certain spots it is necessary for them to work bound, as it were, to the rock, for a drop of seventy-five feet into the river below, or possibly upon some of the straggling stones that rise above the surface of the water at the base of the cliff, would undoubtedly serve to reduce our staff of workmen. Had they been sailors they might, perhaps, have managed better so far as clinging to the rock is concerned, but they could not have done the work."

The workmen are, for the most part, Italians, although a few of other nationalities are employed. Italians, however, are best adapted to the peculiar work, not only because they are lithe, light, and active, but on account of their ability to stand the fierce heat that beats down on the exposed face of the rock.

Population and Temperature.

A census bulletin shows the distribution of population in the United States in accordance with temperature. Arranging it in groups by 5 degrees of mean annual temperature, it is found that no less than 98 per cent of the total population live between lines marked by 40 and 70 degrees Fah. The cotton region is above 55 degrees, sugar and rice above 70 degrees, and tobacco between 50 degrees and 60 degrees. The prairie region of the Mississippi valley lies almost entirely below 55 degrees, while the great wheat region of Minnesota and Dakota is mainly below 40 degrees of mean annual temperature. The highest maximum temperature is in southwestern Arizona and southeastern California. Of the entire population, 89 per cent are found in the classes which have a maximum temperature between 95 degrees and 105 degrees. In considering minimum temperature, it is seen that 95 per cent of the inhabitants of the United States live between the lines of 35 degrees below zero and 10 degrees above, for extreme cold.

From this it is evident how population tends to increase in regions rather north of medium temperature; or, more correctly speaking, between isotherms of low degree.

PANEL DECORATIONS FOR EATON HALL.

The Duke of Westminster has recently made extensive additions to what was already an immense mansion, known as Eaton Hall. In the decorations for these new apartments great expense has been incurred to produce novel effects, and the designs for some of the rooms possess rare novelty. A small drawing room has been ornamented with twelve painted panels by Mr. H. S. Marks, R.A., who took for his models rare and curious birds from the Zoological Gardens of London. Our engraving represents a specimen of the panels produced by the artist. The *Art Magazine*, from which we take our illustration, says of the artist and his subjects:

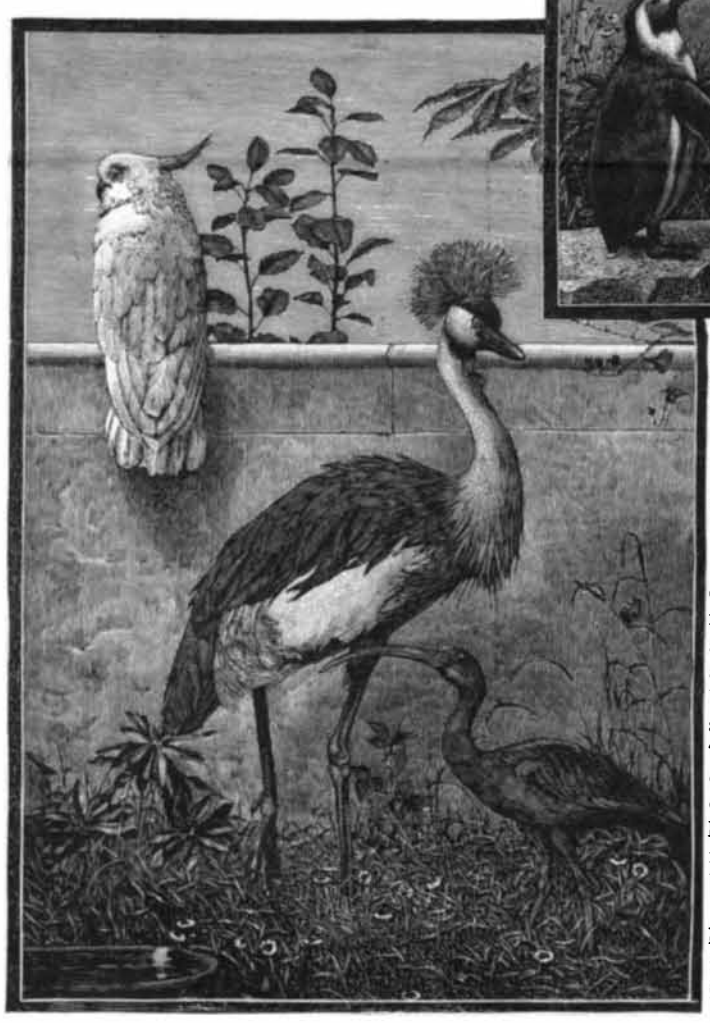
"The birds which Mr. Marks loves to give us are those which serve best to illustrate his peculiar humor. They are all funny birds with strange characteristics, fond of quaint attitudes, and given to odd ways.

