Decay of Stone.

The dissolving power of atmospheric moisture seems to depend greatly upon the quantity of free carbonic acid gas it holds in solution; and though this quantity in any given volume of water be extremely minute, in course of time every substance which has an affinity for it will yield more or less to its action. The silicates of potash and soda, for instance, which are present in the igneous rocks—or, to dwell especially on the class of materials under our notice, in the Devonshire granites—are easily decomposed when rain water falls upon them, and, the feldspar being removed mechanically by any of the countless actions of nature, it leaves the other ingredients of the material exposed to the mechanical disintegration of changes of temperature. The simple carbonates of lime, again, sometimes absorb carbonic acid with much avidity, and pass into the state of the soluble bicarbonates; and thus, in proportion as the original face of the stone is removed, does the lower surface become exposed to the action of the rain. The rain water of such a town as London not only does contain large quantities of free carbonic acid, but it also contains sulphuric acid and ammonia, which are capable of exercising a very deleterious influence upon the carbonates of lime. In discussing, however, the effects of these agents upon building stones, it is essential to bear in mind the fact that the mechanical state of the elements of those materials greatly modifies their resistance. Those which are of a crystalline character do not yield so readily as those which are amorphous, and the crystallization produced by volcanic or plutonic influence appears to be even more permanent than that which takes place in the ordinary way. It follows from these considerations that the stones of an irregular, confused, earthy texture, which are able to absorb considerable quantities of moisture, and which contain silica in a soluble form, or the carbonate of lime, should never be employed in positions where rain water could lodge upon them, beat against them, or be taken up from external sources by capillary or other action. In positions exposed to any of the above dangers, none but non-absorbent and decidedly crystalline materials should be used, and as those qualities are almost exclusively possessed by dense stones, it may be considered that the mere specific gravity of a stone is a *prima facie* indication of its constructive value. But atmospheric moisture when absorbed into building stones acts upon them quite as much through the changes in its own volume, in passing from the liquid to the solid state at the time of frost, as it does by the chemical dissolution it produces. If the stone should be placed in such a manner as that water should accumulate in any perceptible quantities between its various layers, and if the position of those layers be such that the expansion of the water in freezing cannot take place freely, the respective layers containing the water will be violently detached from one another.

Now all stones, even the crystalline limestones and slates, have certain planes or directions of cleavage or of stratification, along which water flows more readily than in any other course. If the stones be placed in a building with those planes in a direction likely to retain rain falling upon, or absorbed through, the surface (which is the case when stones are placed "bed to weather"), disintegration must ensue unless the edges of the beds be left free, and even in that case there is danger of frost detaching one layer from another.—*G. R. Burnell, in the Architect.*

Torpedoes and Torpedo Boats.

Mr. Edward C. Peck has submitted to the English Government a proposal for a torpedo to be propelled by steam obtained from the boiler of a torpedo boat through a superheater. The outside skin of a torpedo is utilized as a surface condenser. It is claimed that such a torpedo, 14 ft. by 14 ft., and with an explosive charge of 100 pounds of gun-cotton, would weigh only about one-half of those in use, and would have a speed of over 30 knots and a range of about 2,500 yards. The cost would be reduced nearly one-half. M. Lisbonne, who was recently Director of Naval Constructions in France, has published in the *Genie Civil* a table of English, French, German, Italian, and Russian torpedo boats of all sorts and descriptions:

England.....	boats,	156;	tonnage,	23,912;	cost,	$7,317,000
France.....	"	143;	"	20,450;	"	6,267,400
Germany.....	"	156;	"	14,597;	"	4,467,600
Russia.....	"	115;	"	5,104:	"	1,560,600
Italy.....	"	89;	"	7,966;	"	2,437,600

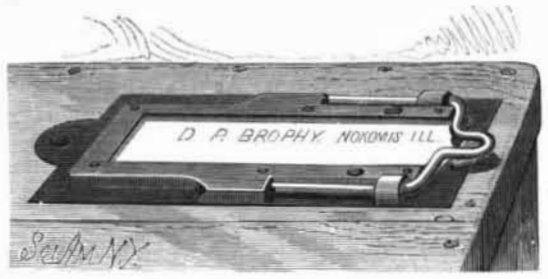
According to M. Lisbonne, where France is most behind England is in torpedo boats of a large size, of from 38 to 45 meters in length.

