PEAT FUEL.

The difficulties in utilizing peat as fuel have been very widely discussed, but the operations at La Pigéonnière, Canada, have, by ten years' practical operation, proved the practicability of converting the substance into a clean and cheap fuel, the supply of material for which is, in many localities, practically unlimited.

The Irish peat, the formation of which is due to the moist atmosphere, when cut and dried in the air, is ready for use in furnaces, etc.; and the considerable formations in Somer setshire, England, and in the valley of the Somme, in France, are utilized in a similar manner. In Canada and this country, where the atmosphere is drier, a supply of surface water is required to produce the substance. It is fibrous in texture, and somewhat red in color; in drying, it loses 40 per cent of its bulk and about 90 per cent of its weight. Thus 10 tuns of the material must be dug out to obtain one tun of fuel; and its economical working is, therefore, a point of great importance. When dry, its heating capacity is about three fifths that of coal.

To render its combustion practicable, it must be pulped and disintegrated before drying, otherwise it is too loose in condition to form a good fuel. The pulping operation destroys a certain hygroscopic character that the dried raw peat assumes, and causes it to resist moisture and to be indestructible by frost.

Mr. James Hodges, C. E., is the engineer of the La Pigéonnière operations, and the process is described as follows: A center level line is traced out, and for ten feet on each side of it the surface is cleared of vegetation, the *débris* being piled up on each side to form two banks 20 feet apart. This arrangement is the preliminary work for a canal, and at one end of it a kind of dock is formed, for launching the apparatus shown in our first engraving. It being ascertained that the peat bog contains sufficient water to flow in behind the machine and fill the excavation, the cutting vessel is started. It consists of a boat of 80 feet length, 16 feet beam, and 5 feet depth, with two screws, of 11 feet diameter, in front, fitted with cutting blades and driven by an engine in the stern of the vessel. The blades cut their way through the bog; and as the water flows in as fast as the peat is taken out, the vessel moves forward, generally at the rate of about 15 feet per hour. Two men are required to clear the peat from pieces of wood, roots of trees, etc. When cut, the peat is lifted by an elevator and discharged into a hopper, and thence passes into a pulping apparatus, and flows off by a distributing trough. The two men occasionally add water to keep the pulp of a proper consistence, but no other hand labor is required. The distributing trough lies at right angles to the length of the boat, and may be lengthened to deposit the material at the required spot. The peat is left on the ground to dry, to the depth of about 9 inches; and when consolidated, it is ready for cutting into blocks. This is done with curved knives, placed 6 inches apart and mounted on a frame, and worked by two men. In a fortnight of favorable weather, the blocks are ready for stacking, which a gang of a man and three boys can perform at the rate of 4,000 blocks a day. They required to be turned and restacked to insure thorough dryness. Our second illustration shows this process.

Mr. Hodges states that, in 10 hours, from 800 to 400 tuns of peat can be excavated by this machine. This will yield about 50 tuns of dried fuel, and will leave a canal 150 feet long, 19 feet wide, and 5½ feet deep, in the peat bed. For this quantity, an average of 38 men for the day of 10 hours will be required. Fuel thus made has been burned in the locomotives of the Grand Trunk of Canada Railway, with a saving, it is said, of 45 per cent of the expense of coal, and a rather larger economy over that of wood.

The engravings were originally published in *Engineering*.

Wave Motion.

Mr. Deverell, of England has devised an apparatus by which the movement of a ship at sea is registered. From the results of a recent voyage, Mr. Deverell deduced the following: The duration of the voyage was 2,026 hours. During that time the ship made 1,764,088 beam oscillations or rolls, and 1,041,137 fore-and-aft oscillations or pitches. The average number of oscillations in both directions per minute was 14. The aggregate arc of pendulum registering beam movements was over 15,000,000 degrees, while that of the fore-and-aft movements was nearly 5,000,000 degrees." Mr. Deverell also considered that he had definitely established from these observations the following propositions: 1. That between ocean limits, the swell of the ocean is unceasing. 2. That the motion of an independent body within a ship on the ocean is unceasing. Here then was represented an immense amount of conservable energy, and the question remained: Could a practicable method be found for conserving it for use on board ship? Mr. Deverell believed that it could, and to a auxiliary extent to be useful in auxiliary propulsion. He expects to be in a position in a few months to detail his method of putting his propositions into practice.

The Bicycle.

