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PRACTICAL DIVISIBILITY OF THE ELECTRIC LIGHT.

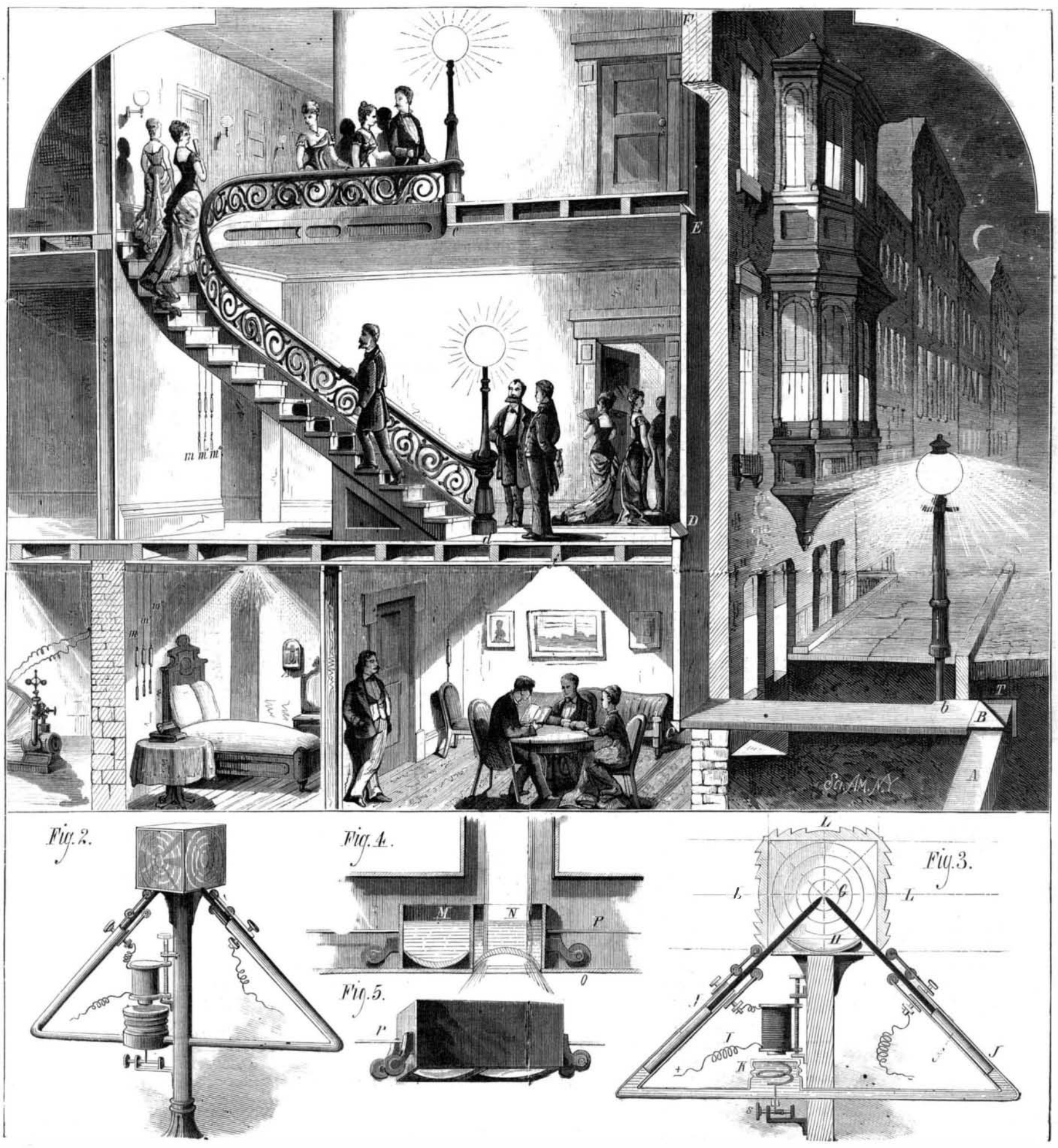
Electric lighting has advanced in the last three or four years from a mere experimental stage toward the practical and useful solution of the great problem.

