courses are each composed of two stones, while the fourth or moulded base, as well as each course above, is of a single stone. The total weight of the pedestal, which rests upon solid rock, is 150 tons. The weight of the entire structure is, therefore, 250 tons; the height, 75 feet 6 inches. In the curve of the mould are military emblems cut in *alto rilievo*, consisting of a field glass, the sword, scabbard, and hat of a major general, all effectively grouped. The die, 6 feet high, is 9 feet square at the bottom, tapering to 8 feet 2 inches square at the top, to correspond with the lines of the obelisk, which tapers from 5 feet 6 inches square at the base to 3 feet square at the base of the pyramid, in which it terminates, the altitude of the latter being 5 feet 6 inches. The angles and upper edges of the die, together with the neck mould, are embellished with carved Egyptian mouldings, and the four sides of the die bear inscriptions.

The stone was quarried at Vinalhaven, Fox Island, Maine, 400 miles from Troy, whence it was transported in a strongly built barge towed by a steam tug. From the dock at Troy it was moved to the cemetery on rollers by means of capstans and heavy hawsers, this part of the work requiring more time than the 400 mile sea and river voyage.

MOLES AT THE CAPE OF GOOD HOPE.

Mr. H. N. Moseley, in his Challenger notes, writing of Simons Town, South Africa, says: The sandy flats and fields about the sea shore are covered with mole hills, and bored in all directions with tunnels, large enough to admit the hand and arm easily, by the sand mole (*Bathyergus suilus*). Bathyergus is a rodent, with an excessively long pair of projecting lower gnawing teeth. It is a foot long, and covered with a light gray-brown silky fur.

There is another similar rodent mole of about half the size (*Georychus capensis*), which rather affects higher land, but occurs also sometimes with Bathyergus.

The two together are in such abundance as to cover the country in all directions with mole hills, and in galloping over the sand one is very apt to be thrown headlong by one of their galleries giving way under his horse's feet. I had two such falls in one day. A clever horse brought up in the country learns, however, while turned out on the run, to lift his foot out of a hole without stumbling.

It is the custom to call the moles, such as we have in Europe, the true moles, and to regard these rodent moles as animals which in some extraordinary way have adopted habits not proper to rodents, but natural and what is to be expected in a certain group of insectivora. But in reality, there seems to be no reason why the one set should be the *true* moles rather than the other, excepting merely as a matter of home nomenclature and prejudice. The South American rodent mole, the tucutuco (*Ctenomys*) is familiar as described by Darwin in his journal. And besides this, there are all the Spalacini, or blind moles, of which there are nine genera, including Bathyergus and Georychus, forming steps toward the ground squirrels, Geomys. Of the true moles, or insectivora, with the habits and outward shape of Bathyergus and Georychus, there are only five or six genera in all. Why should not Talpa be looked upon as the plagiarist?

There is still another very different animal, with mole-like habits, the little armadillo (*Chlamyphorus*) of the Argentine Republic. It seems remarkable that no Marsupial in Australia has become modified to suit mole-like habits. All other mammalian habits almost have been adopted by Marsupials. Bathyergus has, like our Talpa, a bare snout, and strong digging hands and feet.

It burrows of course in search of roots and vegetable food only, not for worms like Talpa. The people about Simons Town have an idea that the animals work the earth at certain stated hours, and have regular periods of rest; but I was always able, by going over a good deal of ground, to find one working at any time of the day. The heaps thrown up are huge, a foot high, five or six times as big as those of our little mole.

A fresh heap is betrayed at once by its darker color, that is, its dampness; in a few hours the dry heat of the Cape reduces it to a glistening white. One has not long to watch, standing a few yards off, before the fresh heap is seen to heave up, three or four times in succession, as the mole forces freshly scooped-out earth up with it from below.

I tried at first shooting into the heap as it was thus heaving, in the hopes of getting the mole, but never with any success.

In order to shoot the worker, the earth should be quickly thrown back from the fresh heap, and the hole laid open to the air.

