Scientific American.

ESTABLISHED 1845.

MUNN & CO., Editors and Proprietors.

PUBLISHED WEEKLY AT

No. 361 BROADWAY, NEW YORK.

O. D. MUNN. A. E. BEACH.

TERMS FOR THE SCIENTIFIC AMERICAN.

One copy, one year, for the U. S., Canada or Mexico.................$3 00
One copy, six months, for the U. S., Canada or Mexico............... 1 50
One copy, one year, to any foreign country belonging to Postal Union. 4 00
Remit by postal or express money order, or by bank draft or check.
MUNN & CO., 361 Broadway, corner of Franklin Street, New York.

The Scientific American Supplement

is a distinct paper from the SCIENTIFIC AMERICAN. THE SUPPLEMENT is issued weekly. Every number contains 16 octavo pages, uniform in size with SCIENTIFIC AMERICAN. Terms of subscription for SUPPLEMENT, $5.00 a year, for the U. S., Canada or Mexico. $6.00 a year to foreign countries belonging to the Postal Union. Single copies 10 cents. Sold by all newsdealers throughout the country. See prospectus, last page.

Combined Rates.—The SCIENTIFIC AMERICAN and SUPPLEMENT will be sent for one year, to one address in U. S., Canada or Mexico, on receipt of *seven dollars*. To foreign countries within Postal Union *eight dollars and fifty cents a year.*

Building Edition.

THE ARCHITECTS AND BUILDERS EDITION OF THE SCIENTIFIC AMERICAN is a large and splendid illustrated periodical, issued monthly, containing floor plans, perspective views, and sheets of constructive details, pertaining to modern architecture. Each number is illustrated with beautiful plates, showing desirable dwellings, public buildings and architectural work in great variety. To builders and all who contemplate building this work is invaluable. Has the largest circulation of any architectural publication in the world.

Single copies 25 cents. By mail, to any part of the United States, Canada or Mexico, $2.50 a year. To foreign Postal Union countries, $3.00 a year. Combined rate for BUILDING EDITION with SCIENTIFIC AMERICAN, to one address, $5.00 a year. To foreign Postal Union countries, $6.50 a year. Combined rate for BUILDING EDITION, SCIENTIFIC AMERICAN and SUPPLEMENT, $9.00 a year. To foreign Postal Union countries, $11.00 a year.

Spanish Edition of the Scientific American.

LA AMERICA CIENTIFICA E INDUSTRIAL (Spanish trade edition of the SCIENTIFIC AMERICAN) is published monthly, uniform in size and typography with the SCIENTIFIC AMERICAN. Every number of *La America* is profusely illustrated. It is the finest scientific, industrial trade paper printed in the Spanish language. It circulates throughout Cuba, the West Indies, Mexico, Central and South America, Spain and Spanish possessions—wherever the Spanish language is spoken. $3.00 a year, post paid to any part of the world. Single copies 25 cents. See prospectus.

MUNN & CO., Publishers,
361 Broadway, New York.

☞ The safest way to remit is by postal order, express money order, draft or bank check. Make all remittances payable to order of MUNN & CO.

☞ Readers are specially requested to notify the publishers in case of any failure, delay, or irregularity in receipt of papers.

NEW YORK, SATURDAY, SEPTEMBER 22, 1894.

Contents.

(Illustrated articles are marked with an asterisk.)

TABLE OF CONTENTS OF

SCIENTIFIC AMERICAN SUPPLEMENT

No. 977.

For the Week Ending September 22, 1894.

Price 10 cents. For sale by all newsdealers.

PATENTS FOR MINOR INVENTIONS.

The present policy of the Patent Office, it is well known, takes the direction of the refusing to issue patents for what the examiners may deem devices of insufficient degree of invention. The tendency is to restrict the granting of patents, to make the Patent Office a species of court, before which the merits of the invention will undergo adjudication before the inventor is given the small privilege he asks, which privilege is simply the right to use the federal courts for the determination of his rights in an invention. The Patent Office, in other words, constitutes itself a kind of guardian of the public against the inventor, the assumption being apparently that the granting of a patent, where not fully deserved, is in some mysterious way an imposition upon the rights of the people at large. Several things militate against the justice of this conception and of actions based upon it. Since the Patent Office began to issue patents in any quantity and since the time when the federal courts were called upon to give decisions in cases relating to patents, many opinions have been rendered by the best judges the land has ever seen, in which the rights of the inventor, the merits of his work, and the expediency of protecting him in the exercise of his genius were enlarged upon. It is especially in the decisions of the judges of some decades past that these statements of opinions favorable to the inventor are to be found. As time went by and patents multiplied in number, the courts seem to have adopted a more severe treatment of inventions. This was especially the case with the Supreme Court of the United States. But more recently, while the Patent Office has taken the rigorous and restricted treatment of the matter, the courts seem inclined to revert to the earlier opinions, and some very gratifying decisions are the result.