The desirability of the electric light has been generally admitted, and its sanitary advantages have been conceded even by its opponents, while its entire freedom from danger of every kind is not the least of its advantages. According to the opinion of several eminent experts, it can be produced on a large scale at prices which compare favorably with those of gas at its cheapest.

The daily increasing use of the electric light is an evidence in its favor. So far, however, it has been applied to the illumination of large areas, and it has been generally believed that its application to household purposes, or to other uses where it must be subdivided, is exceedingly difficult, if not altogether impossible. There are certain practical difficulties in dividing the electrical current, so as to produce a number of small lights by means of a single generator, which have baffled the ingenuity of inventors so far, and which must effectually block the progress of subdivision in this direction, unless some new principle is discovered. It is stated that no matter how cheap the original current may be produced, the loss by division is so great that small lights must be expensive.

In the system illustrated in our engraving, Messrs. Molera & Cebrian, civil engineers, of San Francisco, Cal., have attempted the direct division of the light. They employ optical contrivances, leaving the current undisturbed and undivided, doing away with expensive electrical conductors, and dispensing with lamps or regulators at points where the lighting is to be utilized.

[*Continued on page* 389.]



MOLERA & CEBRIAN'S SYSTEM OF ELECTRIC LIGHTING.

gypsum with charcoal. The most refrangible or actinic rays are most active in producing this phosphorescence, or fluorescence.

Mr. Woodbury, so far as we know, is the first to give this property a practical purpose in photography. He applies the sulphide of calcium in powder to the image formed by light on a surface possessing an elective degree of tackiness, and the image being so formed and submitted to the action of sunlight, or even a good artificial light, presents a luminous picture in the dark. Used with judgment, such portraits may be found very interesting, while, perhaps, nothing could be more ghastly than the unexpected presentment of such a portrait of a deceased friend.

To those of our readers who may desire to study the question of phosphorescence generally in connection with this subject, we cannot recommend any better assistance than the very interesting work on "Phosphorescence, or the Emission of Light by Minerals, Plants, and Man," issued by Dr. Phipson a few years ago.—*Photographic News.*

PRACTICAL DIVISIBILITY OF THE ELECTRIC LIGHT.

[*Continued from first page.*]

A single electric lamp placed near the current generator supplies light for a building or a street. This lamp is surrounded by a system of lenses and reflectors forming a chamber of light, as represented in Figs. 2 and 3. These lenses concentrate the whole of the light into as many beams of parallel rays as there are faces in the chamber. In this form the light may be projected through long distances. The intensity of the light when not condensed is inversely proportional to the square of the distance from the source of light, but when the light is projected in parallel rays and is prevented from radiating, its intensity remains unchanged, except perhaps a small loss by the absorption of the atmosphere.

From every face of the chamber of light a box or pipe projects, which incloses the light beam. These pipes are laid along the streets, as seen at T in the larger engraving, and they are placed along the walls and floors of the building.

At every side street a smaller pipe branches out of the main one, and at their junction there is a reflector, which, by its size and position, will divert into the side street any desired percentage of the entire light. By means of this device every street in a city may be provided with one or more pipes carrying a certain amount of light that is always controllable by merely changing the position of the reflectors. This arrangement may be compared to valves and water gates of a system of water distribution.

Service pipes lead from the street pipes to the lamp posts and to the buildings, and at the intersection of the service pipes with the street mains there is a reflector, the size of which will determine and control the amount of light supplied by the service pipe.

The larger engraving shows, at T, the street main pipe and light beam, A. B is a reflector or totally refracting prism, which sends a portion of the main beam of light into the service pipe, B C, which, in the present case, supplies both the street lamp and the building. Another reflector or prism, *b*, bends a portion of the supply beam upward into the lamp post; this vertical beam strikes a reflector of suitable shape, which diffuses the light as may be required, the manner of diffusion depending of course on the form of the reflector.