One then has only to retire about ten paces and wait patiently. The mole does not like the fresh air, and in the course of five minutes or so, comes back to fill it up, but usually puts its head out for a moment first, to find out what's up, though it certainly cannot see far with its minute eyes, which are not bigger than the heads of carpet pins, the whole eye ball, when extracted, being not bigger than a tenth of an inch in diameter.

Of course a charge of shot at the moment the animal shows its head is effective. But the easiest method of getting specimens is on scraping away the earth from the fresh mound, to insert in the hole a common rabbit gin, well secured with peg and string. I trapped a good many Bathyergi in this way, and one Georychus.

Bathyergus is very fierce when dragged out of its hole, fast by one leg in a gin.

The animal bites the air savagely with its enormous teeth, which project an inch and a half from the lower jaw, and makes an angry, half snarling, half grunting noise.

I took several of the moles on board the ship alive in a sack. I let the sack swing by accident against one of my legs, and one of the moles gave me a very unpleasant nip, biting through the sack and my clothes.

When put in a strong wire cage the mole first tried to burrow, but finding that absolutely impossible, tried to bite the wires all round, and that failing, became sullen and quiet. The animal can evidently see for a short distance.

Besides these moles, which are a great pest in gardens, there is a little insectivorous mole (*Chrysochloris inauratus*), the golden mole, which is not more than half the size of our English mole, and has a dark, silky fur, shot with most brilliant metallic golden tints.

This mole makes quite superficial runs in the ground so near the surface that the earth is raised all along the run, and hence the track can be followed everywhere above ground.

When one of these is seen at work it can be thrown out with a stick or spade at once.

Progress of the Great Suspension Bridge between New York and Brooklyn.

At the last monthly meeting of the trustees of the Brooklyn Bridge the Executive Committee reported that the amount required to complete the bridge is as follows:

Estimated cost of the bridge, Feb. 1, 1879		$13,708,026.60
Expended at that date		10,103,553.54
Amount required, Feb. 1, 1879		3,604,473.06
Expended since that date up to Dec. 1, 1879	$1,006,262.04	
Cash on hand and receivable from two cities at this date	596,676.04	$1,602,938.08
Remaining to be provided for		$2,001,534.98
Add for rise in land, materials, and labor 10 per cent since Feb. 1, 1879		200,153.49
Add for contingencies		48,311 53
Grand total to be provided for		$2,250,000.00

At the same meeting the test of seven of the suspenders of the bridge in the testing machine at the U. S. Arsenal, Watertown, Mass., was reported on. The tested suspenders were chosen at random from those made for the bridge. The object of these tests was to ascertain the efficiency of the mode of securing the suspenders to the parts by which they are attached, respectively, to the main cables and to the suspended superstructure. The suspenders are attached to a wrought iron fixture at one of their ends and to a casting at the other end, by being inserted into conical sockets, 3¾ inches in diameter at the base of the cone. At the other end the diameter is just sufficient to allow the suspender to be passed through. The suspenders are secured in these sockets by spreading the wires which compose the rope, and then driving in the voids tapering pins of wrought iron; the projecting wires are turned over, and the cavities filled with lead. The tests seem to show that turning over the wires and filling the cavities with lead do not add to the strength of the fastening. The length of the tested suspenders ranged from 18 feet 9½ inches to 24 feet 3 inches. The strain to which they were subjected varied from 141,000 pounds to 194,000 pounds. In none of the tests was the full strength of the suspender ropes themselves brought out, and in no case did the suspender pull out of its socket.

The maximum stress that can be brought on any suspender from the weight of the structure alone, or the dead load, as it is termed, is 8,200 pounds, and from the movable, or rolling load, 13,125 pounds, making a total of 21,325 pounds. The mean breaking strain of the seven suspenders which were tried was a trifle over 168,000 pounds, or over seven times the strain which they will ever be required to stand. If the lowest breaking strain of the seven tests—141,000 pounds—be taken, the factor of safety will be about seven.

Facts about Gold.