It is stated that the Italian Government has ordered from the firm of Schwartzkopf torpedoes to the value of 6,000,000 marks.

THE great value of isochromatic plates in micro-photography has been demonstrated by Dr. Crookshank, who exhibited to the Royal Microscopical Society of London micro-photographs of bacteria obtained without staining the objects with aniline, as in Koch's process, and he has still more recently exhibited a photograph showing the flagella of a vibrio.

IMPROVED LABEL HOLDER.

The case of this simple and efficient label holder consists of an inner plate and a somewhat smaller outer plate, which are riveted together. The inner plate is made solid, and is provided with holes through which screws or nails may be driven, to attach the holder to a trunk or other receptacle for holding goods of any kind. The outer plate is a narrow U-shaped strip formed all around its inner margin with



BROPHY'S IMPROVED LABEL HOLDER.

a rabbet to receive the label, which extends a little beyond the other end of the plate. A spring is connected at the opposite extremities of its side arms to the case. The arms extend forward to the ends of the outer plate, where they join the cross bar of the spring. The center of the bar is bent to form a loop, to the under side of which is fixed a lug formed with a square inner shoulder, which normally stands in front of the outer end of the label, while the cross bar of the spring presses down on top of the label, which is thus held securely in the case. Loops fixed to the case hold the spring in proper position edgewise of the case, and also limit the upward movement of the spring when it is lifted away from the face of the label. To place a label in the case, it is only necessary to slip the end of the label between the raised latch lug and the inner plate, and then push it inward until the lug springs down behind its outer end.

This invention has been patented by Mr. Dennis P. Brophy, of Nokomis, Ill.

THE MULTUM-IN-PARVO IRON.

The sadiron herewith illustrated is the invention of Mr. H. S. Pease, of Peoria, Ill. It is a miniature stove, with polished surface, and is used in the same manner, and is as convenient, as the common flatiron. Upon the under side of the handle, which is detachable, is a curved fluting iron, corresponding with a fluted piece fixed to the side of the main iron, as shown in the right hand view. The iron is heated with charcoal, but live coals from a common wood fire are equal to the very best charcoal, if made of good, solid wood. This iron does the work of an entire set of ordinary irons, as the heat can be so regulated, by means of the dampers at the heel, as to keep the iron at a uniform temperature. As the iron does not come in contact with a range, it is always clean and nicely nickel plated. The many advantages to be derived from a fluting, polishing, and smoothing iron which is self-heating and extremely simple in construction are apparent.

IMPROVED PLOW.

The plow here illustrated is the invention of Mr. John Babcock, of Walton, N. Y. It is especially adapted for penetrating and breaking hard earth. The standard and beam are cast in one piece, and attached to the former are the handles and point. The point is a plate of steel, beveled both at top and bottom, at one end, to form a drooping point, as shown in the several figures. Back of the bevel the point is straight, to prevent it from entering the ground too far, and through it are several openings, for the passage of bolts for securing the point to the standard. In some cases these openings are made in the form of vertical slots, so that the whole point may be set at an angle on the standard, and in other cases, when these slots are used, the entire lower edge of the point is made straight, as shown in Fig. 2. In Fig. 4 the beveled edge is upset to form side flanges for spreading the dirt.

BABCOCK'S IMPROVED PLOW.

Steno-Telegraphy.

Mr. G. A. Cassagnes, editor of the *Chronique Industrielle*, has recently described before the French Academy a method of transmitting telegrams which he calls "steno-telegraphy," and which is a combination of mechanical stenography with telegraphy.