"There are no more comic birds than the crowned crane, the bird of all others Mr. Marks delights in painting. It is obvious from their manner that they possess in themselves the keenest sense of humor. Now upon one leg, the other tucked up close and out of sight, they rest quietly and solemnly brooding over affairs of state; next, they commence an absurd and ridiculous dance, threading the giddy maze in and out, and round and round, as keen and excited as any bipeds indulging in intricate quadrilles. To the dance will succeed a stately and majestic walk; after which, apparently without any rhyme or reason, they will range themselves against the fence and start off on a wild foot race.

"Compared with this extraordinary bird, the scarlet ibis, although a curious bird, has nothing very remarkable about it except its shape and color, the latter being of a glowing scarlet, which commends it to the artist for purposes of decoration. For the same reason he has selected the flamingoes which figure in the upper wood-cut. These splendid creatures, which measure from five to six feet in height, are magnificent in color, ranging from a deep scarlet to various tones of a bluish pink and faint red.

"The skill of the artist has been further proved by the other birds introduced in these two panels, which have been cleverly selected, make a strong contrast, and strengthen the effect. Nothing more appropriate could well be conceived than the funny puffy little penguin looking up at the giant flamingo; or the modest robin, a bird of home affections, looking at these strange looking foreigners.

"Bird lovers, no less than lovers of art, must be grateful to Mr. Marks for these his last and most charming efforts in decoration."



PANEL DECORATIONS FOR EATON HALL.

Antiquarian Research in Mexico.

The *World's* intelligent correspondent at the City of Mexico says, in a recent letter, that the American explorer, Captain Eavans, had just returned from San Juan Teotihuacan, and had brought some Toltec relics and other antique objects, which he believes belong to an earlier civilization. These antiquities are, according to an agreement made with the Mexican Government, to be placed in the National Museum, in this city. After a thorough examination of the pyramids of "The Sun" and "The Moon," Captain Eavans commenced excavating on the site of the ancient city of Teotihuacan. The ruins of that place consist of heaps of stones and *débris* placed on some 20,000 little mounds, which formed the bases of the dwelling houses. That this city was destroyed by fire is clearly demonstrated by the heaps of charcoal and ashes found on the mounds. The walls of one building excavated and traced out were 140 by 120 feet. The stucco on the inside wall was very fine, of a bright red (which fades by exposure) and elaborate design. A piece shown your correspondent was of a beautiful crimson and white color, interspersed with mica or powdered quartz, which must have made an apartment "light up" beautifully.

You may recollect that when Mr. Charnay made excavations in Teotihuacan about a year ago he reported the finding of strata of pavement or stone work which he decided indicated three different epochs of occupation or civilization. Captain Eavans differs materially from the French explorer. He said to me: "Actual excavations and careful examination have fully convinced me that these three strata, or the pavements, as Mr. Charnay called the layers, which in one place are but two feet apart, and in others only separated by six inches of earth and pebbles, are simply the foundations on which the city was built. I found beneath these layers of stone several sepulchers. Some of these tombs contained human remains interred in a manner similar to those discovered in Indian mounds in the United States. In them were also vases in which food had doubtless been deposited for the dead. There were also implements, etc. made of obsidian." Last week Captain Eavans examined the Pyramid of Cholula. He differs from others who have described it, and says: "There is no natural hillock or elevation; the entire structure is made of adobe, stone, and the *débris* of a former civilization." In conversation to-day, as on former occasions, Captain Eavans expressed a decided opinion that the Aztec civilization has been greatly over-estimated. He believes that many monuments attributed to them, for instance the "Calendar Stone," belong to the Toltecs, or even a more ancient race.

