

Correspondence.

A Steam Rocket.

To the Editor of the Scientific American:

California Gulch, one of the active centers and busy thoroughfares of the great mining camp of Leadville, was shaken to its center by an explosion, on the 9th of August, at 12:30 P.M.

It seems that some lessees on the "stone mine" had a small vertical boiler 5 feet 6 inches by 2 feet attached to a friction hoister. Steam was being raised preparatory to commencing the afternoon work, when suddenly a plate in fire box gave way, the boiler tore itself loose from the bed plate, crashed through the roof of shaft house, and, rocket-like, ascended a considerable height in the air (statements of observers vary from 300 to 600 feet) and fell 180 feet from the point of ascent. A deep dent in the boiler was evidently the effect of the fall from the great height to which it ascended.

From the construction of the boiler, it was well nigh impossible to clean out the space between the firebox and outer shell. Consequently, in using the calcareous waters of the district, this space was probably filled with lime deposit. The burnt appearance of the plates and bagging or bulges between the stays would favor this view.

Scarcely any damage was done to the shaft house except the roof. One man was sitting five feet from the boiler when it exploded. He was knocked down and bruised somewhat, but was otherwise uninjured. Several other men were in the building, and escaped without a scratch. The whole force of the explosion tended to send the boiler upward, and thus happily prevented the destruction to life and property that would otherwise have occurred. DAVID J. ARGALL.

Leadville, Colorado.

Edison's Phonograph in England.

The expectation that Mr. Edison's phonograph would soon be rendered "loud-speaking"—capable, that is to say, of communicating its message to several hearers at once without the intervention of tubes extending from the instrument to their ears—has already been abundantly fulfilled. Colonel Gouraud received a large party of visitors recently, in order to exhibit to them the second instrument which he has received from America, and which, being furnished with a sort of speaking trumpet from which its sounds issue, is distinctly audible to a large group of persons. It was accompanied by a set of cylinders carrying the traces of much talking, as well as of much vocal and instrumental music, and all these, when they were put into the machine, yielded up their record with truly marvelous fidelity. One cylinder had been impressed with the habitual noises of Mr. Edison's workshop, and the listeners were entertained by a succession of sounds produced in the first instance on an anvil, with sandpaper, by a sounding telegraph, and in various other ways too numerous to mention. Another cylinder addressed the company in Mr. Edison's name, and in his voice; while a third yielded up a song from *Faust*, and a fourth "The Barefooted Friar," the traces upon all these having been made in America. Mrs. Shaw, the lady who is widely known as "La Belle Siffleuse," was among the company, and, after she had whistled to a cylinder, the phonograph was made to reproduce her notes with astonishing accuracy, and, presumably in consequence of the more intense character of the vibrations, much more loudly than those of speech or song. —*London Times*.

A Large Clock.

A new clock, weighing 2½ tons, has just been placed in the tower of the Glasgow University, similar to the great clock at Westminster. The frame of the clock newly erected is horizontal and of cast iron planed. It is 6½ feet long, 2 feet wide, and 1½ feet in depth. It is supported on beams built into the wall of the tower, so as to obviate vibration. The wheels, which are of gun metal, can be moved separately, as the pivot holes are screwed to the frame. The main wheels of the striking and quarter trains are 20 inches in diameter, and attached to them are cams to lift the hammers, which are fixed in iron frames connected with the clock by cranks, and having a check spring to prevent vibration. The weight of the hammer that strikes the hour is 120 pounds, and it is lifted 10 inches. There is an automatic apparatus attached to the clock, which stops the quarter peals at night and starts them in the morning. The escapement of the going part is known as the double three-legged gravity, invented by Lord Grimthorpe. The pendulum is of zinc and iron, to counteract influences of temperature. The tubes are arranged so that the expansion of one raises the center of gravity, while that of the other lowers it. The bob of the pendulum is cylindrical, and weighs 3 ewt., and the beat is 1½ seconds. The "bolt and shutter" appliance of the nobleman already named maintains the motion while the clock is being wound. Messrs. J. B. Joyce & Co., Whitechurch, Shropshire, manufactured the clock. —*Engineering*.

Feathered Artists.

BY JOHN R. CORYELL.

In looking for the artists among the birds, one would hardly think of going to the crows to find them, and yet it is among the crows that the feathered artists are most common. The Baltimore oriole, for example, which shows a plain love of the beautiful by weaving into its nests as many bright colors as it can, is a cousin of the crow and should properly be called a starling. Give the oriole a choice of building materials, and repeated experiment has shown that it will always select the brightest colors.

