

Pompeii was partly destroyed by two earthquakes in the year 63 A.D. Its inhabitants were still engaged in building the injured portion, when, on August 24, 79, a grea eruption of Vesuvius overwhelmed the city and the adjacent towns of Herculaneum and Stabiæ. So sudden was the outthe cloud of black smoke burst forth from the crater, and settled thickly over th town, plunging it in complete darkness A dense rain of thin light ashes fol lowed, and then showers of hot stones, mingled with masses of lava giving of mephitic gases. Meanwhile great rivers of black lava poured irresistibly down the mountain sides, filling the street and cutting off the exit of those who had taken refuge in cellars; while oth ers, who were attempting to leave th city by the gates, were blinded by the drifting ashes and overcome by the sul phurous vapors. For three days this terrible infliction continued; and then when the smoke dispersed, where once was a beautiful town was but an arid mass of ashes, pumicestone, and hard ened mud.
Centuries went by. The rich volcanic soil became covered with a pro fusion of vegetation, and a new town sprung up over the buried city, only to be destroyed by earthquake four hun dred years after the great eruption. Pompeii then existed only in tradition and this located the lost city several miles from the uninhabited plain under which it was eventually discovered. In the middle of the last century, the finding of relicsin the vicinity induced the government to undertake systematic excavations. An inscription was soon unearthed establishing the fact that the true Pompeii had undoubt edly been found; and since tha time the work of uncovering the buildings has been slowly and care fully carried on
A fine series of engravings, from "Italian Pictures Drawn with Pen and Pencil," presented herewith give an excellent idea both of the appearance of the excavation and the manner of conducting the work Fortunately the material which chiefly covered the city was not lava, which would have set like stone after probably burning paintings and melting objects in metal, but a fine light ash, which insinu ated itself into the minutest crevices, and even through porous earth enware. The writer assisted in opening a large wine jar still bearing the seals placed over its mouth at the time of filling. The white ashes had replaced the wine, and had made their way through pottery of


Fig. 2-SEARCHING FOR RELICS.
floor, as their weight naturally carries them downwards through the soft mass of ashes. The digging is there fore rapidly prosecuted until the above uniform leve is attained. Then shovels and picks are put aside, and the ashes are taken out by handfuls, each workman carefully crumbling the material to powder before re jecting it. As soon as the experienced eye of any work or recognizes the indications of a mould being formed in the ashes, labor near that point is stopped, and tamping irons are cautiously inserted to make two or three vent in the cavity. Then liquid plaster is poured in; and after being left sufficiently long to harden, the ashes ar taken away and the cast removed. Fig. 9 is from photograph of casts thus obtained. The bodies are those of two women, apparently poor people, as on th finger of one an iron ring was found. The elder one has the limbs drawn up as if in agony; the other, a gir probably of fifteen years of age, is more composed One of the hands is half open, as if holding something The texture of the dress is exactly reproduced, even to the stitches of the seams
It is believed that of the inhabitants of Pompeii thousands perished Many hand in hand groped their way through the streets, and so escaped to the open country. At the chief gate there stood a sentinel, who sternly kept his post through the thunders of that dread ful day. He died in harness. Planted in his sentry box, he covered his mouth with his tunic, and held on against the choking and sulphurous shower. But the ashes fell and fell, and finally filled the box, and buried the soldier alive, still grasping his weapon in one hand and veiling his mouth with the other. There, after age of rest, he was found-a grisly skeleton clutching a rusty sword.
Sad discoveries were made in the street leading to that gate. There were two skeletons locked in close embrace, the teeth perfect, indicating youth in its prime: skeletons of a young man and maid. They had fallen together in their flight, and death had wedded them. There was a mother with her three children hand in hand, who tried vainly to outrun death. Perhaps the mother singly might have done it, but she could not leave her children. Plenty of food for sad thought is furnished her children. Plenty of food for sad thought is furnished
in remembering that six hundred skeletons have been alin remembering that six hundred skeletons have been al-
ready exhumed!-many in such positions and circumstances as to suggest very touching episodes accompanying the final catastrophe Of the family of Diomed, seventeen persons were stifled in a wine cellar well stocked with amphoræ of wine some of which bore the date of the vin tage. The fugitives in their agony of fear stood all huddled in a corner One swooning girl fell forwards on to the bed of ashes that had drifted in She left the impress of her bosom in the drift like a seal in softened wax.
An interesting little circumstance is connected with one of these houses The skeleton of a dove was found in a niche overlooking the garden. Like the sentinel, she had kept to her post sat on her nest through all the storm, and from beneath her was taken th egg she would not leave.
The shops and taverns which have been exhumed are very interesting a illustrating the domestic life of the people. Fig. 5 represents the interio of a baker's shop. Eighteen hundred years ago, the baker, having placed his loaves in the oven, had closed the iro moulds, retaining the form of the objects after the same have door, when he had to fly for his life. A few years since the wholly decayed and disappeared. The work of removing the batch was drawn. The loaves are jet black, and of stony débris from a room isrepresented in Fig. 2. It is not frequently hardness; but the marks of the baker's fingers show plainly that articles are found at a height above four feet from the on them. In an eating house were found raisins, olives,