A remarkable instance of what can be done with the bicycle was recently exemplified in England. A match had been made between Mr. Stanton and Keen, the champion rider, to run 106 miles, the former to receive a start of half an hour. Stanton's machine had a driving wheel of 58 inches in diameter, that of Keen's being 4 inches less. Keen accomplished 50 miles in the extraordinary time of 3 hours 14 minutes 18 seconds, but was compelled to retire in the 91st mile, leaving Stanton to finish the 106 miles alone, which he did in 1 minute 5½ seconds less than 8 hours—an average of over 13 miles an hour, inclusive of a few short stoppages for refreshments, etc.

ASTRONOMICAL NOTES.

OBSERVATORY OF VASSAR COLLEGE.

For the computations of the following notes (which are approximate only) and for most of the observations, I am indebted to students. M.M.

Positions of Planets for December, 1874.

Mercury.

Mercury should be looked for in the morning. On the 1st of December, it rises at 5h. 22m. A.M., and sets at 3h. 32m. P.M. At this time it is well situated. On the 31st, it is not as easily seen, as it rises at 6h. 59m. A.M., and sets at 3h. 51m. P.M.

Venus.

Venus rises on the 1st of December at 8h. 17m. A. M., and sets at 5h. 3m. P.M.

On the 8th of December, Venus makes a transit across the sun's disk, affording an opportunity to astronomers to determine, by the best methods now known, the distance of the sun from the earth. To observe this phenomenon, expeditions have been sent to northern and southern stations by the United States, Great Britain, Russia, and other countries.

The transits of Venus which have been observed occurred in 1639, 1761, and 1769. The next after this of 1874 will be in 1882, and will be visible in this country. The transit of 1769 was observed in this country, and a curious pamphlet describing it was published at that time in Providence, R. I. The writer says: "The transit of 1761 was observed at St. John's, in Newfoundland, by John Winthrop, at the expence of the Massachusetts colony."

"To observe the transit of Venus in 1769, several observators were sent into the South Seas by the Royal Society in London; the Empress of Russia sent several companies into those parts of her empire where the visible duration was of the greatest length, and the King of France did likewise send observers into foreign parts."

On Dec. 31st, Venus rises at 4b. 59m A.M., and sets at 2h. 49m. P.M.

Mars.

Mars is not well situated for observers. It rises at 2b. 46m. A.M., and sets at 2b. 4m. P.M. on the 1st of December. On the 31st, it rises at 2h. 20m. A.M., and sets at 0h. 50m. P.M.

Jupiter.

Jupiter is also unfavorably situated for observations, rising on the 1st at 3h. 18m. in the morning, and setting at 2h. 20m. P.M. On the 31st, Jupiter rises at 1h. 43m. A.M., and sets at 0h. 33m. P.M.

Saturn.

Saturn is not as well situated as it has been through the summer. It comes to the meridian before dusk, and sets on the 1st at 8h. 57m. in the evening. On the 31st, it rises at 9h. 28m. A.M., and sets at 7h. 14m. P.M., so that it is scarcely possible to get a good view.

Uranus.

Uranus can sometimes be seen with the eye; and as it rises on the evening of the 1st, among the small stars of *Cancer*, at 9h. 24m., it could perhaps be seen at midnight. It rises on the 31st at 7h. 23m. P.M., and passes the meridian at about 2h. 30m. in the morning, at which time it has an altitude, in this latitude, of nearly 59°.

Neptune.

Neptune rises at 2h. 32m. P.M. on the 1st, and sets at 3h. 38m. the next morning. On the 31st, Neptune rises at 34m. after noon, and sets at 1h. 39m. the next morning.

Sun Spots.

The record is from Oct. 20 to Nov. 14, inclusive. The photograph of the 20th shows the three large spots of the 19th, with another of good size, very near the center, which was not seen on the 19th. The 21st was not clear; and on the 22d, this spot had disappeared, together with the most westerly of the other three. On the 23d, the two remaining spots were seen, the more westerly having perceptibly decreased in size, and on the 24th it had disappeared without reaching the edge. From the 26th to the 29th inclusive, the spots were few and very minute, the faculæ being very marked on the 27th. On the 30th, a large spot appeared on the eastern edge of the sun's disk, which proved to be the precursor of a fine group. Photographic pictures of Oct. 31st and Nov. 2d show two large, well-defined spots. Owing to clouds and fog, no pictures were taken from Nov. 2d to Nov. 10th; but the group was watched with a small telescope, and the two large spots were seen to divide into several smaller ones, the picture of Nov. 10th showing a group of six small spots within the western limb. On the 11th, the group was near the edge of the disk, and on the 12th it had disappeared, and the sun's axial motion had brought a small spot into view within the eastern limb. On the 14th, three groups of very small spots were seen within the eastern limb, and nearly in a line with the sun's equator.