In a recent lecture on gold, Professor Egleston, of the School of Mines of Columbia College, remarked that it was formerly supposed that gold was to be found only in or on the Ozoic and Paleozoic formations. When, in California, Whitney discovered it in the Jurassic, it was a revelation. It is now found in the deposits of all ages. The rock in which it lies is generally metamorphic, and therefore it is the surroundings that indicate the period. By gold we mean a yellow substance, which contains a quantity of pure gold, mixed with other substances, of which silver is almost always one. It is common to consider the quantity of gold in the world to be large. But there is only seven thousand millions worth, which is about half pure gold and half silver. The annual production is about one hundred millions worth, and the production has decreased 44 per cent during the past thirty years. The production of silver, however, has increased 100 per cent, and now equals that of gold. One third of the gold goes to wear and tear, one third goes into circulation, and one third into the arts and manufactures. All the gold in the world would make a pile only 25 feet wide, 45 feet long, and 25 feet high.

The First American Patent.

The first American patent for an invention was issued to Samuel Hopkins, at New York, July 31, 1790, for an improved process of making potash and pearlash. A recommendation to the House of Representatives to appropriate $500 for the purchase of this patent was made by Secretary Schurz, January 8. The present possessor of the document is E. T. Hale, of Columbus, Ohio. It is written on a sheet of parchment in a round, old-fashioned hand, signed by George Washington, and certified by Ed. Randolph, Attorney-General, as being conformable to the act of Congress to promote the useful arts, and its delivery to the grantee is certified by Thos. Jefferson, with the seal of the United States.

Marine Foundations.

A great deal of ingenuity has been spent by engineers in the construction of the foundations of lighthouses and other similar structures. In some of these the stones are laid in offsets to a considerable height above the rock, with the object of breaking the sea; each stone in the face is dovetailed vertically and horizontally into the adjoining stones, while a further precaution is taken by bolting each stone to the course below it by bolts of yellow metal and galvanized steel. Such a mode of construction was adopted in the Wolf Rock Lighthouse off Land's End, considered the most difficult erection of the kind on the British coast. The rock on which it was built is seventeen feet above low water. In another structure, well known, the Bishop Rock Lighthouse, which, Findlay says, is probably the most exposed lighthouse in the world, the same construction is employed, and as a rule, in most sea rock structures, massive blocks, dovetailed and doweled together, have been used A notable exception to this mode of construction was the plan devised for building the Phare d'Ar-men. The rock, Ar-men, presented formidable difficulties; it was almost impossible to obtain a secure footing, an iron structure was out of the question, on account of the difficulty of landing large pieces of iron framing; and to make matters worse, the rock was divided by deep fissures. The method resorted to was as simple as it was bold; it was decided to bore a number of holes thirty centimeters deep and one meter apart all over the site, and others outside, in order to hold ring bolts necessary for craft and to fasten lashings. In some of these holes wrought iron gudgeons were fixed for the purpose of fixing the masonry to the rock, and thus to make the construction itself serve to bind the different parts of the rock together.

In addition to these gudgeons, horizontal iron chains were introduced into the masonry courses to prevent disjunction. The gudgeons were 0·06 meter square and 1 meter long, made of galvanized iron, and the lower masonry was of small undressed stones set with Parker Medina cement. Here we find a very different principle of consolidation necessitated mainly by the difficulties of landing large materials, and also by the rock cleavage. Of course, the object of dovetailing and doweling the blocks together is not only to insure strength, but to prevent displacement of the masonry by the force of the waves during construction before the superincumbent weight of masonry could be brought to assist. In some other instances the courses of the basement are divided into a number of keystone-like parts, each of which is secured to the underlying stones by granite plugs let into the adjacent courses. Iron and screw piles have now superseded, in several cases, the solid foundations we have been describing, as in the instances of the Fowey Rocks, Ship Shoal, and other structures in the United States; but the engineer of marine works will probably sooner or later have to resort to a method of building foundations under water in which the advantages offered by the combined use of concrete and iron must be acknowledged. The government works at Dover harbor, and the harbor constructions at Douglas, in the Isle of Man, are instances in which concrete blocks of large size have been successfully employed; and the question appears to be worth a passing thought, whether or not, by the use of iron in the shape of piles or pillars, together with chain bond, smaller blocks of concrete might not be used with more economy in structures which have to withstand the force of the waves, or in places where the employment of large blocks would be attended with risk and difficulties. Blocks of Portland cement concrete might be cast or moulded into forms capable of being interlocked together in the same manner as the stones of Eddystone, the Bell, and Wolf Rock towers, and these could be secured to the rock by a system of iron uprights and horizontal bars, so that the structure may possess both vertical and lateral cohesion under the most trying circumstances.—*Building News.*

The Sun's Rays as a Means of Research.