But the most famous artists of the crow family are the bower birds of Australia. And among the bower birds the spotted collar bird is the most artistic. It builds but an ordinary nest for the laying of its eggs and the rearing of its family in, but to compensate for the lack of taste displayed there, it exerts itself like the ideal socialist to apply its talents for the general good. Ordinarily in the bird world the female is the architect, but with the bower bird this is not the case. The male birds at certain seasons of the year come together with as much system as the beavers when building their dams, and unite for the erection of what have been aptly called assembly rooms. In shape these structures are bower-like; hence the name given the bird. In purpose they are literally for the assembling of the two sexes at pairing time, when every male bird in his best plumage attends and disports himself in the way which to him seems best calculated to win him the object of his affections. The male birds having given their time and talents to the building, think perhaps that they have the best right to the privileges of the place. However that may be, they certainly do most of the promenading and dancing. They actually do dance, seeming, moreover, to enjoy the exercise. They are not so selfish, however, as to exclude the females from the delights of this pastime, but permit them to dance as much as they choose, only observing the decorous rule of dancing singly instead of in pairs of opposite sexes.

A remarkable degree of ingenuity and skill are displayed in the building of the bower. A flooring of about two feet by three is first woven of twigs. Other twigs of a curved shape are disposed along the length of this platform in such a way that the tops meet in an arch over it. These are held firmly in place by being inserted in the ground and by having stones laid all along their bases. If these twigs forming the sides of the bower are found to have projecting twigs on them, they are removed and others are put in their places, for nothing is permitted in the bower that is at all likely to injure the plumage of the festive birds. Other twigs are woven laterally into these twigs to give the structure greater strength, and the inside of it is lined with tall, soft grass, so disposed that the tufted heads meet near the roof. The grass is kept in place by a row of stones arranged along the inner base of the bower. The structure being completed, the birds go out upon a search for objects with which to ornament not only the bower itself, but the approaches to it as well, for the entrances to the structure are marked by well defined pathways lined by small white pebbles in the manner of some of our country garden walks. The ornamental objects sought are required to be either pure white in color or brilliant or glittering. Bleached bones, bright seeds, gay shells, feathers, agate, and the like substances are most commonly employed. In front of each entrance a little mound covered with ornamental objects is placed.

In Africa there is a bird which, like the bower bird, combines the qualities of architect and decorative artist, with the difference that this bird divides the talents between the sexes, the female being the architect and the male the decorator. The house, for such it really is, is a notable affair, consisting of mud and twigs, and covering an area of fifty square feet in some instances. One observer has described this extraordinary structure in these words: "The doorway to this dwelling is placed on the lower part of the slope, in order that rain may not cause an inundation of the habitation. A level platform of wood is then built at the higher end of the structure, and a carpet of some soft vegetable material is laid on it. A partition wall with a doorway is then raised to cut this portion off from the main room, for this is the mother's chamber and the nursery. Another portion of the dwelling is then partitioned off for use as a storeroom, and it is the male bird's duty to stock it with provisions against a bad season. The remaining space in the house is retained by the male bird as a sort of guard house and resting place combined."

No sort of decoration is allowed by the mother bird to encumber the interior of the house, but apparently she does not care what the father does with the outside, provided only that he first procures food before giving himself up to his artistic instincts. The things which he collects show his catholic taste in art. Anything glittering or odd in shape will please him, and, if the truth be told, his house in the end comes to look like a refuse heap or a modified city dumping ground. The passion of the hammerhead for *objets de vertu* is such, and so well understood among the natives, that

when one of them loses any specially glittering or gaudy article, he at once sets out for the nearest hammerhead house and there searches for it.

In a certain sense the gardener bird of New Guinea is more remarkable than either of the foregoing birds. It is not a well-known bird, and most of what we know of it is derived from the account of an Italian naturalist, Dr. Bessari, who had heard of it from the natives, but would not believe what he was told until he had verified their words by actual observation of his own. It is a sober-colored little bird, and, like the bower bird, does not devote any of its artistic tastes to the beautifying of its own home, which is as simple as the circumstances of a nest in that region will allow.

It is on the public assembly room that it exercises all its strange powers. When the time for building has come, a level spot, upon which a stout, upright shrub is growing, is selected, and all around the shrub, as around a tent pole, the edifice is erected. The apex of the tent is about twenty inches from the ground, and the base is nearly a yard in diameter. The sides are formed of stems tightly interwoven until a waterproof material is made. An arched doorway is made in the most convenient side, and a gallery is constructed all around the interior of the building. An embankment of moss holds the central pillar firmly in its place.