Fig. 3.-THE GATE OF HERCULANEUM AND STREET OF TOMBS,
onions, figs, fish cooked in oil, and other articles of food, some reta ing their natural appearance and all plainly recognizable. It is a curiou plainly recognizable. It is a curious
fact that a precisely similar mode of fact that a precisely similar mode of
cookery prevails in the modern Italian villages to that indicated by the utensils and prepared food found in Pompeii; and in some instance vessels have been found which might at the present day be put to their original use, as they differ lit tle from those now employed. In one eating house, for instance, is a dresser of brickwork in which ar large metal and earthenware vessels for soup, with furnaces to keep it warm and ladles to distributeit, pre cisely as are used in modern res taurants. Amphoræ of wine ar marked with the year of the vintage, the characteristic quality, and the name of the wine merchant from whom they were purchased. Tav erns are indicated by checkers on the doorpost, or by a sign painted on the wall. The streets are paved
with solid blocks of stone worn in deep ruts by chariot wheels; and at one drinking fountain, where slaves stooped and drank from the flowing spout, on the edge of the trough is a spot worn smooth by the pressure of the many hands that rested against it.

The dwellings for the most part are small and low, few exceeding two stories. They have little ornamentation ex exceeding two stories. They have litt
ternally, and are well adapted to a peoternally, and are well adapted to a peo-
ple accustomed to pass most of the day in the open air. The upper stories, being of wood, with flat roofs, were speedily consumed; but as those portions of the house were generally used as storerooms or apartments for servants, their loss is of little consequence. The ground apartments have escaped serious injury; and on their walls some of the frescoes appear as brilliant as if recently painted. Figs. 6, 7, and 8 afford an excellent idea of the variou objects found in the dwellings, as well as of their remarkable state of preser-
vation. Fig. 6 shows a collection of vation. Fig. 6 shows a collection of
cooking utensils. It is hardly necessary to call attention to the colander the frying pan, and the forks and spoons, as being the same as those now used. Gold ornaments, copied from the designs shown in Fig. 7, are now quite common; and many of the terquite common; and many of the ter-
ra cotta lamps depicted in Fig. 8 have ra cotta lamps depicted in Fig. 8 have
served as suggestions for the patterns of modern gas fixtures.
The walls of the city, which have been traced throughout their full extent, indicate that an irregular oval