At Teotihuacan some skulls were taken from the sepulchers, and it was found that they corresponded with those discovered in the Indian mounds of the United States, not only in size, but in the peculiar flattening of the occipital region. Captain Eavans mentioned that the pottery, especially the circular dishes, in these Mexican ruins were almost identical with those found in Arkansas, and he entertains the idea that the great Toltec Empire was overrun by Indians from the north as well as by the Aztecs and by tribes from Central America. He remarked various indications that communication had existed between these races. Among other things he said: "This can be proved by implements of obsidian being discovered in the mounds of the United States, and as that substance does not exist in those northern regions the probabilities are that it came from Mexico."

A Census of the Rocks.

The Census Bureau has undertaken an interesting and valuable work in collecting information relating to quarries of building stone and the like in all parts of the country. The inquiries cover not only the location and extent of building, roofing, flagging, ornamental, and other stones and rocks, but the amount of capital employed, the annual output, methods of quarrying and dressing the stone, the number of hands employed and wages paid, methods of transportation and their cost, the number of structures of all sorts made of each sort of stone, and so on.

The aim has also been to secure duplicate samples of four inch cubes of rough rock from each quarry, for physical and chemical examination. This part of the work is being done jointly by the Census Office and the National Museum, and is in charge of Dr. Geo. W. Hawes. "One of the objects of this investigation," said Dr. Hawes to a reporter, "is to find out what minerals each one of the building and ornamental stones contains, to ascertain how each will act under different conditions as to temperature, etc., to discover the strength of each—in a word, to know all about our rock resources. Here are a half dozen different kinds and colors of granite, all unlike in structure and yet all called granite. Quarrymen and stonecutters can tell nothing about them except what you can see for yourself. Now here," said the Doctor, turning to a large block of coquina from Florida, "is a stone which answers admirably for a building stone in Florida, but if you were to build a house of it in New York it would soon tumble down. On the other hand, those granite blocks which are apparently indestructible and which are so valuable a building stone in New York, would soon deteriorate—rot, so to speak—in the Florida climate. Of course, in a scientific investigation like this we naturally solve some important economic questions and make some discoveries which will be of very great practical interest and value. For example, we know that Portland sandstone when quarried and set on edge, as it is in the walls of so many buildings in New York, will in a few years begin to scale off and give the building a ragged appearance. Again, we received some samples of rock from the only quarry in Florida—a kind of sandstone. Well, after a thorough examination and analysis of this stone we found that it contained about sixteen per cent of phosphoric acid. It is consequently a great deal more valuable as a fertilizer than it is as a building stone, but that fact had never before been discovered."

In the workshop where the stones are being polished and tested the correspondent was shown examples of the more familiar stones. A piece of Quincy granite was seen, under the microscope, to be full of pentagonal cells containing air and water. Under the action of heat the water is converted into steam and bursts the stone; hence the tendency of Quincy granite to fly to pieces in a fire.

In polishing the different faces of the sample cubes many important discoveries have been made. Sandstones and limestones, which have never been thought worthy of any better place than in the foundation or wall of some rough structure, have been smoothed and polished, and it is found

that the quarries from which they were taken contain material adapted to the most elaborate and elegant structures. Dr. Hawes declares that from the samples already received he is convinced that no country in the world is better supplied with stone for both building and ornamental purposes than is the United States; and he thinks that when all our native resources become known, as they will after the census work has been completed and its results published, the United States will cease to import stone from foreign countries.

Fish Plagues in the Gulf of Mexico.

The occurrence of areas of poisoned water in the Gulf of Mexico, causing the death of fish in vast numbers and threatening at times important industries, has been the occasion of special inquiries by the Fish Commission. As early as 1844 Mr. Benjamin Curry, of Manatee, described the effects of the plague. It appeared again in 1854, and in a milder degree on several occasions until 1878, when in several localities the marine fauna of was completely destroyed. The fatal areas are described as strips of greenish discolored water, a mile or more long, and from fifty to two hundred yards wide, strongly marked by the numbers of dead sponges and fishes floating in it. The sponges, which are usually white when the animal dies, turn black in the poisoned water; and the gills of many of the fish are covered with a froth or slime.