But it is on the grounds that the artistic feeling of the bird shows itself, and these are thus described: "The grounds cover about the same space as the house, and are made green and lawn-like by being covered with patches of moss brought thither for that purpose. Over the lawn are placed in artistic manner bright flowers, fruits, and fungi. Insects, too, which are attractive by reason of brilliant coloring, are captured and disposed about the grounds. Nor is this all; the inner gallery is also decorated with these bright objects. And when the ornamental fruits, flowers, and insects begin to fade, they are removed and replaced. Moreover, with evident design, the material of which the house is built is a species of orchid which retains its freshness for a very long time."

Besides these birds, there are many others which in one way or another exhibit real artistic feeling. The baya bird of Asia, for example, decorates its nest, itself an elaborate structure, with fireflies, which, in the night, give out their brilliancy, much as our houses when, on the occasion of a garden party, we hang them about with Chinese lanterns. The humming bird, too, shows a distinctly decorative sentiment when it covers the outside of its nest with gayly colored mosses and lichens.

Mahogany the Best Finishing Wood.

As is known to every woodworker, mahogany has no equal for durability, brilliancy, and intrinsic value for any work which requires nicety of detail and elegance of finish. Cherry, which is a pretty wood for effect and extremely pleasing when first finished, soon grows dull and grimy-looking. Oak, which has been so much used of late, is attractive when first finished, but experience teaches that it does not take many months to change all this, and instead of a light, fresh-looking interior, one that has a dusty appearance is presented, which no amount of scraping and refinishing will restore to its original beauty. What applies to oak is yet more applicable to ash.

Mahogany, however, seems to thrive best under the conditions which are detrimental to these other woods. At first of a light tone, it grows deeper and more beautiful in color with age, and although its first cost is more than these other woods, yet its price is much less than is popularly supposed, and the only objection urged against it has been cost. What is more valuable, however, and what makes mahogany in reality a less costly wood, is the fact that, unlike cherry, oak or ash, it is easily cleaned, because it is impervious to dust or dirt, while it does not show wear, and instead of growing duller, grows brighter and more pleasing in appearance. While first cost is more than that of cherry, oak or ash, it is nevertheless true that the judgment of many men has led them to regard mahogany as the cheaper wood when its durability and cleanly qualities are considered, and to-day it takes front rank in first class material. —*The Builder and Woodworker*.

Adhesive Qualities of Onions.

Paper pasted, gummed, or glued on to metal, especially if it has a bright surface, usually comes off on the slightest provocation, leaving the adhesive material on the back of the paper, with a surface bright and slippery as ice. The cheaper description of clock dials are printed on paper and then stuck on zinc, but for years the difficulty was to get the paper and metal to adhere. It is, however, said to be now overcome by dipping the metal into a strong and hot solution of washing soda, afterward scrubbing perfectly dry with a clean rag. Onion juice is then applied to the surface of the metal, and the label pasted and fixed in the ordinary way. It is said to be almost impossible to separate paper and metal thus joined. Probably metal show tablets might be successfully treated in the same manner.

Invention and Discovery.

Two words which glibly enough fall from the lips of the average man in a careless sort of indiscrimination as if they were synonymous. But there is a vast sea of distinction between them. Literally, they are not so widely separated; but they have come to represent two totally different aspects of human action. To the writer's thinking, the terms have been greatly confused.

Columbus hardly *discovered* America, he *invented* it—that is, as to its cognizable existence. He studied, figured, applied the laws as he knew them, and determined that there must be a continent there, and he plodded on till he proved the fact, and reduced his invention to practice.

Newton *discovered* the law of gravity, one might say, without either mental or physical effort. Watt *invented* the steam engine, and Stephenson *invented* the locomotive. They felt and knew the goal was ahead, but how to reach it was the question which required invention of the highest order. Eli Whitney saw the painful and laborious methods of cleaning out cotton and shredding it, intuitively felt it could be done by machinery, went to *work*, and gave the world one of his great inventions, the cotton gin. Howe's great inspiration to place the eye at the point of a needle may be said to have been a discovery. It unfolded a picture to his mind prophetic of good to almost countless millions, but *invention* had to be invoked to give the picture life, and the sewing machine, in all its beauty, came slowly forth from the chrysalis of Howe's discovery. The irregular lathe and the modern harvester were inventions: their dim, indefinable forms loomed up in the mists of their inventors' minds, they felt the impulse of improvement, the value of the goal gained, and they went to work and at last succeeded, and the wood carver and reaping hook lost their usefulness to that extent.

