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(Illustrated articles are marked with an asterisk.)

THINGS EASY AND DIFFICULT.

The easiest things to be done are not by any means the easiest things to be described, while on the contrary, those things which are most easily described are often the most difficult to accomplish. The more complicated the mechanism used to obtain a given result the more complicated and extended are the rules for its use and manipulation. Large volumes have been written upon the use of the steam engine yet a person of ordinary intelligence can soon learn to manage one of these iron giants. The operation of file cutting could be described in the space this article will occupy, yet it would take years of practice for any one to become a very successful file cutter. The two examples we have cited illustrate the important principle, that it is easier to learn the manipulation of a machine designed to perform any given work than to attain skill in performing the same work by manual labor.

In no department of the arts is this more manifest than in the use and manufacture of musical instruments. The violin, devoid of keys, composed of three elements, a sounding board or shell, strings, and the bow which agitates the strings, is in mechanical construction the simplest of all instruments having much scope or expression. It and the instruments of its class are correspondingly the most difficult to play of any known instruments, requiring the most laborious efforts, even on the part of those endowed with great musical genius, to arrive at perfection in execution and expression. The difficulties of learning to perform skillfully on the violin consist not in comprehending how to do, it is the *doing itself*. It is not the education of the mind but of the muscles that is difficult.

This leads to another important fact connected with this subject, namely, that in most cases the education of the muscles to delicate manipulation is more difficult than the acquisition by the mind of the principles which govern and direct it.

If then strength of will in the overcoming of difficulties is an element of greatness, the artist who can skillfully perform is greater than the critic who can only tell how work should be done without being able himself to put in practice his own teaching. This truth is felt by all competent workmen and is the cause of their impatience with the criticisms of men who are only able to approve or disapprove their work without being able to execute it themselves. Such impatience is fostered by the arrogance of critics, who imagine that they are superior to their hard-handed subordinates and put on airs accordingly. Let one of these doff his gloves and take his place at the lathe, vice, or planer, and show that he can do as well as direct, and the respect of those who submit to his dictations will be an assured thing. There are many of these kid-glove gentry in the mechanic as well as the fine arts. Professional critics, who can do nothing but look on in this age of progress, are not wanted. Young man, just emerging from your polytechnic institute, your school of mining, or chemical laboratory, remember that proportionally as you add practical knowledge to your other acquirements you will successfully control men and advance in station.

STREET DUST LAID BY THE USE OF CHEMICALS.

A patent was taken out in England, last September, relating to the application of a compound of deliquescent salts to the prevention of dust upon roadways. This season, extensive experiments have been made to test the value of the invention, and the results seem very favorable. It is estimated that it costs $500,000 dollars per annum to water the streets of London, and notwithstanding this enormous outlay, the dust cannot be laid. The demand for something more effectual has given rise to the invention referred to. The composition used is from ½lb. to 1 lb. of the mixed chlorides of calcium and sodium to one gallon of water. The salts are put in the cart and the water is then taken in. By the time the cart is full, the salts are dissolved. Although we have had sufficient rain in New York and Brooklyn, as well as in other parts of the country, the season in England has been remarkably dry, and consequently very unfavorable to the development of the principle upon which this invention is based, viz: the retention of moisture by the mixed chlorides. The reports, however, are remarkably favorable. It produces a most important effect upon the surfaces of macadamized roads, hardening and concreting the material in such a manner that when it is perfectly dry, no dust arises from the passage of ordinary traffic. The light dust always found upon a dry road surface, watered with plain water, is not to be seen. The surface remains firm with the absence of detritus. The roads are thus rendered more durable, while the chlorides being anti-putrescent, a sanitary advantage is gained, at the same time that economy in the use of water is secured—important considerations in all large cities.

The shopkeepers, along the streets where this composition has been used, have given their testimony in its favor. They state that, instead of having their shops filled with dust, they can scarcely see a particle, and on Sundays, while other streets are smothered in dust, they rejoice in immunity from this nuisance.

The chlorides used are cheap, and obtainable in large quantities. The chloride of calcium has not been in large demand heretofore, but can be manufactured to any extent. There seems no practical difficulty in the use of these salts, and we hope that a trial of them will be made in this country. The city of Calcutta, in India, is about to test the method. The dust is said to be intolerable there, and of a most damaging nature to clothing, etc., as the roads are made of brick, easily pulverized by the feet of horses and the wheels of vehicles.