Fig. 4.-TEPIDARIUM OF PUBLIC bath.
man keeps up a perpetual tapping on a tom-tom drum, while he keeps up an animated conversation with Emman
and Gheesa. Seyed Emman is dressed in the Hindoo fashion; he wears a resplendent turban, a very handsome silver waist band, and massive silver anklets ornamented with bells; his assistants are also well dressed, their copper-colored skins
are sometimes called, double-headed snakes; the next, a large lacertine; the others, cobras. While four of the snakes are crawling about the platform, the charmer pays especial attention to one of the cobras. The instant the lid of the basket is off, up rises the cobra as if impelled by a spring. This cobra is a large snake and prettily marked; he has especially cobra is a large snake and prettily marked; he has especially
brilliant eyes. It is very beautiful to see the wonderful way in which he expands his hood. This is beautifully marked at the back, the resemblance of a pair of spectacles. There are also patches under the throat. For a minute or two the cobra holds himself quite erect; the man sets down on hisheels immediately in front of the cobra, and pipes at him furiously with his musical instrument. This seems to excite the anger of Mr. Cobra, who makes two or three very nasty spiteful lunges at him. The charmer then dances round the snake, which still remains in his basket-the shape of a common strawberry basket. The brute, following the man, with his expanded hood and threatening head, made several strikes at his naked legs, but he was never quick enough to hit him.
"I observed what I did not know before, that a person with a quick eye can tell when a cobra is going to strike. A cobra never strikes while his head is on the ground. Next, when his head is erect, he must draw back a little before he can make a dart.
"The anatomy of the cobra should be known to all our readers. When he is quiet and undisturbed, his hood does This hood is formed by a loose skin imhas orent It |the effect, Mr. Gheesa had painted his forehead and arms not appear 20,000 to 50,000 , but according to pop in yellow ocher. Seyed Emman comes out on to the plateral superintendent of the excavations, Pompeii har form carrying his snakes suspended to a bambifull more than 12,000 inhabitants at the time of the eruption. of bamboo. He places the baskets on the earth, and dances Eight gates have been discovered, and the roads outside of $\quad$ round them frog fashion, all the time playing a curious Inthem were lined on each side with tombs of considerable dian instrument that look likes a cocoanut with a penny size and architectural pretension. The Street of Tombs, be-- whistle attached; this is called a surringhee. It appears that fore the gate of Herculaneum, Fig. 3,
was probably the principal burial place of the city; and the sepulchral monuments adorning it give evidence of the refined taste and great wealth of prominent Pompeiians. The streets, which for the most part run in regular lines, are with some exceptions barely wide enough to admit a single vehicle. The widest does not exceed 30 feet in breadth, and few exceed 22 feet. Five of the main streets have been partially or wholly traced; and with these a regular system of minor streets appear to have been connected. These thoroughfares, with a single exception, terminate in or traverse the western quarter of the city, which is the only part yet completely explored The public yet completely explored. The public buildings were profusely decorated structures, and included temples of Ju-
piter, Mercury, and Venus, besides two piter, Mercury, and Venus, besides two
theaters. The thermex or public baths -a room in one of which is represented in Fig. 4-were elegantly adorned.
The most important paintings and objects of art discovered by excava-


Fig. 5.-BAKER'S OVEN, BREAD, AND FLOUR MILLS.
al Museum at Naples. Until recently the excavations have proceeded slowly; but at present the Italian Government is liberally assisting the work. The space now laid bare measures about 670,000 square feet, or one third the whole area
occupied by the city. Signor Fiorelli calculates that, making the excavations ing the excavations on an average 25 feet d
ing 81 laborers daily, the whole city will be unearthed in 1947.

## Hindoo Snake Charmors.

Frank Buckland, the naturalist and writer, informs the readers of Land and Water that at the Westminster Aquarium, London, a company of three or four snake charmers have recently arrived from India. He states that not for twenty years have these curious people, with their wonderful tricks, appeared as exhibitors in London.
"The performance takes place in the northwest corner of the Aquarium. Convenient seats have been arranged so that every one can have a good opportunity of seeing what is going on. In order that there shall be no suspicion of trapdoors, etc., the platform on which the performance takes place is composed of solid earth. The performers are three in number: the principal actor is Seyed Emman, his assisttant is called Gheesa. There is also present a very intelligent-looking slim boy named Moen Deer. This young gentle-


Fig. 6.-POMPEIIAN COoking UTENSILS in The museum at naples.

nothing can be done without formal incantations-frog dan- of all their fangs.' cings, and a great deal of talking and shouting. AfterSeyed Emman has sufficiently charmed the snakes in the baskets, he lifts off the covers of three of them, and dexterously | twitches the living contents on to the platform. The first | br |
| :--- | :--- | :--- |
| basket contained two specimens of amphisbena, or, as they | th |