The horizontal light beam, B C, reaches the vertical supply pipe, C F, laid along the wall of the building, and the reflector at the juncture of these two pipes bends the beam upward.

At D, E, F, there are other reflectors, each of which, according to their size and position, will bend horizontally the amount of light required for each floor. These smaller beams are projected through pipes laid along the floor joists. The horizontal beam, D *d*, is partly intersected by a reflector at *f*, which bends downward a portion of the beam which enters the room below through a diffusing lens (shown in detail in Figs. 4 and 5), called by the inventors a secondary lens, which sheds the light in any predetermined direction, according to the shape and curvature of the lens. The remaining portion of the beam passes on to illuminate other rooms, including the hall above, which receives its portion from a reflector at *d*.

The arrangement just described is duplicated on the other floors and modified to conform to the varying requirements of the different stories.

When it is desired to distribute light to rooms not in line with the main pipes, a double reflector may be used to divide the principal beam into two lateral ones, which will illuminate two or more adjoining rooms.

It will thus be seen that all of the rooms in a building may by illuminated by a single beam, and that the light may be divided without material loss. The reflector, B, controls the supply of light for the entire building, and the amount of light may be regulated or it may be shut off altogether by moving the reflector. In like manner the reflectors, D E, will control the light for their respective floors. If they are stationary the percentage of light for each floor will be constant, but if either of them is arranged to slide into and out of the light tube, it will vary the amount of light supplied to the corresponding floor at the expense of the other floor. The light in any of the rooms may be increased or diminished in a similar way. The reflectors are sometimes arranged to slide laterally, so as to increase the light or decrease it to a mere glimmer, or even shut it off altogether without affecting the light supply of the other rooms. In the left hand rooms there are at *m m' m''* cords or handles connected by cords or wires to the prisms or reflectors, which, being pulled or turned more or less, will slide the prisms or reflectors; in this way the light may be perfectly controlled with less effort than is required to turn a gas key.

The secondary lenses, which are shown in detail in Figs. 4 and 5, are made movable, and a set of two or more of them is supplied to every room. These lenses are moved by the cord, P, which is connected with one of the handles, *m*. By moving the handle either of the lenses may be brought into line with the beam of light. These lenses will diverge the light more or less according to their curvature, so as to illuminate a part or all of the floor, or the entire floor and as much of the walls as may seem desirable.

The lenses, in addition to the sliding motion, have a swinging motion, by means of which the light may be projected in any required direction, rendering it unnecessary to place the table exactly under the lens. The inventors state that these lenses will answer for all household purposes, and that by means of lenses of different kinds a very wide range may be given to this system of lighting; for example, if a condensing lens is employed the light will be concentrated at a single point, so that it may be used to advantage by the microscopist. If no lens is employed the beam of parallel rays may be used in the magic lantern and in other apparatus for projection. It may also be employed in philosophical experiments, in medical examinations, and surgical operations. There are many branches of industry, now requiring daylight, which could be conducted in the night by means of the condensed light.

Another advantage in this system is that the color of the light, as well as its intensity, may be readily modified by means of colored glass slides. This is especially convenient in photography, where lights of different colors and of differing actinic power are required. This feature will also render the light valuable in treating ophthalmic diseases at home and in hospitals. There are many uses to which this system of lighting seems adapted, which, for want of space, cannot be mentioned.

As to economical advantages it will be noticed that regulators or lamps are entirely dispensed with, and that attendance is consequently not required.

Another important feature is that a large generator of electricity may be employed, thereby greatly reducing the cost of the production of the electrical current. The loss consequent upon the use of electrical conductors is entirely avoided, as the single lamp needed is located near the generator, permitting of the use of a short and thick conductor having practically no electrical resistance.

A great advantage in having only a single lamp for a large system is that a vacuum may be maintained in the chamber of light without difficulty, thereby preventing the rapid combustion of the carbon, which always occurs when the electric arc is maintained in air. The cost of the carbons, as well as the labor of replacing them, which, in the ordinary electric regulators, is something considerable, is entirely avoided.