THE EARTHQUAKE TERM.

Our mother earth is passing through one of those periods of convulsion the phenomena of which are among the most terrible of all the manifestations of physical forces. The throbbings of the earth crust, which have extended over so vast an area during the last twelve months, the meteoric shower, and the meteorological phenomena during the same period, are together an interesting subject of study. What mysterious connection exists between these occurrences, if any does exist, or rather the real nature of it, has never been satisfactorily shown; and there is yet, perhaps, room for skepticism upon the hypothesis that the cosmical matter from which the enormous number of meteors periodically rain upon the earth's surface has any direct agency in these disturbances. That the weather and other atmospherical phenomena are influenced by some cause acting in concert with the causes of earthquakes, if not by the same causes, must be admitted. It would be interesting to review in this connection the histories of some of the most remarkable earthquakes on record; we will, however, allude only to one, which destroyed the city of Caracas, in Venezuela, in 1812. The shocks of this earthquake continued at intervals for months previous to the above catastrophe, and were felt with more or less violence from the mouth of the Ohio river to that of the St. Francis, in the United States. Fissures were opened, lakes disappeared, trees were felled, and such changes produced in the general appearance of the surface that a tract 70 to 80 miles in length and 30 miles wide along the Whitewater river and its branches has ever since been called the "sunk country." The traces of the fissures and chasms produced at that time were visible for years, and were noticed by Flint, the geographer, seven years after their occurrence, and Lyell, the geologist, as late as 1846. Such were the effects of this convulsion in our own land. Throughout Mexico and Central America they were still more remarkable, increasing in intensity as they extended further south, finally terminating with the destruction of Caracas, which involved the almost instantaneous death of 12,000 people. The atmospheric phenomena during the period preceding the final great convulsion was exceedingly peculiar. Electrical discharges from an apparently cloudless sky were frequent. Vivid auroral displays were more than ordinarily common. At New Madrid, below St. Louis, the inhabitants were at one time surprised and alarmed by the appearance of the sky, which although cloudless, presented along the western horizon a most brilliant electrical display. A continued glare of most vivid lightning, accompanied by what was at the time supposed to be incessant thunder, appeared to proceed from below the horizon, and coupled with the preceding alarming events, produced great terror in the minds of the people.

The present season has presented great climatic peculiarities. From all parts of the world come accounts of hurricanes, floods, unusual vagaries of temperature, and prevalence of winds from unusual quarters. The *Scientific Review*, speaking of the extraordinary heat and drouth experienced in England, says: "The southerly winds have prevailed for an unusually long interval, and the weather has consequently been very hot and very dry. On the 22d of July it was possible to cook a beef steak on the south side of Westminster Bridge by the heat of the sun's rays alone. The apparatus employed was of a very simple kind; it consisted of an empty cigar box, the inside of which had been blackened, and the top closed with three panes of glass about one inch apart. In the course of twenty minutes the steak was done on both sides, while a few potatoes were baked around it."

With the south winds and the extreme heat in England have appeared the mosquito, which threatens to become a pest in a country hitherto exempt from that annoying insect. The peculiarities of our climate during the last twelve months have attracted much attention. Both extreme cold and heat have been experienced, and these extremes have continued for extraordinary periods, while we have had unusual storms of wind and rain. All this indicates unusual atmospheric disturbances. Overhead and underfoot the elements are warring with terrific energy. The recent eruption of Vesuvius, the earthquakes in the West Indies and the Sandwich Islands, the meteoric fall of 1866 and 1867, the alleged shifting of the Gulf Stream nearer to the eastern continent, and above all the accounts just received of the disastrous earthquake in southern Peru and Ecuador, exceeded in destructive effect by only two similar events on record, constitute a series of remarkable occurrences which may not perhaps be rashly regarded as the commencement of an epoch of permanent physical and climatic change to which the earth is destined. Some will see in these events the fulfillment of prophecy, and the indications of moral and political changes not less momentous.