IN describing a recent balloon ascent to the French Academy, M. Tissandier mentions having entered a bank of gray clouds at a hight of only 485 feet, this being lower than in any previous ascent. At one time, curiously, while the ground was completely hid from the voyagers, they ascertained, from the voices they heard, that they were distinctly seen from the ground. The clouds were transparent from below upwards, opaque from above downwards. M. de Fonvielle took spectroscopic observations of the sun at various hights, from 4,850 to 3,250 feet. The blue was observed to invade the space occupied by the indigo and violet rays, while the red was much the same as on the ground. On nearing the upper surface of the clouds again, the violet and indigo resumed their former extent.

Correspondence.

ENTOMOLOGICAL NOTES.

To the Editor of the Scientific American:

I send you a few notes on entomological paragraphs which have lately appeared in the columns of your journal.

BEECH BLIGHT.

Under this head, you published several communications last spring, one of which, from Mr. Jacob Stauffer, of Lancaster, Pa., contained the following words: "It would seem that this blight is not so very new after all. Westwood figures the larva of the *psylla betulæ*." * * "I would simply add that neither from Mr. Riley, Mr. Walsh, nor Mr. Harris could I learn anything further about the species, or if it were ever before noticed."

The insect is not the *psylla* referred to, and does not belong to the flea lice (*psylludæ*), but to the plant lice (*aphidæ*). It was briefly described by Dr. Asa Fitch, in 1851, under the name of *eriosoma imbricator*, though it in reality belongs to the genus *pemphigus*. I have referred to it in the *American Entomologist*, vol. I., p. 58.

VESICATORY POTATO BUGS.

The Colorado potato beetle possesses no vesicatory properties; but the so-called old-fashioned potato beetles, belonging to the very same family as the Spanish fly (*cantharis vesicatoria*) all possess it in a high degree, and the fact was known and made use of not only nineteen years ago, but half a century ago. Kirby and Spence, in their invaluable "Introduction to Entomology," speak of these insects being used in place of the green European species, and Harris and most subsequent authors who treat of the *lyttæ* refer to the fact. Some years ago I caused large quantities of the striped blister beetle (*lytta vittata*) to be collected and properly dried, and from them Mallinckrodt Brothers, of this city, made an excellent cerate, which has been used with satisfaction by our local physicians. I would also state to Mr. E. S. Wicklin that these blister beetles have not become great strangers. *Lytta vittata* may be got in almost any year, by the cartload in this latitude, and they often ruin a potato field in a few days; while *cinerea*, *marginata*, and *atrata* frequently swarm on particular plants. The European *vesicatoria* abounds most on ash trees, and is collected principally from these trees, and with far more labor than is required to collect the *vittata* in this country. But such is the force of habit and the difficulty of diverting the course that trade has once taken, that our pharmaceutists still send to Southern Europe for their cantharides. But I presume they make as much profit on the one as they would on the other, and there is no particular inducement for them to encourage home industry.

THE PHYLLOXERA PREMIUM.

An item in one of your late numbers makes mention of the fact that one of your correspondents has discovered that the liberal use of cow dung is a sure cure for the phylloxera on vines, and—whether jokingly or not, I cannot pretend to say—calls upon the French Government to remit the amount of the reward, in case the proposed remedy prove effectual. It is a pity that your correspondent is so modest as to keep back his name, and a still greater pity, for him, that cow manure and cow urine were among the earliest supposed remedies thoroughly tried in France. The fact that he will not be able to prove priority of suggestion is all the more to be deplored, for the reward for a remedy has been increased from sixty thousand to three hundred thousand dollars. Cow manure is an excellent invigorator of the vine, and its use, as that of all other invigorators, is beneficial in counterworking the effects of phylloxera, but it is no *sure* remedy for the disease. CHARLES V. RILEY.

St. Louis, Mo.

What Temperature Kills?