"The cobra has several (some five or six) poison fangs on ach side at the edge of the roof of the mouth. Thesefangs re perforated, the bole being just large enough to admit the bristle of a hairbrush. In connection with the upper end of the tooth, there is a duct communicating with a poison gland the size of a large nut. The cobra may be said rather to strike than to bite. It does not lay hold, as does a dog, but it gives a quick and almost instantaneous stab with its teeth; the poison runs down -the word is rather injected-into the wound made by the tooth. I myself have had very unpleasant experience of cobra poison. I was dissecting a rat which had poison. I was dissecting a rat which had
just been struck by a cobra. In skinning just been struck by a cobra. In skinning it, a minute drop of the poison got under
the nail, and the symptoms were very unpleasant. I have examined the cobra poison under the microscope; it is colorless, slightly viscid, something like clarified honey. On two occasions I have watched the poison form itself into crystals when under the microscope. This had been seen and described a hundred years ago by Dr. Mead. Microscopists of the present day say that Microscopists of the present day say that
this crystallization is simply drying. Iam this crystallization is simply drying. I am
of different opinion. I believe that these of different opinion. I believe that these
crystals are sui generis. The subject is crystals are sui generis. The subject is
well worthy of further investigation, though the operation of procuring the
poison is somewhat dangerous; poison may, however, be procured from the fangs of living or recently killed vipers.
'The next trick performed by Seyed Emman is the con version of the dried skin of a little animal into a living beast, which beast turns out to be a mongoose, and a fierce little animal is this mongoose. A dried skin of a cobra is next placed on the ground, the charmer dances round it and pipes on his cocoanut a stirring strain which reminds me very much of Highland bagpipes. He rolls thisskin up and places it in a covered basket, from which basket in due time he produces a second living cobra, rather larger than the first This cobra seems a very spiteful gentleman; he made dis tinctly two or three fierce lunges at the charmer, and I could distinctly see his mouth wide open when he made his strike. This experiment of converting a dried cobra skin into a living cobra is, I should fancy, a repetition of the trick we read of in Exodus: 'Then Pharaoh called the wise men and the sorcerers. Now the magicians of Egypt they also did in like manner with their enchantments, for they cast down every man his rod, and they became serpents.' The next trick is making a shrub grow into a small tree under a basket. A seed is placed in the ground. The first time the basket is lifted off the seed has grown into a small plant. At each taking off of the basket the plant is discovered to be large and larger. The trick is very cleverly done, as the man is sitting in the middle of the stage, which is, as I said before formed of earth. Other very ingenious tricks follow, and th performance is terminated by the celebrated basket trick. The boy, Moen Deen, is tied hands and feet, and then completely inclosed in a large cabbage net. The young rascal, grinning all over with apparent delight, is then dropped, like a pudding into a pot, into a very small basket, which seem hardly big enough to hold a brace of hares; the lid is then put down. Incantations are performed while the cloth is thrown over the basket, a sharp sword is then thrust through the basket in all directions. When the cloth is removed the boy is found released from the net, and jumps out of the basket unhurt. On another occasion, when I was present, the boy disappeared from the basket, and suddenly reappeared on the platform, whence or how I really cannot understand.
'Altogether this is a very interesting performance, and brings before our eyes scenes which most of us have heard, but few have had an opportunity of seeing. After the performance was over, I interviewed the charmers; they told me they were obliged to take very good care of their cobras as the weathe was so cold. Dr. Lynn has telegraphed to India for more cobras, and some twenty thirty more of these venomous brutes are shortly expected. It will then be an interest ing sight to see Seyed Emman handle these newly caught specimens."

## Photographic Bibliography

Photography during its brief career has already had numerous applications-some exceedingly useful, but others less so. As a means of supplying facsimile copies of valuable documents it is unrivalled; and reprints, in facsimile, of original editions of the works of Shakespeare, Holbein, and other authors of past times, as well as copies of certain manuscripts of Burns and other modern authors, are now easily accessible. The forthcoming advent of th sacred writings connected with other rellgious faiths. It has been stated that there exists a law of the Mohammedan duction and multiplication of copies of the Koran. The precise nature of the existing objection to the use of types in connection with the reproduc tion of the Koran we cannot at presen ascertain, although we have made in quiries from those who are believed to be in a position to know. Hence up to the present period all copies of the Ko ran made use of by the adherents of the Mussulman faith have been labo riously produced by writing with pen and ink. That this has arisen from desire to keep their "book of the law" free from error is without doubt, al though, reasoning from strict analogy, this seems to be the very best means of introducing error.
It is pleasing to find that the high religious authorities of the Mohamme dan faith have at length decided that although the typographic art, pure and simple, may not be applied to the reproduction of the Koran, the art of photography may be invoked to provide the means of disseminating their sacred writings. It is believed that if a copy of the Koran recog. nized as perfectly accurate be placed in the light, and another copy of its pages be obtained by photo-mechanical means, there will obviously be no chance of errorm occurring
tion of printing into England has afforded certain writers an Testament, to ke found in the Imperial Library, at St. occasion for instituting comparisons between the wonderful strict surveillance of an armed guard. If this valuable work extent of the circulation of the Bible compared with the were reproduced with the degree of accuracy appertaining doctrine might not cease to existl It is well known amon religion prohibiting utilizing printing types in the repro-bibliographers who are students of the New Testament in the
in such reproduction. By means of photolithography and phototypography-the latter of which is suitable for work ing at a modern printing maching-it is not too much to say that in a brief period copies of the Koran in the original Turkish language may be as easily procurable in the town and villages of Oriental countries as they now are in London