The causes which produce the grand and terrible phenomena of earthquakes are doubtless various. The generation of gases by chemical reaction, and the development of enormous volumes of superheated steam, by the contact of water with the intensely heated interior of the earth, are without doubt the most common and potent. The distance below the surface at which these forces act, although undoubtedly great, is unknown. The sensations produced upon people by earthquake shocks have peculiarities which must be felt to be realized, as it is impossible to give any adequate description of them. The most graphic description we have ever heard, was given to us by a gentleman who has experienced several of these occurrences both at sea and on land. The sensation at sea he says is often described as resembling the shock produced by a ship's striking upon a reef, but there is a feeling of something different, a sort of instinct of something further away and more powerful, which accompanies the first feeling of surprise and alarm, a sort of mysterious pulsation through the water, which once experienced is not easily forgotten. On land he describes it as being like what would be the feeling of a person standing upon a flexible, buoyant substance, like an immense tarpaulin spread over the surface of a liquid mass in a state of violent agitation. The undulations succeed each other so rapidly and irregularly that it is impossible to time one's steps to meet them, persons are suddenly and violently prostrated, while the mysterious subterranean noises, the peculiar appearance of the sky and atmosphere, the universal alarm of all living things, conspire to produce the most appalling spectacle that the imagination can conceive.

The accounts received from Ecuador and Peru indicate a disaster of almost unparalleled extent, and the misery which must inevitably result will appeal to the sympathy and the charity of the entire civilized world. Whether it will prove the grand finale of the present earthquake term, or whether other disasters are to follow, no mortal can say. Time only can determine this, but we trust that the giant forces which have produced such wide spread devastation and death have expended their energies, and the earth may again "rest for a season."

INQUISITIVENESS---OUR CORRESPONDENTS.

Most people are inclined to think inquisitiveness a very disagreeable characteristic, and it must be admitted that when it expends itself upon the acquisition of a minute knowledge of other people's business, no other adjective can be found which seems more applicable, unless it be some which are prohibited in polite intercourse. But although in personal and private concerns this quality renders its possessor an unmitigated nuisance, in matters of science and philosophy it is the prime motor. The great discoveries that have ever been made have resulted from inquisitiveness. There are those who seem to believe that *acquisitiveness* is the great stimulus to progress, and we do not deny that it has had a large share in initiating and forwarding the enterprises, and improvements which characterize the present age; but before acquisitiveness will induce men to aid in the investigation of any subject, the inquisitiveness of those who demand from nature the revelation of her mysteries, must be rewarded by such plain and direct responses, as to give some warrant for the assumption of pecuniary risks.

Such inquisitivenes is the chief attribute of philosophical minds. It has stimulated the Newtons, Watts, Franklins, Faradays, and Ericssons of past and present ages to plunge into the most laborious and complicated investigations, for their own sake. The search after knowledge, for the pure love of it, is what has paved the way for all the great achievements which have so ameliorated the condition of mankind.

The position of this journal, upon the relative merits of of practical science and speculative philosophy, must be well understood by our readers. We have been opposed to abstract speculation beyond certain limits, and except for the purpose of opening the way to real and earnest investigation of facts. The inquisitiveness of which we speak is never satisfied with hypotheses. The positive or negative response of actual experiment is its ultimatum, and until that be reached it will not be content. No man, however gifted by nature or improved by culture, can be perfectly sure that in forming a theory he has embraced all the facts which relate to it. Prof. Tyndall has said, that "the true physical philosopher will never rest content with an inference, when an experiment to verify or contravene it is possible." We are daily in receipt of theories upon all manner of subjects—some of them crude, some of them remarkably ingenious. That the most of

these are not published is perhaps a matter of surprise to our correspondents. We are always glad to publish anything that we consider suggestive, or likely to lead to useful research. Many communications, although they may contain entirely erroneous statements and false reasoning, are noticed because they afford an opportunity for the imparting of useful information, or the correction of popular errors. Our readers would be surprised, were we to merely give the titles of some of the communications we receive. Here is a correspondent who writes us upon the duality of sex in the human brain; another who thinks there is a relation between the phenomena of thought and the planets Venus and Mercury; still another who most dogmatically states that he has without experiment, by pure reasoning, discovered the relation of matter in its ultimate condition, and wishes us to occupy four columns of space with his ideas upon the subject. In striking contrast with these is one from a school-boy, asking for information upon a subject which shows that he is inquisitive in the right direction, and couched in language which gives evidence of improved opportunities, and large promise for the future. Welcome, my lad! Your inquiry shall receive attention in due time, while other more pretentious, but far less valuable correspondence, finds its way into the waste-basket.

COPPERED IRON ROLLERS FOR CALICO PRINTING.