The latest plague followed the terrible hurricane of August, 1880, and extended from Tampa Bay to Shark River, Bahia Honda passage, and in patches by Key West, the Marquesas, and East Key, the Tortugas group.

The following account of the plague at Egmont Key is given by the agent of the Fish Commission there:

"The first dead fish we saw was on Sunday, October 17, as the tide came in. There were thousands of small fish floating on the water, most of them quite dead. I saw only one kind the first day; they were small fish, four or five inches long; the Key West smackmen called them 'trim.' They were new to me. The next day other kinds were dying all along the shore; the pompano was about the next to give in, and by the 25th of October nearly all kinds of fish that inhabit these waters were dying except the ray family. I don't remember of ever seeing any stinger or whipper ray, or the devil fish, as we call the largest ones of the ray family. From the 25th of October to the 10th of November was the worst time; during that time the stench was so bad that it was impossible to go on the beach. I sent my family to Manatee, and the assistant keeper and myself shut ourselves up in our rooms and kept burning tar, coffee, sulphur, rags, etc., night and day, in order to stand it. It was warm, damp, and calm weather. They continued to die for about six weeks; they kept getting less every day. I counted seventy sharks within eighty yards, all small; I never saw a shark over four feet long dead. The cowfish and eels were about the last to die. In regard to the cause of their dying, I have made up my mind it was caused by the fresh water, as there were immense quantities of fresh water coming down the bay, and the water here was nearly fresh on the surface, while the water underneath was perfectly salt. Now, if the fresh water could have passed off into the Gulf without being disturbed by winds it would have naturally spread out thinner and thinner as it would have rolled on toward the Gulf Stream, and once it got there then there would have been no trouble. But on the 7th of October we had a heavy gale from the southwest, and it continued to blow from the south and west until the 11th of October, and a very heavy sea running at the mouth of the bay, and it churned the fresh and salt water all up together, and the strong southerly winds set this mixed water back and kept it here for several days. I noticed a few days before the fish commenced to die a peculiar smell on the water, something like the smell of bilge water, and the color of the water was a dirty green, mixed with small sediment. I noticed the fish while they were dying, when they first came in shoal water; they would act crazy, dart around in every direction, but in a short time they would give up and float ashore. On examining them I found their gills all glued together with a slimy substance and of a whitish color, and in a short time the gills would turn green, and the fish bloat very large I cannot make any correct statement as to the number that died, but thousands of barrels floated up on this island There are no fish dying now; all we catch are fat and nice.'

Joining Together of Glass Tubes.

In order to fuse together two pieces of glass of the same diameter they must have the ends evenly cut off. They are then both held in the flame and slowly turned, without touching each other, in order that both ends may become uniformly heated. Then they are taken out of the flame, and carefully but truly placed together. The thickening which is formed at the point of junction is removed in the following manner: The end of the tube which has been joined is either melted together or closed with a cork; then the thickening is heated in the flame, while at the same time it is very evenly rotated; after softening it is slightly blown out; then again heated, and so somewhat compressed; then blown out again. This operation is repeated until the thickening has completely disappeared. It is particularly essential that during this operation of removing and blowing out, the axes of the two tubes form a straight line. This requires some skill and dexterity of manipulation. If one wants to join a narrow tube to one which is wider, the latter is first closed at one end, and this end softened by careful rotating in the flame; then blowing into the open end, a bulb is formed at the heated end; this is broken by strong blowing. By means of a file the ragged edge is removed; often it may be cut with a pair of scissors; only a narrow rim then remains, which is rounded as much as possible by turning in the flame. In this way the end of the larger tube has been reduced to about the size of the smaller one. Both pieces are now heated at the same time in the flame, as has been previously described, due precaution being taken that the two ends were of equal diameter before they were heated together. If one of the openings is still too wide, its size is reduced by heating it a little stronger than the other, until it contracts sufficiently. The two ends being then of equal size, and having been uniformly softened, they are joined, and treated as has already been mentioned.