where the English translation may be obtained at any book stall at a shilling per copy.
Of still greater interest wouid it be if the Russian Govern ment allowed a photographic reproduction to be made of


Fig. 8.-BRONZE AND TERRA COTTA LAMPS


Fig. 9.-CASTS of human bodies found at pompeil
parently trifling marks of no larger dimensions than a comma the whole sense of a passage may be inverted or, at least, seriously modified, and it has frequently been insisted that
such " marks" have been intentionally made or varied with the view of supporting special dogmas. By the production of one good photographic copy all such differences would cease to exist.
As public attention will inevitably, by the new and liberal policy of the Mohammedan religious functionaries, be directed to the reproduction of other works by similar agencies, we anticipate a rapid demand for facsimile reprints of rare works. For the most part, such reprints have hitherto been made by the aid of photolithography; and with such a work as Holbein's "Dance of Death" on our shelves before us, it would be unjust to say that this process is not equal to the task of facsimile reproduction. Still it is in phototypography that the art of reproducing scarce works will find its chief outcome, speed and quality being alike the concomiants of this method of printing.-British Journal of Phoography.

## Now Drawing Scale.

An instrument for reducing or enlarging drawings, called a planigraph, has been invented by M. Marmet, of Versailles. It consists of a rule carrying two scales which have different graduations, and are placed end to end in opposite directions. At the common origin of the scales is a needle about which the rule can freely turn. Reading on one side, the vector radii of the different points of a given figure, and marking n the other side the points designated by the same numbers, ou obtain a figure reduced or enlarged in the proportion you obtain a figure proportion ard are fixed to the rule by screws. There are five for each side, among which choice is made according to the reduction required.

## The opening of the Pormanent Exposition

The Permanent International Exposition in the Main Centennial Building, Philadelphia, was formally opened on May 10. Speeches were made by the Hon. John Welsh, President of the Centennial Board of Finance, Hon A. T俍 $f$ the Permanen Mibidion of the Permanent Exhibition Company. The music rendered by a large chorus and orchestra, was nearly the same as at the Centennial opening. President Hayes declared the show open for the season, but forgot to touch the button which signalled to start the machinery, as it was intended he should do. The crowd was large and not very orderly; but the ceremonies passed off reasonably well. At present the condition of the exhibits is as usual-by which we mean incomplete, as is invariably the case in every fair of this description on the opening day. There is every indication, however, that the display will be a creditable one; and the new arrangement of the huge building affords excellent facilities for comparison and study of exhibits. When the Exposition is reduced to good running order, we shall lay before our readers whatever there is therein of novelty and interest.

## The Fall of the Now York Post Office Roof.

The verdict of the coroner's jury, after ex amination into the causes which recently led to the fall of a portion of the roof of the new Post Office building in this city, shows that, on the removal of a wall in the fourth story, the remainder of the same wal the story above was left standing, but was supported by wo light 15 inch iron beams, which were not deemed com petent to sustain the load. Accordingly this superincum int wall was removed, and an iron truss substituted for in order to uphold the roof This truss with the iron roof beams, not being strong enough to stand the stress, the fabric, under its load of concrete, fell. Ex-Supervising Architect Mullett is charged with fault in the matter; but that gentleman appeals from the verdict, which he says emanates from professional rivals, and asks that an examination be conducted by the Chief of Engineers, U.S.A.

