessary to have an extraordinary amount of air and a rapid draught—greater than can be obtained from the earth, because it is not porous enough—a shaft is dug outside the ice cell and filled with coarse material. Tubes extend into the outside earth. Openings from the interior of the cellar to the external atmosphere are essential to produce a draught of air from the earth.

In the accompanying engraving Fig. 1 is a ground plan of a cellar, and Fig. 2 a view showing the interior. Along the bottom of the walls are shown the rows of tubes through which the air passes from the exterior; *b b* are trap doors; at *e* are openings leading to the outer air, and at *c* is an air well built in the center of the cellar floor. Just in front of the walls, *a*, are areas, and behind one wall is a mass of ice, shown in the left of Fig. 2.



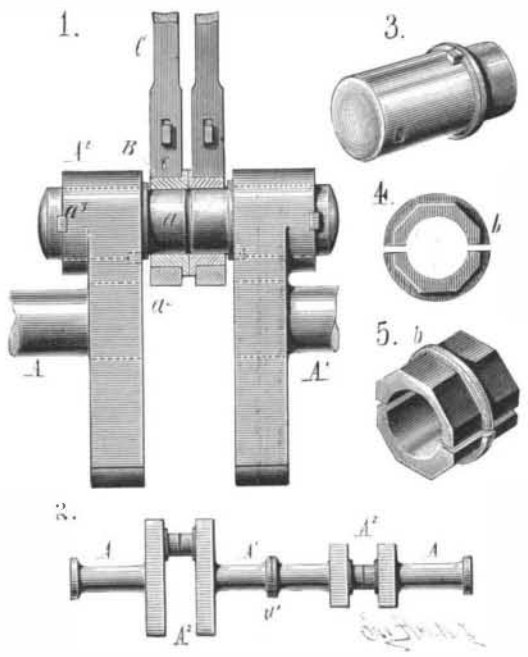
FRICK'S CELLARS.

This invention has been patented by Mr. Joseph K. Frick, of Evansville, Ind. For particulars address John Raum, Washington, D. C. (see Business and Personal column).

CRANK PIN FOR STEAM ENGINES.

Too frequently we hear of ocean steamers being disabled by reason of a broken crank pin, crank, or crank shaft, and during the time occupied in repairing the damage the safety of the vessel is endangered. The object of the invention illustrated by the accompanying engravings is to provide simple and effective means for obviating the liability to breakage of crank pins in the crank shafts of steam and other engines, and for facilitating and economizing repairs, especially in the case of marine engines, either at sea or in port.

The crank pin (Fig. 3 is a perspective view of one section of a divided crank pin) is either forged in or subsequently divided transversely in two separate sections, each of which



EDDOWES' CRANK PIN.

has a cylindrical bearing surface at one of its ends for a distance equal to about one-half the length of the bearing surface of an ordinary crank pin, and a body of proper diameter to fit within the eye of the crank arm, A^2. In order to stiffen the sections, a collar, a^2, which may either abut against the face of the crank or enter a recess, is formed upon each section of the pin between its bearing surface and body. The outer end of the bearing surface is curved at its periphery, so that when the two sections are brought into line a small circumferential groove will be formed, which serves to give proper clearance to the brasses and also retain the lubricating substance.

The crank pins may be secured to the arms by being shrunk in in the ordinary way, but for greater facility of insertion and removal the inventor prefers to effect the connection as follows: The eyes of the cranks are bored out with a very slight taper, and the body of the pin is correspondingly turned so as to insure a good, snug, and moderately hard driving fit entirely through. A feather (shown in Fig. 3), formed upon the body of the pin at the face of the crank arm next the bearing surface, fits into a recess in the arm, serving to resist turning or twisting strain upon the pin. To further secure the pin, a key, a^3, is passed through a transverse slot in the body of the pin, the key fitting at its ends in keyways in the face of the crank eye. The key is carefully and snugly fitted, and should have a very slight draught to keep it safely in place. It may also have an adjustable keeper, secured by a top bolt and jam nut in the usual manner.