The last number of the London *Mechanics' Magazine* says, that to save a portion of the large amount of capital invested in copper printing rollers by calico manufacturers which lies necessarily idle, "the Swiss printers have been experimenting," and with complete success, with iron rollers coated with copper of sufficient thickness to allow of the pattern being engraved upon it. The mode of coating adopted by the Swiss is said to be a secret; but there are several plans by which a thin layer of copper can be obtained upon which as much metal as may be wished can be thrown down by the ordinary electrotype process. We have published several modes of coppering iron already, and add one more devised by Weiskopf. He first brushes the object (say roller) over with a solution made by dissolving one part of nitrate of copper in fifty parts of hydrochloric acid; and afterward with a second solution of ten parts nitrate of copper, ten parts chloride of copper, and eighty parts hydrochloric acid. This latter solution is applied very quickly with a soft brush The copper is deposited in a few seconds, and the object must be rinsed immediately in cold water and wiped with a soft cloth. By repeating the application of this second solution the copper coating may be obtained of any desired thickness. This process, the author says, is to be recommended for its simplicity, cheapness, and the durability of the copper layer. Our own experience with the coating of copper with acid solutions similar to this has shown us that unless the application be made very quickly indeed, the copper does not adhere firmly to the iron and is apt to blister and peel off. For coating rollers, therefore, we should recommend an alkaline process—either Weil's or the old cyanide plan. When the pattern is out of date, the Swiss convert the old roller into a new one by covering all parts of the roller except the engraved pattern, with an insulating varnish, then immersing it in a bath, to fill up the pattern with freshly deposited copper. The roller is then ready to have a new pattern engraved upon it."

We can scarcely reconcile the two statements in the above extract that the Swiss process is a "secret," and that they "immerse the roller in a bath" to fill up, by deposition, the depressions of the engraving. We have, also, very little faith in coating iron rollers with copper for calico printing by the electrotype process. Several plans for coating iron with copper by deposition have been proposed, but we have yet to know of any that have been entirely successful—that is, have produced a perfect homogeneous and solid coating It is almost impossible to make the surface of the iron so chemically clean and to so free it from all minute irregularities that the copper will combine with it and secure a perfect copper covered surface. The colors used in printing frequently contain acids, and if the slightest pin hole exists in the copper covering these acids would certainly affect the colors by the oxidation of the iron, and tend to undermine the copper.

The rollers used in calico printing are hollow, to receive a mandrel, but are composed entirely of copper. When the pattern engraved on a set of rollers has been used sufficiently, the roller is turned in a lathe to remove the engraving, and then ground and polished. Thus the roller may be used for a large number of patterns, being re-engraved and turned until the shell becomes too thin. The worn out roller and the turnings are worth nearly if not quite as much as pig copper to be wrought over again.

We have often thought that iron rollers might be substituted for those made entirely of copper, having a casing of copper—not, however, deposited by the battery—but a sheath or hollow cylinder of copper might be forced upon the iron core by hydraulic pressure and made of sufficient thickness to be engraved and used for printing a number of times. This would seem to be more reasonable than the plan proposed by the *Mechanics' Magazine*, as it would be certain to secure solid metal for the reception of the engraving.

THE QUALITY OF ILLUMINATING GAS.

In looking over our exchanges we notice frequent complaints in regard to the poor quality of illuminating gas furnished by the different gas manufacturing companies These complaints are not confined to particular cities, but seem to be nearly universal. Some seem to cling, however, to the idea that it is not the quality of the gas that is at fault, but the meters. In an article entitled "Gas Measurement," published on page 337, Vol. XVIII. of the SCIENTIFIC AMERICAN, we showed that the meters were unjustly blamed for the want of uniformity in the expense of illumination through corresponding portions of the year, and that the real fault was to be referred to the inferior quality of gas furnished by the manufacturers.

It is not unfrequently the case that the standard of quality is allowed to sink so low that three feet of gas give no better illumination than two feet of the proper quality ought to give. The three feet of poor gas cost the producers but little more than two feet of good gas, and the companies add largely to their dividends by the fraud. When the murmurings of the public begin to be troublesome and seem to threaten opposition, up goes the standard, and the clamor subsides for a season.

It is high time that a remedy for such wholesale imposition should be prescribed. The standard of quality should be fixed by law, in lieu of anything better; but we are confident that our suggestion contained in the article above referred to would be a much better check than any legislation upon the subject could be. The suggestion referred to was the invention of a meter that should register for quality as well as quantity. The idea seems to us perfectly practicable, and the man who can invent a cheap and accurate apparatus by which the daily quality of gas, as well as its average quality for a given time, can be registered, would find a buyer in nearly every consumer of gas. With such tell-tales in every house, gas companies could not practice the irregularities hitherto complained of. People would know what they were buying and would be on an equal footing with the monopolists, who, not content with legitimate profits, seek to swell their gains by depreciating the quality of their products.