## Pitury, an Australian Rival to

Coca.
Baron Von Müller, of Melbourne, has at length determined the botanical source of the "pitury," a stimulant long known to be in use by the aborigines of Central Australia, and said to be of marvellous power. After some years of efforts to obtain a specimen, he has with certainty determined them to belong to Duboisia Hoprooodii, a bush referred to the order solanacece. In the Australian Medical Journal, Baron von Müller states that the natives chew the leaves to invigorate them during thei long foot journeys through the deserts just as coca leaves are used in South America. It is carried about by them in little bags. It is also employed to ex cite courage in warfare. We shall probably soon hear con cerning its therapeutic qualities.

## The Achievoments of Scionc

Dr. Oliver Holmes, the poet, author, scientist, inventor of the popular stereoscope instrument, recently delivered an mainly before the Boston Microscopical Society. It was construction of the instruments and in the discoveri their aid. "To those of my generation," he began, "this modern world which most of you take as a matter of course, it being the only condition of things of which you have had experience, is a perpetual source of wonder-a standing miracle. Science and art have in our time so changed the as pect of every-day life that one of a certain age might well believe himself on another planet or in another stage of existence. The wand of Prometheus is in our matchboxes; the rock of Horeb gushes forth in our dressing rooms; the carpet of Arabian story is spread in our Pullman car; our words flash from continent to continent; our very accents are trans mitted from city to city; the elements of forming worlds are analyzed in our laboratories; and, most wonderful and significant of all, the despotic reign of tradition received its deathblow when the angel of anæsthesia lifted from woman hood the worst terrors of the primal malediction."

## Mind and Health.

The Science of Health says on this subject: "The mental condition has more mfluence upon the bodily health than is generally supposed. It is no doubt true that ailments of the body cause a depressing and morbid condition of the mind; but it is no less true that sorrowful and disagreeable emotions produce disease in persons who, uninfluenced by them, would be in sound health-or, if disease is not produced, the functions are disordered. Not even physicians always consider the importance of this fact. Agreeable emotions set in motion nervous currents, which stimulate blood, brain, and every part of the system into healthful activity; while grief, disappointment of feeling, and brooding over presen sorrows or past mistakes, depress all the vital forces. To be physically well one must, in general, be happy. The reverse is not always true; one may be happy and cheerful, and yet be a constant suffererin body.

## Curious Electrical Exporimont.

If an ebonite electrophorus be whipped with a fox tail, it is negatively excited, and the condenser gives positive sparks. If, again, the electrophorus be rubbed with leather on which is some mosaic gold, the ebonite disk is positively excited, and the condenser gives negative sparks. It is stated by M. Schlosser, however (Poggendor.f's Annalen), that if the same ebonite disk be excited on one side with the fox tail, on the other with mosaic gold on leather, one may at any moment obtain from the same disk positive or negative electricity, according as the one or the other surface of the electrophorus is used as the source. The most important point in this double excitation is the very much greater length of spark, as is readily observed by the eye. On the other hand, considerably shorter sparks are obtained from the same electrophorus when both sides are similarly excited, for example, whipped with the fox tail.

## NEW YORK ACADEMY OF SCIENCES

A regular meeting of the Academy was held in its rooms, t 64 Madison Avenue, on Monday evening, May 1, 1877, Dr. J. S. Newberry, President, in the chair. The audience, drawn together by the announcement of an exceedingly important paper on a new and interesting subject by one of our leading chemists, was unusually large and intelligent, and included several ladies.
After the transaction of some routine business, Dr. H. Carrington Bolton read a paper on the