When it is desired to join the pieces of tubing at right angles (T-shaped), one of the tubes is closed at one end and heated by means of a small sharp pointed flame, which is blown tangentially against the tube. In this way a small, round piece of the wall of the glass tube becomes very hot, and precaution is taken that the heated portion is as much circular as possible. As soon as the glass appears to be sufficiently soft, one blows into the open end of the tube, the flame, however, being still kept directed at the heated circle; this then is blown out with a slight snap. The open end of the tube which is to be joined is now placed in the flame, and when both tubes have become sufficiently softened, they are brought together and joined, as has been described. In the same way a tube may be joined to the side of the bulb.—*M. B., in Journal of Education.*

Strawberries and Garden Truck by the Barrel.

The following method of growing strawberries in barrels is not novel, but it has been recently vouched for as a practical and profitable success. It would seem to offer many advantages for people in villages with little or no garden space. Bore fifty holes in a barrel with an inch auger, and sink the bottom of the barrel an inch or two in the ground. Fill the barrel with rich loam to the level of the first row of holes; then insert the strawberry plants, taking care that the roots are well secured. The row completed, fill up the barrel to the second row of holes, and set out another row of plants, and so on till the barrel is full. For watering and fertilizing, set into the top of the barrel an old tin can with a perforated bottom, filling the can with proper fertilizers. The barrel of plants can be kept irrigated by water enriched by passage through the can; or good results can be obtained by irrigating with soapy wash water without fertilizers. Fifty well nourished plants will furnish a family with many messes of berries, and three or four barrels covered with plants would be equal to a good sized strawberry bed. The plants should be set out in the fall, and might be covered for protection during the winter.

A modification of this plan is strongly recommended by the *Prairie Farmer*, Appletons' *Home Garden*, and other authorities, for growing melons, cucumbers, tomatoes, etc., in places where regular gardening is not practicable.

What is needed is a few barrels. Bore holes around the middle, and one hole large enough to admit the nose of your watering pot. Fill the barrels with stones as high as the rows of holes, and fill in with good, rich, fine earth to the top, in which plant cucumbers, melons, squashes, tomatoes, etc. One barrel will be enough for each kind. Be sure to have one large flat stone lean over the large hole where you will pour in water until it runs out of the holes you have made, and which will prevent the earth from filling this large hole up. Range the barrels around your yard and plant your seeds. Keep the barrels filled with water up to the holes, and you have all the requisites for rapid, healthy growth—air, heat, and moisture. You can raise all the vegetables you will need in the greatest perfection, and they will last until late in the autumn, as they can easily be covered on frosty nights. Cucumbers and tomatoes may hang over the barrels, cutting them off when they reach the bottom. Melons may be tied to the wall fence. The stones have an important service in holding up the earth, and in absorbing the heat during the day, which they give out at night, keeping the water at an even temperature. You will be astonished at the result, if you have never tried it.

Interesting Ring Trick.

Some years ago great stress was laid upon the ability of certain spiritual mediums, so-called, to pass upon the arm of another person an unbroken iron ring, the person's hands being clasped all the time by the medium's two hands. Mr. W. I. Bishop lately showed a gathering of scientific and literary people in London how it is done. He bandaged the eyes of Mr Sime, saying that it was for that gentleman the same as if the gas was turned out. He then caused Mr. Sime to place his hands together on his knees, brought his own hands from each shoulder of Mr. Sime to his hands, placed one of his hands on Sime's two, and said: "You feel now that both of my hands are touching yours." "Certainly," said Mr. Sime, "I feel both of your hands." Bishop had one hand perfectly free, and slipping it through an iron ring placed the free hand back. The ring was thus held on their joint arms, Mr. Sime having no idea that Mr. Bishop's right hand had left his for an instant. He said the illusion was perfect. So much can be done with a remarkably shrewd Scotchman in the dark while every one else is smiling at the simple process. Mr. Bishop then got Henry Labouchere to write five names and roll them up in pellets, *à la Foster*. After they had been written and placed by Mr. Labouchere in an envelope, Mr. Bishop came upon the platform and sat opposite him at a table. Mr. Labouchere was then requested to lay the pellets out on a table, and Mr. Bishop wrote out successively on a sheet of paper every name that had been folded up. Mr. Labouchere had watched every movement very keenly, but was entirely deceived. Mr. Bishop then showed that it was done by holding between his fingers a dummy pellet which he substituted for each of the five in turn, so that five should always appear on the table, while really one of the real pellets was in his hand to be read.