The electric telegraph was never discovered; it was consistently invented. Countless devices and methods were designed, tested, thrown away—to be afterward revived, many of them—new appliances and systems laboriously worked out, the midnight oil unsparingly sacrificed, until at last a perfected and practical system and apparatus were given to the world.

It is hard to say whether the dynamo was invented or discovered, considering its prototype, the magneto machine. The probabilities are it was an accidental discovery. The arc light was a discovery pure and simple. Electric incandescence was a discovery, but the incandescent lamp in its commercial form stands forth as one of the most beautiful examples of man's inventive faculty. The countless experiments on material, the bulb, the seal, the standardizing, the pumps, and all the appliances that go to provide us with the beautifully glowing luminary, all are ineradicable proofs of invention of the very highest order. Midnight oil and noonday sun, morning's vigor and evening's reposeful ruminations, were all called into requisition to complete the work. This is true invention.

The phonograph was originally a discovery, a happy thought of Edison's, but invention of a high order was necessary to produce the beautiful instrument of the present day. It was like Howe's needle—the germ was there, but the machine had to be devised to make it practicable.

The undulatory telephone was a discovery, a brilliant one, but still a discovery. A happy thought supplied the missing link in an incomplete chain, and when the weld of that link was accomplished the whole world was enchained in admiration, the wonderful utility of the device was quickly recognized, and the discoverer reaped a rich harvest.

The pneumatic process of Bessemer was an invention of high grade and far-reaching importance, and the Siemens regenerative furnace has proved its equal in merit as a methodical and logical invention beautifully carried out.

The inventor sees his goal, and consistently strives for it. He knows the object is there, and he goes energetically after it, sometimes straight to it, but oftener is many times lost in the wilderness of deluded fancy. He sees a light ahead, sighs relief and darts after it, only to find it a will-o'-the-wisp. Undaunted, he starts again, only perhaps to meet other and worse misfortunes. But he struggles on hopefully, and at last reaches the shrine of his adoration and is for the time content.

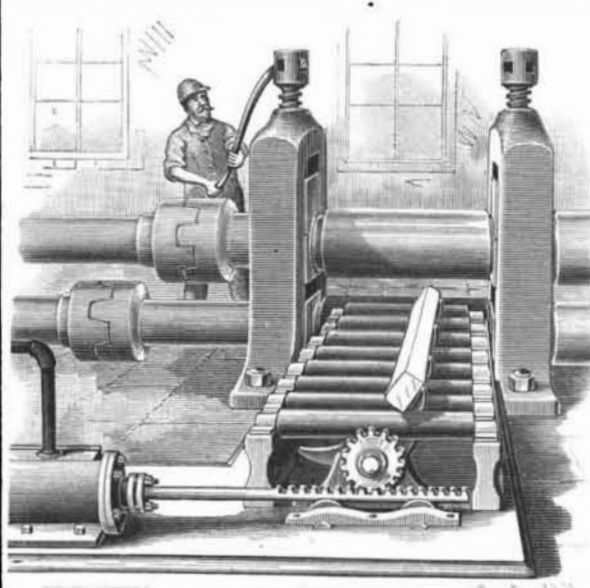
The discoverer walks along calmly toward some goal, or lies on the roadside meditat-

ing, and happening to cast his idle eyes downward, sees a gem sparkling at his feet, and he sometimes picks it up and adds it to the galaxy of the world's diadem, but he as often fails to note the scintillations that betoken its preciousness, and spurns it back into the deeper dust, to lie unseen and unknown perhaps for ages.

Which of these two promoters of the world's welfare merits the higher praise, it is needless to ask.—*Electrical Review.*

AN IMPROVED INGOT MANIPULATOR.