The apparatus are as follows: At the transmitting station: a keyboard perforator, an automatic transmitter, and a distributer. At the receiving station: a distributer, polarized relays equal in number to the keys of the keyboard of the perforator, and a printing apparatus.

At the transmitting station, the keyboard of the perforator, maneuvered by one stenographer only, perforates in a band of paper a series of apertures arranged in horizontal lines, and each of which represents at least one syllable. The perforating is done at the rate of two hundred or more words per minute.

Through the very position assigned to it by the maneuvering of the keyboard, each aperture corresponds to a definite stenographic sign, which is to be printed upon the stenographic band of paper at the other station.

The perforated band is placed under the transmitter, where it remains immovable, as does also the band that is to receive the impression at the receiving station. If, through one of the apertures, the transmitter then automatically emits a current that passes into the line wire through the brush of the transmitting distributer, this current, on reaching the other end of the line, will be received by the brush of the receiver, which will keep up a continuous motion synchronous with that of the brush of the other station, and will actuate a polarized relay that closes a local circuit designed to print the sign corresponding to the current emitted at the transmitting station.

Since, in consequence of the very revolution of the distributing brush at the transmitting station, the same operation is repeated for each of the apertures in succession (which form a small, perforated, horizontal line), and since the paper at the two stations remains always immovable, a horizontal line is printed, and the line of apertures of the transmitting station is thus converted into a line of signs, representing at least one syllable, at the other station.

The bands then move forward by the space of one interline at both stations, and everything is in readiness for the printing of another line, and so on.

The number of syllables that may be thus printed during one revolution of the brushes depends, then, solely upon the number of contacts into which the distributer and receiver of the two stations can be divided, and such number itself depends upon the possible duration of the emissions, that is to say, upon the length and state of the telegraph wire.

Numerous experiments made upon the French lines have given the following speeds of transmission with a single line wire:

1. As far as 210 miles, 400 words per minute; and with two keyboards, 24,000 words per hour.
2. As far as 390 miles, 280 words per minute; and with two keyboards, from 16,000 to 17,000 words per hour.
3. As far as 540 miles, 200 words per minute; and with a single keyboard, 12,000 words per hour.

The transmitting, moreover, may be done either entirely in one direction or the other, or simultaneously, partly in one direction and partly in the other, according to requirements.

Steno-telegraphy, then, affords a means of greatly increasing the number of words transmitted by the same conductor. It may consequently be employed to great advantage in telegraphy, since it prevents the encumbering of the wires, by utilizing each of them more perfectly than has been done in the past.

Again, it permits of stenographing a discourse while it is being delivered, and of transmitting it at the same time to distant points. In this way, the first sentences of a discourse begun at Paris at two o'clock might be put in type ten minutes afterward in a printing office at Marseilles; and as the keyboard and electric transmission (without relays and through a single wire) never cease to follow the orator, the latter's discourse might be distributed simultaneously in the two cities, which, as well known, are 578 miles apart.—*Revue Internat. de l'Electricite.*

Effect of Fog on the Electric Light.

It was recently announced that the electric light on May Island, at the mouth of the Firth of Forth, had been sighted in clear weather from a distance of forty-six miles at sea, by the master of the Swedish steamer Frithiof. The same steamer arrived at Granton recently, and the master of the vessel reports that early in the morning, when there was a very dense fog prevailing, he had got within three miles of the May Island before the very powerful electric light recently placed in the lighthouse could be observed, and that it then only resembled a dim light from a single candle. These two facts afford a very marked contrast in regard to the penetrative power of the electric light in clear weather and in a dense fog. It is well that such data should be put on record and accumulated for future reference.

Catching the Octopus.