To the Editor of the Scientific American:

I notice in your issue of November 7, 1874, an editorial article entitled: "What Temperature Kills?" In the third paragraph you say that "not one seed germinated after exposure to boiling water." I wish to state that the seed of the common locust tree will not only stand the temperature of boiling water, but will always fail to grow unless boiled for 8 to 10 minutes.

My father planted about 15,000 seeds of the common locust on four acres of land, and only about 50 seeds germinated. We now boil them for 10 minutes, or place them in cold water and allow it to come to a boil, and remove them three minutes afterwards. These seeds will grow finely after a large brush pile has been burned over them.

These are facts, occurring every year, to my personal knowledge. HIRAM VAN METER.

Macomb, Ill.

The Crystallization of Carbon.

To the Editor of the Scientific American:

I would like to add my testimony to what you have already published to the world on the crystalization of carbon, especially as at last we seem to be on the high road to success.

Twenty years ago, while conducting experiments for another purpose, I was accidentally led to the conclusion that the diamond is a crystal of slow growth, from carbon, first reduced either to a liquid or gaseous state. I inferred this, partly, from the growth of large crystals of other substances, whose full size was not attained in less than from five to eight years time. This theory is less complex than that of Mr. Thiese, of Rochester, and it consists in confining carbonic acid gas in a large strong receiver, and in submitting it to a moderate heat and great pressure for a considerable length of time. The oxygen would probably be first thrown down to form ozone; other constituents and spurious carbon would follow, forming a mass at the bottom, upon which the crystalization of pure carbon would take place in due time.

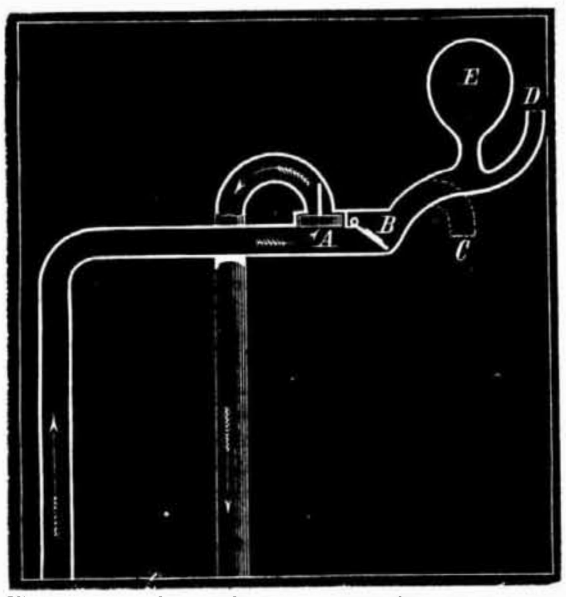
I would suggest the construction of several large and stout glass vessels for the purpose, so that different combinations of chemicals may be submitted to trial, and the result noted from day to day. CHARLES THOMPSON.

St. Albans, Vt.

A Siphon Water Ram.

To the Editor of the Scientific American:

I wish to call attention to an improved siphon hydraulic ram, which, I believe, will elevate water to the hight of thirty feet with considerable less fall than the ordinary ram requires for that elevation.



The engraving herewith given will explain its operation, the arrows indicating the course of the water through the siphon. A is the check valve, and B the outlet valve. Water may be discharged at C, or be carried up by the tube, D, in which case the air chamber, E, will be required.

Gilman, Ill. B. FRESE.

A Flying Machine.

To the Editor of the Scientific American:

Cannot we arouse a little more spirit and inquiry regarding the subject of a practical flying machine, and keep the ball rolling until the aim is accomplished? What think you of this contrivance? (See accompanying illustration.) As here represented, the fireless steam engine is assumed to be used, but the object is rather to show a good arrangement for other parts, aside from the motor.

The horizontal driving shaft passes through the frame of the car, and is made to revolve by means of its cranks, worked by rods from the oscillating cylinders below. At each end of this shaft are beveled gears which actuate the vertical wing shafts, and so rotate the spiral fans.

The arms which support the wing spindles are disconnected at the center of the car (under the canopy) and so arranged upon the car frame that, by means of handles, they are easily and quickly made to revolve, partially and independently above the shaft, so that the gearing may always be in action. The object is to incline the wing shafts, for the purposes of propelling the machine forward or backward, or of turning it around when desired.