Besides being adapted to the illumination of large and small areas, this system of lighting appears peculiarly suited to certain applications for which other lights are totally unfit; for example, mines may be safely illuminated without fear of explosion and without increasing the temperature or vitiating the air. In warehouses, storerooms, powder works and magazines, chemical factories, and the like, this system can be used with perfect safety. It is also adapted to the illumination of railroad tunnels and similar places.

Messrs. Molera & Cebrian exhibit some very flattering figures based upon an expenditure of twenty horse power, which, as we have already learned, is not sufficient to obtain the most advantageous results. They claim that they are able to produce by their system 195 lights per horse power giving a light equivalent to 1,958 candles, and that the cost of lighting is less than one twentieth the cost of gas.

The lamp used in connection with this system is so clearly represented in the engraving as to require little explanation. Fig. 2 is a perspective view, and Fig. 3 is a vertical section.

Chamber G, before referred to as the chamber of light, is surrounded on the sides and top by lenses, L. At the bottom there is a concave reflector, H, and at the center two carbon rods converge. These rods are supported by pistons or floats in inclined tubes, J, which are connected at their lower ends by a horizontal tube communicating with the spring acted bellows or cylinder, K. The tension of the spring that draws the top of the bellows down, may be changed by revolving the small windlass, S.

The top of the bellows is iron, and above it is supported an electro-magnet, which is in the electrical circuit. The carbons pass between conducting surfaces, and are also in the electrical circuit. The tubes, J, as well as the horizontal tube and the bellows, are filled with a suitable liquid. As the current passes from one carbon point to another the core of the electro-magnet becomes magnetized and attracts the head of the bellows with more or less force, maintaining a uniform light by governing the distance between the carbons by displacing the liquid in the tubes and throwing the pistons or floats up or down, according to the strength of the current.

Should the current cease the spring draws down the head of the bellows and the points of the carbons touch. When the current is too strong, the top of the bellows is attracted upward, and the carbons separate.

Rats in Brazil.

Mr. Orville A. Derby contributes to the *Rio News* some interesting information on the plague of rats in Brazil. From time to time in all parts of Brazil the plantations are subject to the depredations of armies of rats that issue from the forests and consume everything edible that comes in their way. During a recent excursion in the province of Paraná Mr. Derby found an almost universal lack of corn throughout the province, due to such invasion of rats, by which almost the entire crop of last year had been destroyed. This invasion, or plague as it is called, is said to occur at intervals of about thirty years, and to be simultaneous with the drying of the *taquara*, or bamboo, which everywhere abounds in the Brazilian forests. The popular explanation is that every cane of bamboo sprouts with a grub, the germ of a rat, within it, and that when the bamboo ripens and dies the germ becomes a fully developed rat and comes out to prey on the plantations.

An educated and observant Englishman, Mr. Herbert H. Mercer, who has resided a number of years in the province and had an opportunity of studying the phenomenon, furnished Mr. Derby the following rational and curious explanation: The bamboo arrives at maturity, flowers, and seeds at intervals of several years, which doubtless vary with the different species. The period for the species most abundant in Paraná is thirty years. The process, instead of being simultaneous, occupies about five years, a few of the canes going to seed the first year, an increased number the second, and so on progressively, till finally the remaining and larger portion of the canes seed at the same time. Each cane bears about a peck of edible seed, resembling rice, which is very fat and nourishing, and is often eaten by the Indians. The quantity produced is enormous, and large areas are often covered to a depth of five or six inches. After seeding the cane dies, breaks off at the root, and falls to the ground, the process of decay being hastened by the borings of larvæ which live upon the bamboo and appear to be particularly abundant at seeding time. These larvæ have doubtless given rise to the story of the grub developing into a rat. New canes spring up from the seed, but require seven or eight years to become fit for use, and thirty to reach maturity.