The United States Fish Commission print in one of their recent bulletins an excellent report by Mrs. Emma Metcalf Beckley, Curator of the Hawaiian National Museum, on "Hawaiian Fishing Implements and Methods of Fishing." The writer gives some curious details about octopus fishing. The smaller kinds of octopus, which live in shallow water, are caught by women, who do their work with remarkable skill. They can tell whether an octopus is in a hole whose entrance is no larger than a silver dollar, and, plunging their spears in, they invariably draw one out. The larger kinds of octopus, which are always found in deep water, are caught by men with cowries, generally of the Mauritiana, but sometimes of the tiger species. An octopus will not rise to a large spotted or ugly cowry, so the fishermen have to take care that the spots on the back of the shell are very small and red, breaking through a reddish brown ground. Cowries with suitable spots, but objectionable otherwise, are slightly steamed over a fire of sugar cane husks, a process which gives them the desired hue. The fisherman, having arrived at his fishing grounds, first chews and spits on the water a mouthful of candle nut meat, which renders the water glassy and clear; he then drops the shell with hook and line into the water, and swings it over a place likely to be inhabited by an octopus. The moment an octopus perceives a cowry, it shoots an arm out and clasps the shell. If the shell is of the attractive kind, one arm after the other comes out, and finally the whole body of the octopus is withdrawn from the hole and attaches itself to the cowry, which it closely hugs, curling itself all around it. The creature remains very quiet while being rapidly drawn up through the water. Just as it reaches the surface, the fisherman pulls the string so as to bring its head against the edge of the canoe, and it is killed by a blow from a club which is struck between the eyes. This must be done rapidly, before the animal has time to become alarmed; for if it lets go the cowry it becomes a dangerous antagonist, and there is risk of the fisherman being squeezed to death. The cutting off of one or more of its eight arms does not affect the rest in the least.

Apes as Workers.

It was reported by telegraph the other day that Mr. Parkes, a farmer at Kingston, in Kentucky, had succeeded in training seven large monkeys or apes to work in his hemp fields, and to break and prepare the hemp for market. Mr. Parkes, according to the dispatch, has found that they do the work more rapidly and better than the negroes, and at one-quarter the cost. The apes, it is said, were sent to him by a brother in Africa, who had seen them put to similar uses there, and Mr. Parkes is so well satisfied with the results of his experiment that he has ordered ten more of the animals.

Whether this particular story be true or false, there is no doubt that the more docile and intelligent of apes have been instructed to perform work very like that to which Mr. Parkes is said to have trained his seven monkeys after four months of patient tuition. Mme. Clemence Royer, in a recent article in the *Revue Scientifique* on the mental faculties of monkeys, shows that they are well adapted for some kinds of domestic offices and acquit themselves gracefully in them, and she cites cases where they have been made exceedingly useful in field and other work. Pyrard, the French traveler of two centuries ago, says that in his time the colonists of Sierra Leone employed chimpanzees in carrying water and beating of mortars, and Breton has in his Chinese pictures a representation of monkeys gathering tea leaves on the tops of one of the steep ridges of Chansung. The ancient Egyptians, too, obtained considerable services from the cynocephalus, or variety of baboon, an animal so remarkable for its intelligence that it was selected by them as the symbol of intellect. Buffon describes a female chimpanzee at Loango which could make the beds, sweep the house, and help turn the spit. Houzeau expresses the opinion that these female monkeys would make excellent nurses for children, their milk being exceedingly rich in butter.

Mme. Royer, therefore, comes to the conclusion that a time is coming "when these races, bred by man, will render great services in daily life and industry, and will contribute to the general progress." There is nothing in such a prediction, she continues, which does not rest on scientific premises, and nothing in it to laugh at, after the manner of the smart young men who are now getting up funny articles on Mr. Parkes' experiment.