The Photographic *News* reports that M. Raoul Pictet is about to try, on an extensive scale and experiment, having for its object the dissociation of the metalloids by means of the sun's rays By the use of a huge metallic mirror he hopes to bring such a concentration of sun rays to bear upon the metalloids as will enable him to definitely determine the truth or fallacy of the theories of Messrs Lockyer and Victor Meyer. The experiment will probably be made at Geneva, and will, by reason of its magnitude, be unique for a research of this nature.

IRON PROTECTED BY GUM.—Sheet iron covered with gum of the euphorbiacea, common and luxuriant in tropical climates, was immersed in Chatham, England, dockyard, where everything rapidly becomes foul, and when taken out was found quite clean. The gum is intensely bitter and poisonous; hence marine animals avoid it.

PAPER NEGATIVES.—The paper is covered with collodion containing an iodide, floated upon a silver bath; washed, and floated upon a tannin solution. In order to render the paper negative transparent it is dipped into a solution of castor oil thinned with alcohol.—*M. Aimé Pêligry.*

Preserve Your Papers.

Thousands of subscribers understand this, save their numbers, and have them bound at the end of the year; others thoughtlessly lose or destroy the first few numbers they receive after subscribing, and subsequently regret they had not preserved them. A year's numbers make a volume of over 800 pages, and to every one it will be found useful for reference.

Bound volumes of the SCIENTIFIC AMERICAN and SCIENTIFIC AMERICAN SUPPLEMENT, for 1879, are now ready, and for sale at the office of publication. Orders are also filled by all News Agents.

NOVEL SIEVE.

The engraving shows an improvement in flour sifters recently patented by Mr. L. H. Thomas, of Reading, Mich. It may be used for sifting the flour, and after it is sifted the

IMPROVED SIEVE.

flour may conveniently be carried in it from the bag or barrel to the tray in which it is to be mixed. A series of annular projections are formed on the handle, and marked with the quantity or weight the sieve would contain when filled to that point.

The method of using the sieve is to take it by the handle and plunge it into the flour or other material to be sifted, giving it at the same time a rotary motion. The flour passes inward through the meshes of the sieve, filling it to the point desired.

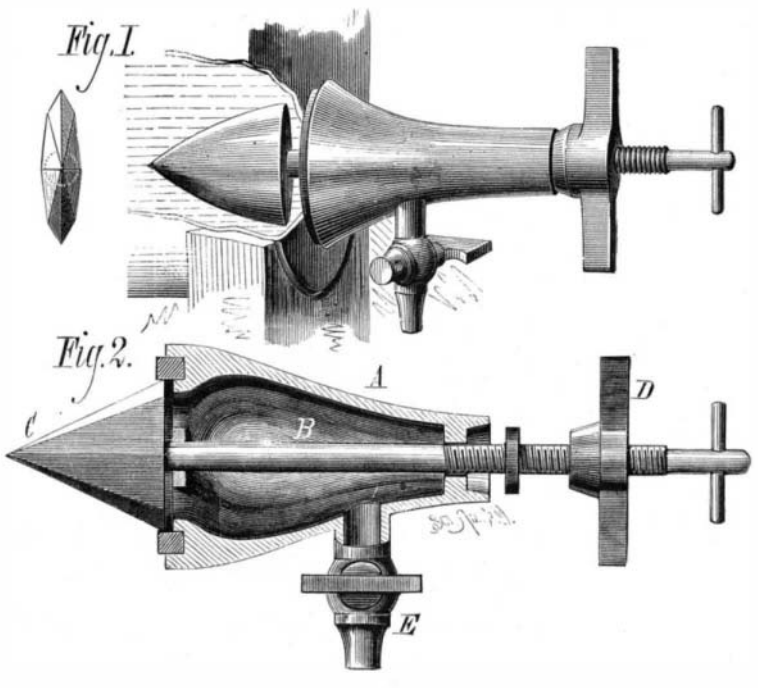
NOVEL TAP FOR TIN CANS.