In the Official Gazette of the United States Patent Office of September 11, 1894, a decision is published exemplifying what we have just said. In 1878 a patent was granted to an inventor for a corncob pipe having its exterior interstices filled with a plastic self-hardening mass, which rendered the pipe durable and efficient. This certainly was a minor invention and may be taken as typical of a class which the Patent Office in its present practice views with disfavor. It seemed to require but little invention to smooth the surface and fill the interstices of a corncob pipe. In a decision rendered April 20, 1894, on this patent, Judge Thayer, of the Eastern District of Missouri, Eastern Division, affirmed its validity and held that it was infringed by a specified structure made by the defendant in the case.

The first clause of the decision referred to the patent and its construction. The judge states broadly that the patent is for a new article of manufacture, which, without involving a high order of invention, leads to the production of a new article. Then, seeking to determine by the correct theory the degree of invention by the history of the object, he finds that these pipes had a large demand immediately, and that a new industry on a small scale, but sufficient to give employment to a number of persons, was established. The patentee, as the first person to manufacture a pipe of this character, is held to be entitled to a broad interpretation of his patent, one sufficiently broad to prevent others from availing themselves of its merits by a merely colorable departure from what the patent described.

In the last years of the life of the patent the patentee has at least the satisfaction of eliciting a most excellent opinion from the court, an opinion which might be commended to the examiners of the Patent Office as a guide in rendering decisions in these cases of minor inventions, for nothing is more certain than that it is utterly impossible to tell what the future of an invention will be. The smallest and apparently the most insignificant invention may have widely different value from anything which appears on its face. It is often in the very simplicity of an invention or device that the genius of invention lies. The doctrine of the criminal law is that it is better for many criminals to escape than for one innocent man to be punished. A parallel doctrine might apply to inventors and their inventions. It would be better to grant many patents, destined ultimately to be declared invalid, than to omit or to refuse to grant a patent for a single invention of merit. The true function of the Patent Office, broadly stated, is to grant, not to refuse, patents. The granting of the patent merely gives the inventor standing in the courts. It involves no possibility of imposition on the public, but simply puts it in the power of the inventor to protect himself in the exercise of such rights as he may possess.

The Work of Dust.

Dust has a very large share in nearly all the phenomena of the earth's atmosphere. It is what makes the clear sky appear blue; and when we look up into the sky we see the dust in the atmosphere illuminated by the sun. There is nothing else before us that can permit the light to reach the eye. Light goes invisible, straight through all gases, whatever their chemical composition. The dust catches it, reflects it in every direction, and so causes the whole atmosphere to appear clear, in the same way that it makes the sunbeam visible in the darkened room. Without dust there would be no blue firmament. The sky would be as dark as or darker than we see it in the finest moonless nights. The glowing disk of the sun would stand immediately upon this dark background, and the same sharp contrast would prevail upon the illuminated surface of the earth—blinding light where the sun's rays fall and deep black shadows where they do not. Only the light of the moon and the stars, which would remain visible in the daytime, would be able to temper this contrast in a slight degree. The illumination of the earth's surface would be like that we see with the telescope on the lunar landscapes; for the moon has no atmospheric envelope that can hold floating dust. We then owe to dust the even moderately tempered daylight, adapted now to our eyes; and it is that which contributes much to the beauty of our landscape scenery.

But if dust makes the sky appear clear, why is the color of the sky blue? Why does dust, of the different constituents of white sunlight, reflect the blue rather than the green, yellow and red? This fact is connected with the size of the dust particles. Only the finest dust settles so slowly that it can be spread everywhere by means of the air currents, and can be found constantly in all strata of the atmosphere; and special importance can be ascribed only to these finest particles. The coarse parts soon fall to the ground. Let us consider the fine mechanism of light, the extremely short ether waves which determine its existence. These waves, although they are of even less than microscopic size, are not all equally long. The shortest are those that give blue light, while all the other colors are produced by longer waves. The fine atmosphere dust contains many particles which are large enough to reflect the short blue ether waves, fewer than can reflect green and yellow, and still fewer large enough to reflect the long red waves. The red light, therefore, goes on almost without hindrance, while the blue is more liable to be diverted, and thus to reach the eye. A similar phenomenon may be observed on a larger scale on water which is roughened with waves of different lengths, and on which pieces of wood are floating. The pieces of wood stand in the same relation to the water waves as the dust particles to the ether waves. The great long waves pass the blocks undisturbed, only rocking up and down; while the finer ripples of the water are turned back, as if the blocks were firm walls.