An improved apparatus to facilitate the handling of steel blooms, billets, slabs, etc., in a rolling mill, is illustrated herewith, and has been patented by Mr. Orlando P. Mason, of Bellaire, Ohio. The tables by



MASON'S INGOT MANIPULATOR.

means of which the ingot is fed to the rolls have driven rollers on which the ingot lies, and by which it is moved backward and forward as it is passed to and fro through the rolls. A horizontal shaft is arranged on bearings under the rollers, and provided with a series of projecting arms, preferably of crescent shape, at right angles to its axis, the arms extending upward between the rollers, and the shaft being operated by a pinion working into a rack actuated by a hydraulic cylinder, by a small reversing engine, or in any other suitable manner, the length of the rack being such as to allow the shaft to make one complete revolution. With this construction the ingot, as it lies on the rollers, can be readily moved from one side to the other, the crescent-shaped arms catching the piece on its lower corner and tumbling it over, as the horizontal shaft is put in motion by means of the reversing engine or other power.

For further information relative to this invention address Mr. John W. Cabot, Bellaire, Ohio.

NEW TYPE OF PHOTOGRAPHIC PORTRAITS.

Fig. 1 is the exact reproduction of a photograph. It gives a genuine portrait under the form of a marble bust. How such a result may be easily obtained is shown in Fig. 2. The model is placed behind a hollow column or thin pedestal of painted wood. If it be desired to represent a Roman emperor, a helmet of white



Fig. 1.—A PHOTO BUST.



Fig. 2.—HOW THE BUST IS OBTAINED.

cardboard is placed upon the model's head, his hair and face are whitened with rice powder, and those portions of the body that it is desired to render visible are surrounded with white flannel. The background should be formed of black velvet. It in no wise interferes with the operation if the arms be raised. After the negative is developed, the figure that it is desired to preserve is cut around with a penknife, and the arms and all the portions that are not wanted are scratched out. The glass thus becomes transparent where the scratching has been done, and in the positive the bust stands out from a black background.—*La Nature.*

Electrical Street Railways.

"The Solution of the Municipal Rapid Transit Problem" was the subject of a paper recently read before the American Institute of Electrical Engineers by Frank J. Sprague. The actual operation of street railroads by electricity is bringing to view the obstacles which are to be overcome, and the success already attained leads Mr. Sprague to believe that municipal rapid transit is to be solved by the adoption of some system of electrical propulsion. It is his opinion that the data and experience obtained in the operation of the Union Passenger Railway in Richmond, Va., prove that electricity meets all the requirements for traffic of that character, while the grades are heavier and the curves sharper than will be encountered in most American cities. The Richmond road aggregates thirteen miles of track through nine miles of streets, and is operated from a central station, the power being derived from three 125-horse power engines. The cost of running the cars is \$1.98 for operating and \$1.48 for station expenses—a total of \$3.46 per car per day or eighty-mile run. This does not include executive expenses, taxes, nor general charges of that character. The overhead system he considered the best and most economical, and, if properly constructed, has no objectionable features. For the operation of a similar surface railroad in New York City, conductors could be advantageously suspended underneath the elevated railroad structure.

The Fortifications of the Future.

General Brialmont, Inspector-General of Belgian Fortifications, says the defenses of the Meuse are the material guarantee of Belgian neutrality and autonomy, and constitute a line of defense for France. The valley of the Meuse is continued in France by the valley of the Oise, which is not sufficiently defended. The twenty-one forts which are being constructed in Belgium, and which are capable of offering effectual resistance, are a barrier closing at the same time the gates of Belgium and those of France. Thirty months will suffice for their construction, which has been undertaken by competent French contractors. The system adopted is that of metallic cupolas. Metallic cupolas will be the fortifications of the future. The common belief that the power of explosives may be indefinitely developed is, says the general, contrary to facts. All recently invented explosives are of nearly the same value. There is no reason to believe that greater destructive force can be obtained by means of explosives. The steel cannon hooped with iron represents also the maximum of resistance which can be obtained from the tube conveying the explosives. The problem of defense is thus simplified, as the projectiles which can be directed against the metallic cupolas have arrived at the highest possible degree of power. The metallic cupolas resist the most powerful cannon, and the ripping of some cupolas during the recent trials at Chalons does not prove the contrary, because no work can withstand a protracted fire at only 200 meters distance. In regular war there is no firing at 200 meters. Germany is erecting metallic cupolas in her fortresses, while France is only discussing the matter, and has virtually no longer a fortified frontier on the east.

Dangers of the Emery Wheel.

By the bursting of an emery wheel in the carriage factory of R. M. Stivers, in East Thirty-first Street, this city, Henry Dunwald, a young grinder, was killed. He was bending over the wheel, and some of the flying fragments crushed in his chest. Dunwald was twenty-two years of age and unmarried. He had selected the wheel as one without a flaw, and he had sole charge of it in the factory.