We give herewith an engraving of an improved tap for tin cans recently patented by Messrs. John T. Cooper and Julius Wagner, of Silver Reef, Utah Ter. The invention is shown in perspective in Fig. 1, and in section in Fig. 2, and it consists of a bell-shaped body, A, provided with a stopcock, E, and having a central spindle extending through it, carrying atone end the triangular sharp-edged head, B, and at the other end a wing nut, D, for drawing the bell-shaped body against the head of the can. The body, A, is provided with an annular packing which insures a tight joint between it and the can, and a packing ring is placed upon the spindle, B, below the nut, D.

The tap is applied to a can by projecting the triangular head some distance beyond the body, then forcing it through the can top and turning it through a quarter of a revolution, and finally drawing the body, A, tightly against the can top by turning the wing nut.

After the tap is once in place the contents of the can may at any time be drawn out through the stopcock, E.

This device is of great utility when it is desirable to use only a portion of the contents of the can at a time, as it prevents the remainder from evaporating or becoming spoiled by contact with the air. Aside from this it has the advantage of convenience, being capable of ready application to cans of any kind.



IMPROVED TIN TAP.

A Large Merchant Steamer.

A steamship which promises to be the largest and finest vessel in the world is now building at Barrow, England, for the Inman line. Her dimensions are to be as follows: Length of keel, 546 feet; length over all, 590 feet; breadth of beam, 52 feet; depth of hold, 38 feet 9 inches, and depth from top of deck houses to keel, 52 feet. Her measurement will be 8,300 tons, or over 2,000 tons larger than either the City of Berlin or the Arizona, and 800 tons larger than the Servia, the Cunard steamship now under construction.

The vessel will be finished in about a year, and will bear the name "City of Rome." Her engines will be of 8,500 horse power with six cylinders, three of which are high pressure and three low pressure. There will be eight boilers, heated by 48 furnaces, and a speed of over 18 knots is expected.

The City of Rome is to be built of steel, with a double bottom, and 11 bulkheads. Two longitudinal bulkheads are to be run through the engines' and boilers' space to decrease the danger of the vessel's sinking in case of collision. The top decks are to be of the best teak. The saloon and state rooms will be placed amidships, and accommodations provided for 300 first class passengers.

Was Adam a Peruvian?

Dr Rudolf Falb, whose linguistic researches in South America have already been noticed in this paper, has lately sent to a Vienna paper a summary of his conclusions He says that the language spoken by the Indians in Peru and Bolivia, especially in Quichua and Aymara, exhibit the most astounding affinities with the Semitic languages, and particularly with the Arabic—in which tongue Dr. Falb himself has been skilled from his boyhood. Following up the lines of this discovery, Dr. Falb has found, first, a connecting link with the Aryan roots, and, second, has arrived face to face with the surprising revelation that "the Semitic roots are universally Aryan." The common stems of all the variants are found in their purest condition in Quichua and Aymara, from which fact Dr. Falb derives the conclusion that the high plains of Peru and Bolivia must be regarded as the point of exit of the present human race.

John Bright on the United States.

On returning from his visit to this country Mr. T. B. Potter, M.P., was given a demonstrative welcome by the Rochdale Reform Association. In the course of his remarks with regard to his visit, Mr. Potter said that after coming here from the commercial depression of England and its policy of imperialism he seemed to regain faith in the future of humanity and confidence in the English race. In America, if not in England, the people were untainted by the shallow doctrines of Jingoism and free from the benumbing social influences of privilege in church and state. He would advise all of them to go and take their wives with them. It was his pleasing duty to convey to Mr. John Bright the messages of affection and gratitude with which he had been charged from meetings in every part of the United States which he had visited, and the ardent hopes of all, from the President to the artisan, that "he will not die until he has seen America."