We know of no more promising field for inventive genius than this, and we are confident a rich reward awaits the inventor that shall succeed in supplying this growing want in all gas-consuming towns.

OFFICIAL EXAMINATION OF APPLICATIONS FOR PATENTS.

Applications for patents are distributed into thirty-six different classes under the following classifications:

I. AGRICULTURE. II. AGRICULTURAL PRODUCTS (Preparation of). III. BUILDERS' HARDWARE. IV. CALORIFICS. V. CARRIAGES. VI. CHEMICAL PROCESSES. VII. CIVIL ENGINEERING. VIII. CLAY MANUFACTURES. IX. COMPOSITIONS. X. FELTING AND HAT MAKING. XI. FINE ARTS. XII. FIRE-ARMS. XIII. GLASS MANUFACTURE. XIV. GRINDING MILLS. XV. HARVESTERS. XVI. HOUSEHOLD FURNITURE. XVII. HYDRAULICS AND PNEUMATICS. XVIII. ILLUMINATION. XIX. LEATHER MANUFACTURES. XX. MECHANICAL ENGINEERING. XXI. METALLURGY. XXII. METAL WORKING. XXIII. NAVIGATION. XXIV. PAPER MAKING. XXV. PHILOSOPHICAL INSTRUMENTS. XXVI. PRESSES. XXVII. PRINTING AND STATIONERY. XXVIII. RAILROADS AND CARS. XXIX. SEWING MACHINES XXX. SPORTS, GAMES. AND TOYS. XXXI. STEAM AND AIR ENGINES. XXXII STONE WORKING. XXXIII. SURGICAL APPARATUS. XXXIV. TEXTILE MANUFACTURES. XXXV. WEARING APPAREL. XXXVI. WOOD WORKING.

These classes are distributed to twenty principal examiners, and their assistants, and each class embraces a variety of subjects, as for example class thirty-six, devoted to "Wood-Working," contains nearly 500 modifications of machines and implements applied to that branch of industry. Now when an application for a patent is filed it goes to the class or subdivision to which it belongs, and is examined when that comes up, and not upon the plan adopted by the miller who grinds out his grist in regular rotation.

It would not be possible for an examiner to get through with his cases properly unless he should take up and dispose of all that relate to the same subject on his file. This explantion will enable applicants for patents to understand why some cases remain longer than others in the Patent Office.

PATENT OFFICE MATTERS.

Commissioner Foote has appointed James S. Grinnell chief clerk, in place of A M. Stout, resigned Mr. Grinnell was for several years chief clerk in the Agricultural Department, but more recently Examiner in charge of the class of Lumber in the Patent Office. He is a gentleman well qualified to perform the duties of the office, and his appointment, we are sure, will give satisfaction to inventors, and all others who have occasion to do business with the Patent Office. General W. H. Browne, of this city, has been appointed a First Assistant Examiner and assigned to duty with General Schoepf in the classes of Land Conveyance and Mechanical Engineering. Horace Binney, of Philadelphia, Pa., has also been appointed a First Assistant, and Emmett Quinn a Second Assistant Examiner.

The Commissioner, in order to reduce the expenses of the office, has notified a number of those engaged in the model rooms that their services will not be required after the 1st proximo; and there will also, we understand, be a reduction of the clerical force in the draftsmen's and other rooms, after that date.

Perpetual Motion.

An exhibition of a "Perpetual Motion" machine is now going on at Wilkesbarre, Pa., which seems to astonish the natives, if we may judge from the laudatory editorials of some of the papers in that region. One of our Wilkesbarre cotemporaries says:

"We are free to confess that we were disappointed in point of mechanism; it is one of the finest pieces of mechanism that we ever saw, and in a scientific point of view it is a puzzler, and worthy a visit from every mechanic and every philosopher, and we are satisfied that all will be pleased as well as astonished. To describe this wonder of the nineteenth century is a task, and beyond the possibility of description, and must be seen to be understood.