The ape is unquestionably the most intelligent and the most manlike of the lower animals, both physically and mentally and morally. He may be far away from the superior races of men in intellect, but the difference between him and the lower races is much less marked. The black chimpanzees of Africa have feasts like those of the negroes. They live in communities, fight in concert, and care for their wounded. They are very clever in the use of their hands and arms, throwing stones better than street boys. Buffon's black chimpanzee knew how to unlock a door, and if he did not find the key in the lock, would hunt for it. The monkey took its meals like a well-bred person, ate with a spoon and fork, used a plate, and served itself with wine. In one of her letters from the Malay Peninsula, Miss Bird describes a dinner to which she was invited, and at which her companions were two apes. "The apes had their curry, chutney, pineapple, eggs, and bananas on porcelain, and so had I," writes the enterprising lady, who speaks of another ape, which was an important member of the family of the British resident at Klang, as walking on its hind legs, and going along quietly by her side like a human escort. It had not even a rudimentary tail, and when it sat with its arms folded it looked like "a gentlemanly person in a close fitting suit."

The worse defect of monkeys is that they are inveterate thieves. They look upon stealing as fun, and therefore will pilfer even when they have no desire for what they take. Mme. Royer tells us that "they are capable of sacking a house and carrying off everything movable in it with the system and concert of a band of robbers. They observe a kind of discipline in their operations, and post their scouts to inform them in season when it is time to run away." The monkeys in Sumatra, according to Cesare Moreno, steal fruits and vegetables from gardens, and will plunder houses. "Forming a line, in order to pass their spoils from hand to hand, they scale the walls, enter at the doors or windows, and leisurely pillage all they can find." They are also very greedy, and will get tipsy when they have the chance, and a drunken ape seems more like a man than ever.

If, therefore, Mme. Royer's prediction is verified that the time is coming when apes will be added to the industrial force, it will probably become necessary to increase our police protection, unless pious education shall succeed in conquering the natural depravity of the monkey.—*N. Y. Sun.*

Preservation of Eggs.

Australian eggs are preserved in the following simple manner: The vessels in which the eggs are to be placed are glass jars with patent stoppers, vulcanized India-rubber joints making them perfectly air tight. As soon as the eggs have been collected, the jars are stood in hot water for some time, and left until the air in them has become thoroughly warm and rarefied. The jars having been heated, the eggs are wrapped up in paper to prevent them knocking together, and placed in a warm receptacle, their pointed ends being uppermost. The jars are immediately closed up, and then, and not until then, are removed from the hot water. It is said that if this process is skillfully carried out, the eggs will be as fit for the breakfast table as the day they were laid, many months after they were put in the jars. The great secret of success in carrying out this method is, no doubt, to thoroughly heat the air in the jars. The eggs will stand a better chance of keeping, if the paper in which they are packed is previously baked and used warm. Patent stoppered jars are not absolutely necessary, any stopper answering which effectually excludes the air. At the late Birmingham, Eng., cattle show, prizes were offered for the best dozen of preserved eggs, and they were given, as was the case the year previous, to those preserved in simple lime and water, or packed in dry salt. Samples were shown covered with melted suet, beeswax, oil, or lard, and all these were good. But strange to say, one exhibit which had been rubbed over with pure vaseline as soon as laid was the worst of all. All the eggs were putrid.

Plaster Casts from Photographic Cliches.*

It is sometimes desirable to convert a photograph (say of certain of the *Microzoa*) into a plaque, which can be mounted on a tablet and exhibited in a case. This can be done by taking plaster casts from reliefs in gelatine. They are producible in two ways: 1. On the commercial dry plate. 2. On *cliches* of bichromated gelatine.

1. On the commercial dry plate. I have experimented with a few makes, but find the gelatine too soft in most cases. One make (possibly containing bichromate) gives tolerably good results, but different batches differ in their power of resisting the rather severe treatment to which they are subjected. The treatment is quite simple, and consists of dipping the plate (it must not be alumed) for a few moments in water, kept at a uniform heat of 90° Fahr. by an automatic gas regulator. I should think that a plate could be put on the market suited to this particular purpose, and its utility in the various photo-mechanical printing processes would insure a steady demand for it.

While the relief is still moist and at its best, pour on No. 1 plaster, as in ordinary plaster casting, mixed with a little alum to harden it. When dry, the plaster leaves the gelatine without much trouble, no lubricator being needed. The resulting cast may, of course, be colored if desired.