By this mode of gearing, the two fan wings always revolve in contrary directions to each other, and each has the same number of revolutions. They are also of the same form and size. When both wing shafts are vertical, the car moves upward; when both are slightly inclined in one and the same direction, the car will not only rise, but also move forward; and a contrary inclination of both wings stops the forward motion. A certain velocity of the wings, when the shafts are vertical or nearly so, as before said, causes the car to rise; a less velocity balances it in the air, neither rising nor falling, and still less allows it to descend gently.

The form of the car can be varied to suit the fancy, and it can be made to carry two or more persons. The legs are supposed to be hinged to the body, and to have stout india rubber straps attached across them, to act like springs, breaking the jar when the machine alights. Should the wings cease to revolve, they will act, with the canopy of the car, as parachutes to break the fall. Indeed, a regular parachute can be made to rise and open above the canopy, and flaps may be placed on the sides of the car, if desired.

The most effective inclination or angle for the blades appears to be about 33° from a horizontal line. The wings need not be very large. When intended to carry the machine and only one man, ten feet diameter for each wing appears to be quite sufficient.

PROPOSED FLYING MACHINE.

We must not mistake the buoyant power of still air for its capabilities under the quick stroke of a wing. This effect of rapid motion in the wing is well illustrated in birds. A wild duck of quick motion flies with only one square inch of wing to each ounce of its weight; a turkey with only three fourths, robins with four, tame pigeons with three and three quarters, bats twenty, and butterflies from twenty to fifty; and we find generally that large and heavy birds have much less wing space, proportionally, than the smaller ones.

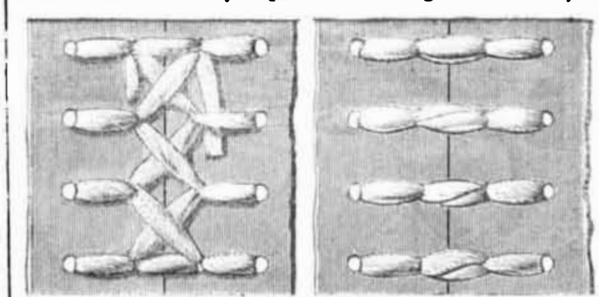
In this machine every desired evolution appears to be provided for. Now what motor shall we use? The whole machine, with all its appliances, can probably be made within a weight of 150 lbs., and at a cost less than that of a good horse. W. D. G.

New York city.

Lacing Belts.

To the Editor of the Scientific American:

Permit me, through your valuable columns, to give your readers my experience in lacing a belt: Place the ends of the belt together, punch holes as for lacing in the usual way; then punch another row of holes directly behind them, from one to one and a half inches away, and not as large as the ones nearest to the end. Cut a lacing eight times as long as the belt is wide, or the lace may be spliced as soon as one is used up. Commence lacing from the inside of the belt; put the lace through the holes nearest the end and in opposite ends of the belt, beginning at one edge, and draw the lace through, until the ends of the belt are drawn together and the lace is of equal length on the outside of the belt. Pass the ends across, put them down in the contrary way from what they were before, and bring them up through the same holes that you put them through first; then you



have the laces on the outside of the belt. Put the ends of each lace down through the holes directly behind them; but do not draw them down snug until after you put it up through the same hole as before from that side, and draw it all tight. Now we have one set of holes finished, and the lace is on the outside of the belt. Cross the ends, and pass down the first row of holes, and repeat as at first, and the lacing will be exactly similar, with the exception that there will be but two thicknesses of lacing in the place of three, as at the first; for it is most essential to have the edges of the belt laced firmly, lest your belt should run crooked over the pulleys. This way of lacing I have learned from fifteen years' experience, and I freely give it to your readers, for I have received far more valuable information from correspondents of your paper, which I would not be without for anything. CLARENCE MCCOY.

Antioch, Cal.

[Our readers will not fail to see that there is a great advantage in having the lacing on the side next the pulley running lengthwise of the belt, as this method gives less friction on the pulley.—EDS.]

New Galvanic Batteries.

To the Editor of the Scientific American:

In addition to the facts in my communication, published on page 277 of your current volume, I wish now to inform you that I have succeeded in making Daniell's and Bunsen's batteries constant and inodorous, by using glycerin instead of water. Thus, in Daniell's battery I put glycerin with sulphuric acid in the copper, and glycerin with sal ammoniac or sulphuric acid in the zinc.