Influence of Minute Traces of Impurities on the Properties of Metals.

That alloys have often properties quite different from those of the component metals is a well known fact. But the remarkable effect of some impurities—they cannot be called alloys—on metals is not so familiar to most people. In a recent lecture by W. C. Roberts, before the Royal School of Mines, in London, the following interesting illustrations were given:

The presence of only one three-hundredth of one per cent of antimony in a mass of molten lead, the surface of which is exposed to the air, will cause it to be rapidly oxidized, while a similar mass of lead of equal surface, but free from the minute quantity of antimony, will be but slowly acted upon; and it has been shown that seven one-thousandths of one per cent of copper is detrimental to the lead employed in the manufacture of white lead.

The presence of one-twentieth of one per cent of lead or certain other metals in standard gold will render a bar an inch thick so brittle that it may readily be broken by a slight rap with a hammer. Less than one half of one per cent of iron in metallic copper will reduce the electrical conductivity by about sixty per cent, while a far smaller quantity will render it quite unfit for manufacture into telegraph cables, or for other electrical purposes.

Dr. Fleitmann has recently shown that nickel, which breaks under the rolls, may be made perfectly malleable by the addition of a little over one-tenth of one per cent of magnesium. An ingot of a certain variety of steel containing no manganese will break into pieces at the first blow of the hammer, whereas a similar ingot containing eight one-hundredths of one per cent of that metal will forge readily.

Certain plates of Swedish puddled iron exhibited in the Paris Exhibition of 1878 were found to have a far higher resistance to fracture by impact than certain other plates compared with them; and yet analysis proved that the main difference between them lay in the fact that the good plates contained only two one-hundredths of one per cent of phosphorus, whereas the inferior plates contained one-tenth of one per cent more.

Carbon, it is well known, gives to iron fusibility, and renders it capable of being cast in moulds. The results of very many experiments appear to show that the presence of fifteen one-hundredths of one per cent of carbon converts iron into steel, rendering it capable of being slightly hardened; with more than one and a half per cent of carbon the metal ceases to be malleable, and it is known as cast iron.

The influence of carbon on the tensile strength of steel is very remarkable. Two samples under identically favorable conditions as to their amount of sulphur and phosphorus, but containing fifteen one-hundredths and eighteen one hundredths of one per cent of carbon, respectively, will differ by six tons per square inch in breaking strain, or by an increase in the latter case of twenty-seven per cent.

Nickel can be made malleable by the addition of three-tenths of one per cent of phosphorus. M. Nyst, of the Brussels mint, has lately found that the presence of fifteen one-hundredths of one per cent of silicon in standard gold will so affect its molecular groupings as to render it possible for a thin strip to bend by its own weight, as zinc would, in the flame of a candle.

Pin Manufacture.

The pins used in this country are made by fourteen factories, chiefly located in New England. Their annual production for several years past has been about 7,000,000 pins. This number has not varied much for some years, the demand remaining about the same. Two years ago the competition among the nine principal companies then existing for the manufacture of toilet pins led to such a cutting of prices that the business became unprofitable, and the market was flooded with goods. A year ago a combination was formed of three wire companies, and now all of the pins made by them are shipped to New York, and handled by the head agency of that city. From their common warehouse they are sent to every part of the country. The importations of English pins are small, and the exportation of pins from the United States is confined to Cuba, South America, and parts of Canada. England supplies almost the whole world outside of the United States, although the American pins are not inferior in quality. The raw material—the brass and iron wire from which all American pins are made—is from the wire mills of this country, and much of the machinery is of American invention and patent.—*North American Manufacturer.*

BEETLES AS A TEST OF WOOL.—A French entomologist asserts that the wool of different countries can be distinguished in market by the beetles which frequent the bales. He has identified 47 species in Australian wool; 52 in South African wool; 30 in South American wool; 16 in Spanish; and 6 in Russian wool.