With this sudden and constantly increasing supply of nourishing food for a period of five years, the rats and mice, both of native and imported species, increase extraordinarily in numbers. The fecundity of these animals is well known, and the result after four or five years of an unusual and constantly increasing supply of excellent food and in the absence of enemies of equal fecundity, can readily be imagined. The last of the crop of seed being mature and fallen to the ground, the first rain causes it to decay in the space of a very few days. The rats, suddenly deprived of food, commence to migrate, invading the plantations and houses and consuming everything that does not happen to be repugnant to the not very fastidious palate of a famishing rodent. If this happens at the time of corn planting, the seed is consumed as fast as it can be put into the ground. Mr. Mercer, who plants annually about fifty acres of corn, replanted six times last year, and finally gave up in despair. The mandioca is dug up; the rice crop, if it happens to be newly sown or in seed, is consumed, as is also everything in the houses in the way of provisions and leather, if not carefully guarded in tin trunks.

A Permanent Exhibition in Boston.

It is reported that the New England Manufacturers' and Mechanics' Institute is completing the erection of a suitable building for the permanent exhibition of the industrial products of New England, with stated fairs and special exhibitions. The proposition is to make each exhibitor pay a small rental for the space occupied, and to distribute the interest in the undertaking as widely as possible throughout New England, the shares being put at twenty-five dollars, and no one man allowed to take over four shares. A fair will be held as soon as a place and funds are secured, and thereafter annually, beginning the first Wednesday of September.

When America was Named.

The Lenox Library, in this city, is very rich in old books, many of them relating to the discovery of America. Among these is the "Cosmographiæ Introductio" of Hylacomylus, printed in 1507, in which the name of America was first suggested for this continent. "Hylacomylus" was the Hellenized form of the name of Martin Waltzmüller, a professor in the gymnasium of St. Die, in Lorraine. In this "Cosmographiæ Introductio," on the fifteenth leaf, appears the suggestion which named the continent, of which the following is a translation: "But now that those regions have been more extensively described and another fourth part has been discovered by Americus (as will appear in the sequel) I do not see why it should not be named America, that is the land of Americus, after its discoverer, Americus; a man of sagacious mind, since both Europe and Asia took their names from women." The popularity of this early geography led to the immediate adoption of its author's suggestion, and the new continent was called America by other writers.

CURE FOR HICCOUGH.—Under this title Dr. Grellet, of Vichy, states that he has never failed in immediately relieving hiccough, *i. e.*, not dependent upon any appreciable morbid condition, by administering a lump of sugar imbibed with vinegar.—*Revue Medicale.*

A Careless Meteor.

In the northwest corner of Emmett county, in the township of the same name, State of Iowa, bordering Minnesota State line, a meteor of unusually large dimensions recently fell. A correspondent of one of our Western contemporaries, who has visited the place, thus describes the meteor and the scene attending its descent:

It was about 5 o'clock in the afternoon that a terrible, indescribable noise was heard, scaring the cattle and terrifying the inhabitants for twenty miles about. There was a line of yellow-reddish smoke-colored haze, inside of which was an infernal rumble, as, at the rate of fifty miles a second, this strange, howling monster, or wonder, came toward the earth with a roar and a crash that fairly shook the earth.

Before it struck there was an explosion terrible, to hear and suggestive of the final dissolution of all things, and then, with a shock and a thud, something struck. Men ran to the spot to find that, at a point within thirty feet of the county line, the sod had been torn as though ripped by lightning, and that a hole was left in proof that something had gone in there out of the way. Chunks of sod were thrown forty rods away from the hole, which, on being dug into to the depth of fifteen feet, ten feet of which distance was in solid blue clay, revealed a lump of metal resembling iron mixed with silver. The hole was dug larger, and by means of chains the mineral was taken out and found to weigh 431 lb. It is two feet long and about sixteen inches square, if a ragged chunk can be called square. Another chunk, weighing 32 lb., fell not far distant, plowing up the sod within twelve rods of the school house near the residence of John Barber. Another piece, weighing 156 lb., was found bedded five feet in blue clay.

There is trouble here over the find. One man, who owns the land, declares that the property is his, while the man who first found it says it is his by right of discovery. The same is the case in each instance. Suits at law have been entered by the owner of the soil against the men who dug them out, and who have hidden their treasure where the officers of the law, as yet, cannot find them.