In Bunsen's battery, I use glycerin and sulphuric acid around the zinc, and glycerin and nitric acid around the carbon. I therefore call this latter battery the nitro-glycerin battery. In this battery I use carbon taken from the bottom of a gas retort, cut into convenient slabs, which I find to be better than artificial carbon. I tried cast iron in this battery, but the result was that the iron oxydized very rapidly and covered the zinc. I found also that it is not necessary in using glycerin to amalgamate the zinc.

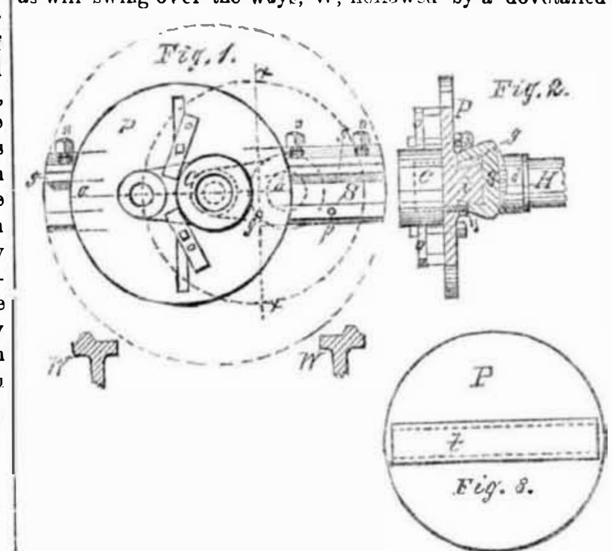
I thus caused the most powerful batteries to be constant.

Milwaukee, Wis. L. BURSTALL.

A Sliding Face Plate.

To the Editor of the Scientific American:

Mr. Rose's recent article on boring the crank calls to mind a sliding faceplate, of which I send a sketch. Fig. 1 is a front view; Fig. 2, a side and sectional view; Fig. 3, back of faceplate, showing dovetail bar, *t*. S is a slide, as long as will swing over the ways, W, hollowed by a dovetailed



longitudinal groove, and provided with a hub, *d*, at the middle, which screws on the spindle, H. P is a faceplate with a bar, *t*, extending nearly across the back, fitted to the slide, S, along which it may be moved. *g* is a bar held against *t*, by screws, *s*, at any desired pressure. C is a crank, strapped to the faceplate, and the latter is moved to a position for boring the main hub; the dotted lines (Fig. 1) show the position for boring the smaller hub. Both hubs are bored and faced at a single chucking; and if the workman is careful not to spring the piece in clamping, the work will be positively in line. It is of no consequence whether the faceplate is crowning or dishing, or whether the slide is square with the spindle; the work will be true. By using a dowel pin, at *y*, and alternately at *p*, cranks may be bored to have exactly the same throw. Eccentrics can be accurately bored and turned at a single chucking.

Its general use will be readily understood by mechanics. All holes bored will be on the line, *a b*, and work must be bedded accordingly.

E. B. WHITMORE.

Rochester, N. Y.

Curious Apples.

To the Editor of the Scientific American:

The curious apple described in your issue of November 21 is simply the effect of abnormal growth, one portion of the fruit developing and ripening sooner than the other. The sweet and sour portions show the contrast between ripe and unripe fruit. By keeping a specimen a sufficient time, this fact will appear. The suture between the parts is also produced by one part having an earlier and larger development. Splitting a bud could not produce the effect. Even if it could be made to grow, it would only produce on each side a limb bearing fruit according to its kind. Trees of the greening apple are sometimes subject to this unnatural growth of the fruit, and the contrast between the ripe and unripe parts is of course strongly marked.

FLETCHER WILLIAMS.

Newark, N. Y.

Drawing as an Educator.

In referring to the usefulness of the art of drawing, in education, the *Illustrated London News* says: "The school board have taken an important and, we think, very wise step by resolving to introduce the elementary teaching of drawing into the schools. The teaching of drawing confers, as it were, a new sense; it develops perceptions which reading and other branches of education can never reach. To say nothing of the increased pleasure it affords through life, so long as the power of sight endures, it trains precisely those faculties which are most regarded in nearly all mechanical occupations, and it forms, therefore, the basis of most technical education. There are few mechanics who would not be benefited in their work by a knowledge of drawing; while here and there the proposed teaching may stimulate genius that might otherwise remain dormant. The system of teaching adopted in the German *kindergarten* has been recommended and the suggestion deserves consideration."