2. On bichromated gelatine. This method is well known. It has the great advantage of being capable of giving a higher relief if required, according to the thickness of the gelatine. On a moderately hard gelaline hot water may be used, a fact known almost as long as photography. A little caution must be exercised in the choice of a subject. Their microscopied *sections* are, for obvious reasons, unsuitable where strict accuracy is required; but when the lights and darks of the *cliches* (upon which intaglio and relief depend) nearly correspond to the real intaglio and relief of the object photographed, the resulting cast will, of course, be accurate as well as beautiful.

THOMAS STOCK.

*A communication to the Edinburgh Geological Society.

Trade Schools.

The action taken by the Master Plumbers' Association of New York in recognizing the trade school as one of the future sources of our supply of skilled workmen, following the adoption by the master stone cutters of a similar course, is attracting considerable attention from trades unions. The leaders of these organizations have virtually committed them to the policy of restricting not only the supply of workmen, but the hours of labor, when in their power, so as to make of each particular craft as much of a close corporation as possible, providing plenty of work for all who may be admitted within the limits, but leaving none for outsiders, and taking from them every possible chance of entering the precincts of the trade organizations.

The persistency with which they have adhered to this principle, the importance they attached to it, and the sacrifices they were willing to make to maintain it, have been abundantly demonstrated during the strike of the journeymen plumbers in New York.

Hitherto, the workman has claimed the sole right to undertake the education of the boy entering his trade, and the master has been for the most part satisfied to let the lads shift for themselves. They come to spend a large portion of the first year or two years of their shop life in the performance of little else but menial duties; and progressing from this department almost at the option of the journeyman to the stage at which they are first allowed to take hold of tools and material, they gradually reach the period when they are considered by the union to which they aspire to belong entitled to a full day's pay as a journeyman. There is no attempt to determine their value as mechanics; by virtue of their payment of the union entrance fee, and the receipt of a card, they are entitled to the same wages as the men who have spent a lifetime at their trade.

In no profession or calling is this crude system adhered to except in mechanical trades—just where a man's value depends wholly upon the degree of skill he possesses. The doctor, the lawyer, the engineer, the architect, even the bookkeeper nowadays, must attain a certain degree of proficiency at his own expense before he becomes entitled to recognition in the vocation he has chosen; only the skilled mechanic is a beggar—depending on the charity of his fellow workman for the means of learning his business.

The masters are beginning to realize the helpless position to which this condition of affairs reduces them, and already in some trades they have been looking for some factor that will aid them in assuming control of the training of young aspirants for their employment. The trade school offers at once a means of effecting the desired change and at the same time of improving the capacity of the mechanic; and though, in the course of the transformation, the union may lose some of its arbitrary hold upon the workman, in our opinion both union and workman will be benefited by the change. That work done encourages other work, has long been recognized as a fact, and the character of the work regulates the nature of the demand. If for the present slipshod manner of training boys we substitute a strict course of technical instruction, and establish at the same time a standard of proficiency for our workmen, we limit the number of members of a trade in time to those qualified to practice it, and this no workman having his own interest at heart can oppose. The trade school will either deprive the union of the dead timber that encourages the progress of the progressive workman and advance the interests of every craft recognizing its value, or it will convert these organizations into a stagnant pool of incompetency that all employers would shun, if they oppose the education of the apprentice. The trade school has come to stay; the trade union can choose between a dignified existence or an ignominious extinction, according as it encourages or opposes this coming factor in the progress of our industrial classes.—*Sanitary Plumber.*

A NOVEL and valuable application of photography has been made by the Century Company, combining the complete preservation of valuable copy against accidental loss or injury by fire or otherwise with the greatest convenience in storage and handling. Over 25,000 sheets of copy of a work on its way through the press, with interlineations, corrections, and additions, have been photographed on a reduced scale of only 1¼ × 2 in. to the page, but easily legible upon magnification.