The crank pin box, of which Fig. 4 is an end view and Fig. 5 a perspective, is divided longitudinally into halves, each one of which may be in a single piece or be divided transversely into two sections, each fitting the bearing surface of one section of the pin, as in Fig. 1. In either case, to afford additional strength to the brass, a collar is formed upon each of its halves, extending around the periphery of the brass exterior to the plane of contact of the abutting ends of the crank pin sections. The collar may be accommodated either by forking the end of the connecting rod or by dividing the rod longitudinally into two parts, as in Fig. 1, each portion being fitted with a separate stub end to embrace the brasses of the adjacent crank pin section, and being coupled at its opposite ends to the cross head. In such case a slight degree of circumferential movement will be permitted between the two crank pin sections, thereby tending to relieve the box from strains induced by variations in the alignment of the crank shaft sections to which the arms are respectively attached. Fig. 2 is a side view, in elevation, of a crank shaft embodying this device, and Fig. 1 is a similar view, showing a pair of crank arms with the crank pin box in position and illustrating the method of securing the crank pin sections by keys and feathers.

In addition to the advantages already enumerated, this method admits of any desired section of the crank shaft being easily and quickly raised whenever desired, to afford access to the bottom brasses of the main journals, and enables a section of a shaft to be readily removed, if broken, and replaced by a spare section without disturbing the remaining portions of the shaft.

Further information regarding this invention may be obtained from the patentee, Mr. A. K. Eddowes, whose address is care Agent Pacific Mail S. S. Company, San Francisco, Cal., or from Mr. J. Snowden Bell, Pittsburg, Penn.

American Gems and Precious Stones.

Mr. George F. Kunz has contributed to "The Mineral Resources of the United States," published by the Government, an article on American gems and precious stones, of which separate copies have been printed. Mr. Kunz has for some years been connected with Messrs. Tiffany & Co., the well known jewelers of New York city, and has had an excellent opportunity for collecting facts concerning American gems.

He states that systematic mining for gems and precious stones is being carried on at only two places in the United States, viz., Paris, Maine, and Stony Point, North Carolina. In other cases where gems are found they are either met with accidentally, or occur in connection with other materials that are being mined or in small veins which are only occasionally met with. They are often gathered with little system on the surface, as is the case with the sapphire, garnet, and olivine found in Montana and New Mexico; or from the beds of streams and decomposing rock, as the moss agate from Colorado; or on beaches, as the agate, chlorastrolite, and thomsonite from Lake Superior.

Some eighty-eight different minerals occur in the United States which have been used as gems. Twelve of these occur in the United States only.

Diamonds are not mined in this country, although they have occasionally been found at a number of localities. A large diamond was found at Manchester, opposite Richmond, Va., by a laborer employed in grading one of the streets. It was an octahedron, and weighed, after it was cut, over ten carats. It was worth $5,000 before cutting. The principal localities for sapphires and rubies are in New Mexico, Arizona, and Southern Colorado, where they occur in the sand, often on ant hills. Garnets occur in the same region, about $5,000 worth of cut stones being annually produced. It is estimated that the value of the tourmalines taken from Mt. Mica, Maine, is between $50,000 and $65,000. Tourmaline and hiddenite are being regularly mined at Stony Point, N. C., some $7,500 worth having already been sold. Rock crystal is gathered and cut in large quantities, the sales at different localities probably amounting to $40,000 annually. Much of it is cut for jewelry, as "Lake George" or "Cape May" "diamonds." The clear crystal for optical purposes is almost entirely Brazilian, as the good material found here rarely reaches the proper channels. Although agates are abundant here, nearly all the polished specimens sold in America have been polished in Germany, having originally come from Brazil and Uruguay. Moss agates, however, are collected here in large quantities, although the cutting is done abroad. The sunstone and moonstone, from Pennsylvania and Virginia, is of good quality, although as yet used but little. The American turquoise is of much interest, but is not much used by jewelers. It is frequently blue when found, but soon turns green on exposure. Jet occurs in Colorado and Texas, and will probably soon be utilized in the arts. The bowenite of Rhode Island and the williamsite of Pennsylvania are used as a substitute for jade.