CTION OF ORGANIC ACIDS ON MINERALS
The speaker at first described the use of organic acids in quantitative analysis to prevent the precipitation of certain metals, and the use of tartaric acid in Fehing's sugar test, and to dissolve antimony, etc. The use of organic acids for decomposing minerals is, however, a novel one. While on a mineralogical tour in North Carolina, he had frequently felt the inconvenience and danger of carrying a bottle of mineral acid for recognizing the carbonates; and he determined, on his return, to try to substitute for it some crystalline organic acid To his surprise, the results were very satisfactory; and he extended his investigations to a dozen different carbonates, eighteen sulphides, twelve oxides, twenty-four silicates, and everal miscellaneous minerals, in all 120 specimens, embracing 90 different species. The action of citric, tartaric, oxalic, malic, pyrogallic, benzoic, and other acids was studied. The following are a few of the points noticed: Organic acids act more slowly than mineral acids, and frequently some time elapses before effervescence begins. Citric acid acts most rapidly and satisfactorily; next to this is tartaric acid; oxalic acid acts in a similar manner, but more frequently forms insoluble compounds, which are sometimes characteristic of the mineral. Acetic acid does not have any effect on the carbonates; and when heated to boiling, the acid distils off, whereas the other acids are concentrated by boiling. Glacial acetic acid does not act unless somewhat diluted. Formic acid is more active than acetic. Propylic acid decomposes several carbonates; pyrogallic acid decomposes calcite. A few experiments were made with metals. Citric and tartaric acids dissolve iron; and citric acid, with zinc, can be employed to generate arsenurietted hydrogen.
When sulphides are subjected to the action of citric acid, sulphuretted hydrogen ( $\mathrm{H}_{2} \mathrm{~S}$ ) is evolved; carbonates yield carbonic acid, $\mathrm{CO}_{2}$

In the case of minerals not attacked by an organic aci alone, the experiment was tried of mixing citric acid with altpeter $\left(\mathrm{KNO}_{3}\right)$, whereby nitric acid is generated on boil . Chlorate of potassium was also mixed with the citric cid, but with less satisfactory results.
When silicates are boiled in a solution of citric acid, silici cid ( $\mathrm{Si}_{2}$ ), either pulverulent or gelatinous, separates.
By mixing citric acid with fiuoride of ammonia $\left(\mathrm{NH}_{4} \mathrm{~F}\right.$ hydrofluoric acid is evolved, which is able to attack most of the silicates not otherwise decomposed, including all the constituents of our common rocks. The following table shows at a glance the
minerals decomposed by citric acid alone and with
The mineral tested is to be in a fine powder.
to be in a fin
In the cold.


| B. | C. |
| :--- | :---: |
| With liberation of | Co |
| Cith liberation of |  |
| $\mathbf{H}_{2}$ S. |  |$]$


|  | On boiling. |  |
| :---: | :---: | :---: |
| D. | E. | F. |
| Without evolution of gas. | With liberation of $\mathrm{CO}_{2}$. | With liberation of |
| Zincite. | Magnesite. | Bornite. |
| Gypsum.* | Siderite. | Bournonite.* |
| Apatite.* | I'yrolusitc. $\dagger$ | And those in C. | and British Provinces, with the prequency and days of issue, the politics and other distinctive features, and in most cases a statement of the amount country, there is a carefully prepared list of periodicals arranged by counties. Catalogues of daily, weekly, religious, and agricultural papers are

appended. To this is added much valuable information as to the peculiar ppended. To this is adyed much valuable information as to the peculiar The volume is handsomely printed and bound, and is embellished by porTraitson steel of leading journalists. It is sent to any address for one dollar. Messrs. S. M. Pettengill \& Co. have been our neighbors for several years, ocupying offlces in the same building with the ScIENTIFIC AMERICAN business with both advertisers and publishers.

## inventions Patentod in England by Amoricans.

 From April 10 to April 23, 1877, inclusive Breecr-loadivg Gun.-B. Fasoldt et al., Albany, Nas. Y. Cartridge Shell.-C. D. Leet et al., Springfleld, Mass. Cigar Lighter, etc.-R. R. Moffatt, Brooklyn, N. Y. Cigar Oighter, etc.-G. Selden, esie, Pa.Coal oil Stove.-J. A. Frey, New York city. Fire extinguisher.-H. S. Maxim, New Yorls city. Fluting Machine. etc.-C. M. Meserole, New York city
Fruit Jar.-A. Dickey, Middletown, Ohio. Frutr Jar.-A. Dickey, Middletown, Ohio.
Lighting Gas, etc.-E. Lindsley, Cleveland, Ohio
Lighting Gas, etc.-E. Lindsley, Cleveland, Ohio.
Loom-J. V. D. Reed, New York city.
Metallic Packing. - W. H. Floyd, Boston, Mass.
Pulley, etc.-G. G. Lobdell et al., Wilmington,
Pumping Engine.-G. F. Blake, Boston, Mass.
Putting up Powders, etc.-C. R. Doane, Brooklyn, N. Y.
Reprigerator, etc.-J. C. Mack, Brooklyn, N. Y.
Reprigerator Car.- W. H. Klapp et al., New York city.
Rock Drill. - W. W. Dunn (of san Francisco, Cal.), London, England.
SHEET METAL.-C. D. Leet
Sheet metal.-C. D. Leet et al., Springfeld, Mass.
Sugar machinery.-F. O. Matthiessen et al., Irvington, N. y.