These are the facts. Now what is the thing that fell, and where did it come from? S. N. R.

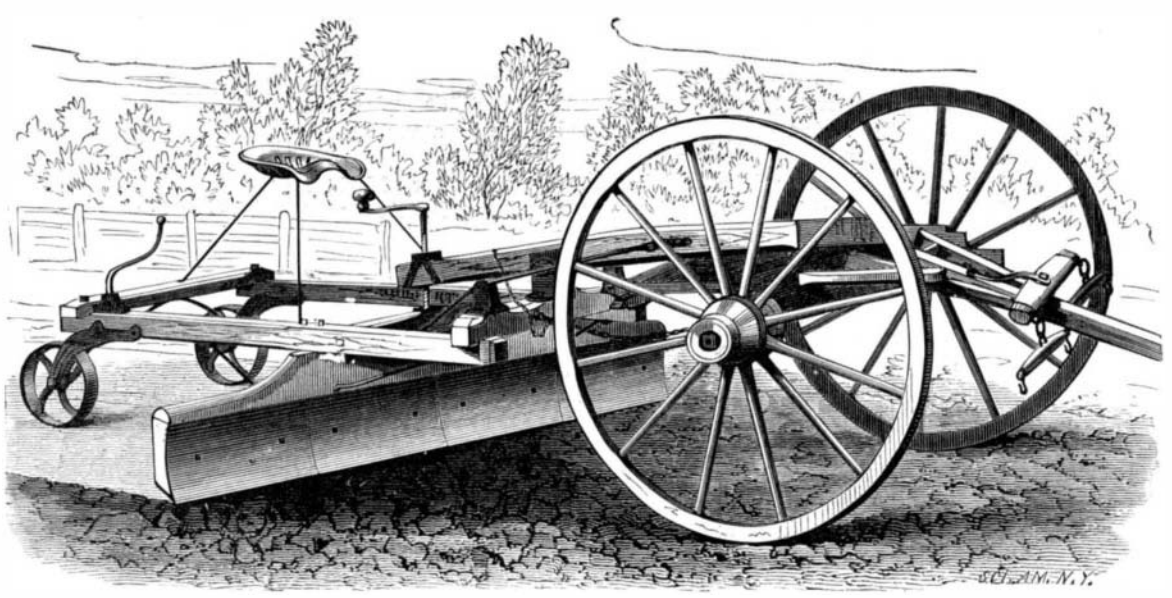
To this the editor of the La Crosse *Democrat* replies that it was undoubtedly a meteor, or a fragment of a comet thrown out by explosion: and following its orbit perhaps for thousands of years, till, losing its momentum, it came within the atmosphere of the earth, and was then, cooling as it whirled through space, attracted to the earth, and, rushing with terrible speed, drove itself into the soil, as above described. The material of which meteors is composed is known as meteoric iron, a useless, burned metal, resembling cinder of iron, but utterly useless, except as a curiosity.

Simple Treatment for Sciatica.

Dr. Ebrard, of Nimes, states that he has for many years treated all his cases of sciatica and neuralgic pains with an improvised electric apparatus, consisting merely of a flatiron and vinegar, two things that will be found in every house. The iron is heated until sufficiently hot to vaporize the vinegar, and is then covered with some woolen fabric, which is moistened with vinegar, and the apparatus is applied at once to the painful spot. The application may be repeated two or three times a day. As a rule, the pain disappears in 24 hours, and recovery ensues at once.—*Jour. de Méd., etc., de Bruxelles.*

IMPROVED ROAD PLANE.

We give herewith an engraving of a simple and easily operated implement for planing, leveling, and smoothing roadways, boulevards, etc.; removing the earth or gravel from the high to the low places, filling them, and carrying the remaining earth toward the center of the road.



LAFETRA'S ROAD PLANE.