After expressing his regret that he had been and probably would be unable to visit America, Mr. Bright spoke at great length and with great eloquence upon the present condition and future prospects of the United States. Touching the size of the United States, he said:

"You know that France is considered rather a big country in Europe, but the United States would make fifteen times France, it would make fifteen times Germany, it would make twelve times Austria, and it would make twenty-five times Great Britain and Ireland. If you look at the map of the United States you will find in the extreme south a State which is called Texas. The size of the single State of Texas is 274,000 square miles. Austria is only 240,000, Germany is only 212,000, France is 204,000, the United Kingdom is 120,000. Texas can afford 2,000,000 acres of land to grow 12,000,000 bales of cotton, which is now about equal to the whole production and consumption of cotton each year over all the globe. This country that I am discussing has only been a country in a certain sense for one hundred years. A hundred years ago it consisted of thirteen small colonies dependent upon this country. Its population now has reached 50,000,000, which is about one-half more than the whole population of Great Britain and Ireland at this date, and I have no doubt but that there are scores in this room, if they live to the age to which I have attained, who will live to see the day when the population of the United States will pass in numbers 100,000,000 of people."

Coursing through the Air.

We have been written by a party who proposes to guarantee to any person of known responsibility, who wishes to take an interest in it, that he will produce a method by which he can direct his course through the air, the activity of which will be in proportion of the weight to the power used.

SOAP AND SHAVING BOX

The combined soap and shaving box shown in the accompanying engraving is the invention of Mr. Anton Hopfen, of New York city. It is composed of three main parts, the lid, the body, and the bottom. The latter is perforated to admit air, provided with cross bars to hold the soap up, and it may be pushed out or extended if required. The cross bars prevent the soap from stopping the perforations in the bottom. The cover of the box contains a piece of flexible rubber, held in place by two straps.

COMBINED SOAP AND SHAVING BOX.

This box is especially intended for travelers, and can be used as a shaving box by extending the bottom and covering the perforations with the flexible rubber.

PIGEONS BY THE MILLION.—The celebrated pigeon roost in Scott County, Indiana, is now, as it has been for seventy-five years, the roost of millions of pigeons. They fly away in the morning to their feeding grounds, many of them going to such a distance that they do not return until midnight. The timber on thousands of acres covered by this roost is broken down badly, large limbs being snapped off like reeds, by the accumulated weight of the birds. Thousands are killed nightly, but the slaughter seems to make no diminution in the vast flocks that congregate there.

A New Marble Working Machine.

The *Herald and Globe*, of Rutland, Vt., describes a new marble cutting machine, lately tried in that town, and pronounces it the most effective it has seen. The principle of the cutting tool consists in the pivoting of one or more toothed wheels or disks to an upright revolving spindle (the teeth of the wheel flush with the end of the spindle), with the axis of the wheels on a different line (in some cases at right angles) to that of the spindle. The revolutions of the spindle, with the teeth of the wheels pressing upon the material to be cut, cause the wheels to revolve so rapidly that the teeth chip the marble at the rate of sixty thousand strokes per minute. The wheels are set at various angles to the line of the spindle, depending upon the work required to be done, and as this arrangement will channel, turn, and flute a column, countersink, mould, panel, letter, and do filigree work, quite a number of different settings are required. Each spindle has about thirty-eight chisels or teeth, and revolves from 1,500 to 3,000 times a minute, thus giving the number of strokes stated above.

Power is communicated to the tool by means of a flexible shaft. The machine is said to work with astonishing rapidity and very economically.

Pig Iron Advancing.

Prices of pig iron are bounding upward again, and, according to the *Hardware Reporter*, some of the more thoughtful iron-makers are feeling uneasy. They fear that values are going to reach a point from which they will drop with a thud one of these days. It was thought some time ago that the English market would regulate ours, but this is proving a delusion, as prices there are bounding upward to as giddy a height as they are here. In other words, instead of the English market controlling ours, the reverse is the case. The cause of the whole trouble is a scarcity of ore. If all the American furnaces were in blast they could meet the enormous demand; but many of them cannot blow in for want of ore—and we notice by our late English exchanges that the same is true with many furnaces in Wales.