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## Inventors who are desirous of disposing of their patents would find Inventy to their advantage toha vethem illustrated in the Scievtric And ican. We are prepared to get up first-class wood engravings of inven tions of merit, and publish them in the Scientific American on very reasonable terms. <br> We shall be pleased to make estimates as to cost of engravings on receip of photographs, sketches, or copies of patents. After publication, th cuts become the property of the person ordering them, and will be foun

## NEW MISCELLANEOUS INVENTIONS.

IMPROVED DIE FOR CUTTING LEATHER.
Albert Warren, Jefferson, O.-This die, which is made of steel, of the shape of the article to be cut, and a little smaller at its cutting end than a he other, so that the pieces cut may pass through it freely, is fitted into hole in a block of wood, so that its rear edge may be flush with the lowe it of the the shor. A blok or woug a hole formed hroug it of the same shape as the cutter serves as a base support for the die. In
using the device, it is laid upon a table or counter, over a hole in said or counter for the pieces to drop through. The material to be cut is the laid upon the edge of the die and is struck with a wooden mallet. With this construction the whole force of the blow is expended in making th cut, as the die does not have to be moved by the force of the blow.

## IMPROVED HARNESS PAD

Miron V. Longsworth, Delphos, O.-The object of this invention is to improve the construction of the harness pad for which letters patent wer granted to same inventor July 18, 1876, so as to make it stronger ard more durabie, and less liable to get out of order. The device consists in the crossbars upon the

## improved ice ax.

William H. Coleman, Salisbury Mills, N. Y.-This tool combines in a single instrument an ax for cutting ice, a pike for pushing it from place to
improved crayon for marking on glass
Bernard J. Clarke, New York city.-This crayon is adapted for marking on porcelain, glass, or other smooth surface; and it consists in a compo sition formed by mixing a pigment with melta brwat suet, and oil cedar. The marks made may be readily erased by rubbing.

IMPROVED PHOTOGRAPHIC BURNISHER
James H. Ferguson, Leavenworth, Kan.-This consists in the combination of a bedplate, to which a burnisher is attached, a feed roll, and an ad justable frame for supporting the feed roll over the brir:isher. The object of the invention is to provide apparatus for dinnining photographs, difficulty of the roll becoming moist from the condensation of the vapo from the lamp used.
improved steam tank for cooking fish and meat in
Francis M. Warren, Portland, Oregon.-One end of this tank, which is of boiler iron, is left open, and around its edge is formed a rim having a cams, which, when the door is in place, may be turned tod a number of door to its seat steam tight. In the bottom of the tank is press the said pipe, which is perforated with n merous small holes, to allow the a steam escape into the said tank freely. To the bottom of the tank is attached track for the hand cars, upon which the cans are piled, to be run in and track for the
out upon.
improved ten pin ball.
William Woods, Brooklyn, E. D., N. Y.-The object here is to improve the construction of ten pin balls, to prevent the balls from being chipped off or spints, so that they will roll perfectly true. To this end, metallic bushes are inserted in their finger holes.
mproved apparatus for drying hides.
James N. Duffy, Newark, N. J.-This invention furnishes an mproved means for drying and stretching hides. It is so constructed that the hid thus dried without fold or wrinkle.

IMPROVED CAST IRON EXTERIOR COFFIN OR VAULT.
Robert Beachman, Lyons, N. Y.-This is an improved individual vault air, and thus preserve them. It protects the body and enables the vault and body to be removed.

## IMPROVED BUTTON.

Benjamin Bailey, Yale, British Columbia.-This consists of a button with recess for attaching a spring steel hook of the suspenders, the butto plate, to the waistband of the pants.