It consists of a curved blade suspended diagonally from the under side of a rectangular frame supported at the rear on wheels, and at the front pivoted to a coupler or reach, one end of which is connected with the planer frame by an elevating and depressing screw, while the opposite end, when the implement is in use, is supported on the axle of the front wheels of an ordinary wagon. In connection with the right hand hind wheel there is a screw, by which the ends of the planer blade may be raised or lowered, so that if it is desired it may scrape hard in the drain at the road or track side, passing the dirt under the blade, and spreading it before it gets to the opposite end of the blade.

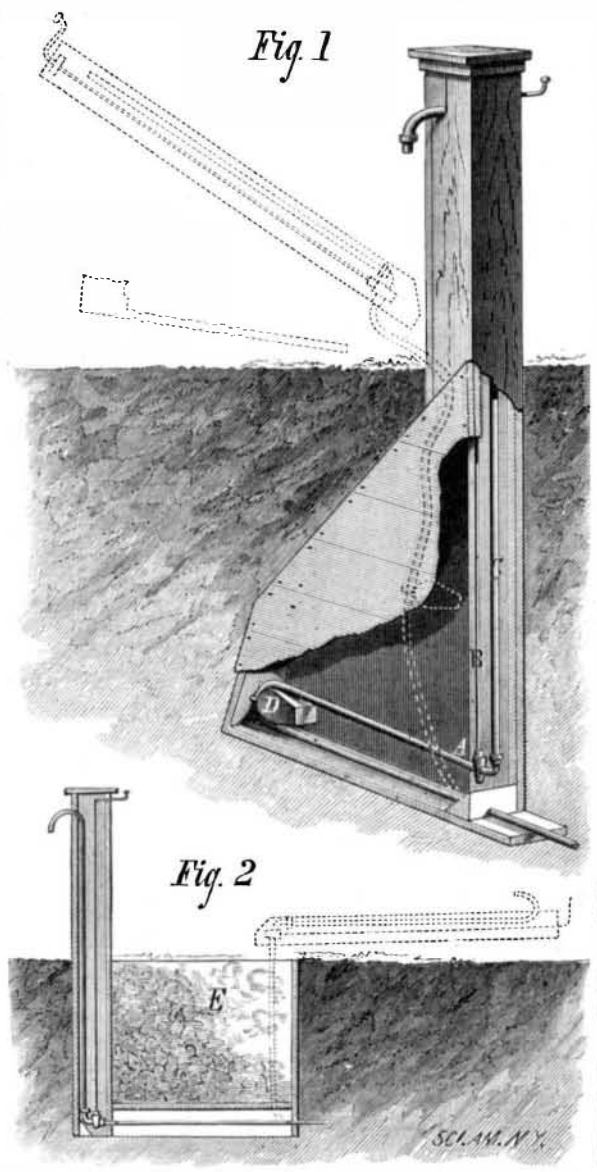
This implement was recently patented by J. P. Lafetra, of Shrewsbury, N. J.

IMPROVED HYDRANT.

The great difficulty in removing, replacing, repairing, or changing the ground faucets or valves of hydrants as ordinarily constructed, has led to the improvement which is shown in our engraving, and which was recently patented by Messrs. Benson & Rose, of Detroit, Mich.

The invention consists essentially in a box or casing of novel form, and in an arrangement of the water pipes, which permits of the examination or repair of the faucet or pipe.

The box or casing (Fig. 1), the upper portion of which may be of any of the usual forms, is enlarged below the



BENSON & ROSE'S HYDRANT.

ground and made in approximately triangular form, one side being vertical and a continuation of the upper portion. This peculiar form provides for the accomplishment of the main object of the invention, which is the arrangement of the water pipe, C, so that it may be raised to permit of the examination and repair of the faucet, A. The water pipe, C, is carried along the lower horizontal portion of the casing to the angle, where it is bent double and carried back nearly to the vertical side, where it is bent at a right angle and carried vertically to the top of the casing, where it terminates in the usual bibb or nozzle.

At the point where the pipe is bent double it is provided with a semi-elliptical block, D, attached to it in any suitable way for preventing the pipe from being broken or flattened when it is bent. The faucet, A, is provided with a valve rod, B, which extends to the top of the casing and terminates in a crank or handle.