"The power is derived from four brass balls weighing each four and one half ounces, operating upon a combination of levers so combined as to give the long end of each in favor of the power, and while the ball on one end is passing down by its own gravity through an arc of 90°, the other end of the lever, loaded with a ball of the same weight, is being carried up through an arc of 95°, the difference between the arcs being occasioned by the inclination of the planes by which the balls are conveyed from one end of the levers to the other. This excess of distance through which the balls pass on the end of resistance seems to be easily overcome by the third lever, which is attached to the second in such a way that it describes a greater arc than is described on the descending end, which seems a contradiction in mechanics, and yet it is so, and at the same time retaining the balance of power in favor of the end of power.

"While the ball in its descent is twelve inches from the fulcrum, the point of resistance is but one; it is therefore certain that whatever weight the descending ball may have, multiplied by the difference between the point of power and point of resistance, would give the potential power of the machine; and it is manifest that a ball of four-and-a-half ounces will exert an influence equal to fifty-six ounces on the machine. Wonderful as this may seem, yet it must be so

"To describe this beautiful piece of mechanism, is out of the question, and the more we say seems only the more to bother the mind; we, therefore, advise those who are interested, if an opportunity offers, to go and see it and solve the problem for themselves. The man who ventures a negative opinion on any question in this nineteenth century, stands on slippery ground. We prefer to see rather than denounce."

Genius is capable of wonderful things to be sure, and no man can fix its limits But the most ingenious machines, if they operate at all, must move in accordance with natural laws. The phenomenon which astonishes our editorial friend is that of a 4½ ounce ball going down hill and at the same time drawing up the hill a weight of 56 ounces. This apparent contradiction has bothered his mind out of its common sense.

The Berks County self-motor is nothing but a piece of mechanical legerdemain, deriving its motion from a concealed source, probably a clock work or an electro-magnet. Such "perpetual motions" are very old.

An engraving of a machine answering somewhat to the description of the "Berks," was published and explained some years ago in the SCIENTIFIC AMERICAN.

Trial Trip of the First Locomotive.

Major Horatio Allen, the engineer of the New York and Erie Railroad, gives the following account of the first trip made by a locomotive on this continent:

"When was it? Who was it? And who awakened its energies and directed its movements? It was in the year 1828, on the banks of the Lackawaxen, at the commencement of the railroads connecting the canal of the Delaware and Hudson Canal Company with their coal mines—and he who addresses you was the only person on that locomotive. The circumstances which led to my being alone on the road were these: The road had been built in the summer; the structure was of hemlock timber, and rails of large dimensions notched on caps placed far apart. The timber had cracked and warped from exposure to the sun. After about three hundred feet of straight line, the road crossed the Lackawaxen creek on trestle work about thirty feet high, with a curve of three hundred and fifty-five to four hundred feet radius. The impression was very general that the iron monster would either break down the road, or it would leave the track at the curve and plunge into the creek.

"My reply to such apprehensions was that it was too late to consider the probability of such occurrences; there was no other course than to have a trial made of the strange animal which had been brought here at great expense; but that it was not necessary that more than one should be involved in its fate; that I would take the first ride alone, and the time would come when I should look back to the incident with great interest.

"As I placed my hand on the throttle-valve handle, I was undecided whether I would move slowly or with a fair degree of speed; but believing that the road would prove safe, and preferring, if we did go down, to go handsomely, and without any evidence of timidity, I started with considerable velocity, passed the curve over the creek safely, and was soon out of hearing of the vast assemblage. At the end of two or three miles I reversed the valve the valve and returned without accident, having thus made the first railroad trip by locomotive, on the Western hemisphere."

Conduction of Air and Hydrogen.

Prof. Tyndall, in his lecture on "Vibratory Motion" at the Royal Institution, illustrated the very low conducting power of hydrogen for sound by a novel experiment. A bell struck by clockwork was placed under the receiver of an air pump, and the air exhausted as perfectly as possible. By applying the ear close to the glass a faint sound could still be heard. The exhausted receiver was then filled with hydrogen, when the bell was again heard to sound, but faintly. On pumping out the hydrogen all trace of sound ceased, even when the ear was placed close to the receiver. Hydrogen being about fifteen times lighter than air, it might be supposed that its low conducting power arose from its tenuity. But such is not the case; the conducting power of air, rarefied fifteen fold, and therefore of the same density, exceeds that of hydrogen in a marked degree.

IT is stated that timber rendered fire proof by saturation with silicates is extensively used in Germany for flooring planks, doors, and staircases.