The top as well as a portion of the side of the upper portion of the casing is made removable, so that when access to the faucet or valve, D, is desired, the cover and side of the box are removed, and the carrier piece, by which the pipes and valve rod are supported, is raised vertically until its lower end clears the enlarged portion of the casing. It is then inclined, as indicated in dotted lines. The pipe is sufficiently flexible to admit of straightening it out. The valve, A, may then be inspected or repaired, and the whole may afterward be readily replaced.

Fig. 2 shows a modification of the device already described. The box, instead of being triangular, is square and the pipe is straight. The pipe is raised up in the manner indicated in the engraving, when it is desired to examine the valve. To prevent freezing, the box is filled with straw, tan bark, or earth. This is readily removed with a small hoe when occasion requires.

Further information concerning this invention may be obtained from Messrs. Benson & Rose, No. 539 Mallett St., Detroit, Mich.

RECENT AMERICAN PATENTS.

Mr. Jacob J. Boyer, of Hebron, Neb., has patented an improved bag fastener, which consists of a metal chain having a split ring for connecting the chain to the bag, and provided with a number of rings and with a hook for engaging the rings when the bag is fastened.

Messrs. L. B. Schaefer and H. Hennings, of Baltimore, Md., have patented an improved scholar's companion, which consists in an arrangement of a receptacle for containing various small articles, and two crossed straps for securing the books, an arm strap being provided for convenience in carrying.

An improved stand for ice pitchers has been patented by Mr. Thomas Leach, of Taunton, Mass. It consists mainly in an annular seat adapted to receive the base of any kind of pitcher. This seat is hinged to a segmental support which admits of tilting the pitcher.

Mr. John Askwith, of Chicago, Ill., has patented an improvement in cans, which consists in feet formed of a cup and stem, the object being to prevent any oil or other liquid that may be upon the bottom of the can from spreading to the lower end of the feet.

An improved switch board, which is so arranged that a message may be transmitted on any two wires simultaneously, and which admits of working either wire separately and independently, has been patented by Messrs. W. E. & J. W. Busby, of Shamong, N. J.

An improved boot strap, which consists of a metallic strap or ear provided with a loop for the finger, and a plate with projecting points which pass through the boot leg and are bent down to secure the strap to the boot, has been patented by Mr. William Smith, of Eaton Rapids, Mich.

A neat and easily arranged clothes horse that can be fixed to the wall of a room and adjusted to receive a larger or smaller quantity of clothing, has been patented by Mr. Thomas W. Green, of Philadelphia, Pa.

An improvement in bakers' ovens has been patented by Mr. George Brake, of Lansing, Mich. The sides, ends, and roof of the oven are of brick, and the bottom, which is of stone or some refractory composition, is supported on central arches over an end fireplace and on projections or recesses at the ends and sides.

Mr. Frederic Jensen, of Seattle, Washington Ter., has devised an improved convertible chair, which may be used as a bed. It is so contrived that the supports for the bed are out of sight when the device is used as a chair.

An improved hold-back for vehicles, patented by Mr. Hermon F. Morse, of East Foxborough, Mass., consists of a flat steel spring, fixed to the shaft by the shank of the breeching hook with its free end bearing against the open end of the hook.

An improved attachment for organs, pianos, melodeons, and other keyboard instruments, by which any one, though wholly unacquainted with music, can play music of any kind, has been patented by Mr. E. F. O'Neill, of Storm Lake, Iowa.

Mr. James K. P. Pine, of Troy, N. Y., has patented an improved check rein guide, which supports the check rein so as to prevent the hurting of the horse's head at the front or rear, and it admits of the use of an overhead check rein.

An improved apparatus for steaming printed fabrics has been patented by Mr. James Smith, of Thornliebank, North Britain. For the fixation of the colors on printed goods, such as calico, it is necessary to subject them to the action of steam. The invention referred to pertains to an improved apparatus for carrying such fabrics into and through the steam-filled chamber.

A chocolate breakfast powder, consisting of sugar coated with chocolate, and in granulated form, has been patented by Mr. J. G. Finke, of New York city.