The finest dust thus appears blue. There is much coarse dust in large towns, when the sky over them is often gray, while only the finest blue dust is carried up in the country. The dust is also variously assorted at different heights above the surface of the earth. The coarser dust will be found at the lower levels, where it is produced. On mountains we have most of the dust beneath us, while the rarefied air can sustain only the finest floating particles. Hence the sky on high mountains is clear and deep blue, even almost black, as if it were without dust. Only when we look at the lower strata, toward the horizon, does the color pass into gray.

Why is the sky in Italy and the tropics of a so much deeper blue than that of Western Europe? Is the dust there finer? It is really so; not that a finer quality of dust is produced there, but because in the moist climate of the North Sea countries the dust cannot float long in the air without being charged with water and made coarser, while in warmer countries water exists in the air as vapor and does not become condensed as a liquid on the dust. Only when it is carried by the air currents into the higher strata and is cooled there, does it thicken into clouds. With this we come to the most important function of dust in our atmosphere—the part which it has in the function of rain, by reason of vapors condensing upon it. It can be affirmed with certainty that all the water which the sun causes to evaporate on the surface of the sea and on the land is condensed again on dust, and that no raindrop falls unless it had a particle of dust as its primary nucleus.

Without dust there would be no condensation of water in the air—no fog, no clouds, no rain, no snow, no showers. The only condensing surface would be the surface of the earth itself. Thus the trees and plants and the walls of houses would begin to trickle whenever cooling began in the air. In winter all would be covered with a thick icy crust. All the water which we are accustomed to see falling in rain pours or in snow would become visible in this way. We should at once feel on going out of doors that our clothes were becoming wet through. Umbrellas would be useless. The air, saturated with vapor, would penetrate the interior of houses and deposit its water on everything in them. In short, it is hard to conceive how different everything would be, if dust did not offer its immeasurable extent of surface everywhere to the air. To this we owe it that the condensation of water is diverted from the surface of the earth to the higher, cooler atmospheric strata.—Popular Science Monthly, from Die Gartenlaube.

© 1894 SCIENTIFIC AMERICAN, INC.

The Colonial Exhibits at Antwerp.

The colonial exhibits at Antwerp are so full, and are brought so near together, that taken by themselves they form one of the most instructive factors of the whole exposition. France is particularly well represented by the products from her Asiatic domain. It is plain from the variety of fabrics made of it and the quantity of the raw fiber that ramie is one of the most valuable exports of Cochin China; not only is it manufactured into bags, hammocks, and hose for fire engines, but into the finest, most delicate cloth. The fiber of the banana is also used there for some of these purposes. Elephants' tusks and deer's horns, tortoise shells and birds of brilliant plumage are among the exports which the workmen of Paris elaborate into expensive trifles.

Tonkin contributes quantities of silk in long yellow, white and red hanks, also some beautiful tissues in silk; specimens of coal and antimony from there give evidence of rich mines.

Tea from Indo-China, indigo and gum copal from Senegal, sugar, coffee, cocoa and cotton from Guadeloupe, dyewoods from Annam, and caoutchouc from Madagascar, lying side by side, make it clear why the French republic finds it advantageous to have her flag planted on islands and continents all around the globe. The beautiful woods made into mosaics testify to the skill of some of her Eastern subjects; and so does the room fitted up with the prettiest rattan furniture that I ever saw; the chairs made in Tonkin have blue and yellow strands blended with much taste; a sofa of red and yellow rattan came from Madagascar; strong chairs, with their frames made of large pieces of bamboo, and the seats and backs of a firm woven fabric, were made in Cambodia. There are tables, too, of like manufacture, and the whole display suggests no end of comfort in a summer country house.

Portugal has not only fruits, maize, baskets, coffee, skins, etc., to show from her Congo possessions, but photographs of clothed and civilized-looking natives, who seem to have advanced considerably beyond those imported from the Free State. The lace and embroidery from the Madeiras are not inferior to those from Lisbon.

The corner occupied by the Dutch East Indies is full of interest. The quantities of clove, nutmeg, cinnamon, tea and coffee are no surprise, nor are the stacks of bamboo, but bamboo bridges do look queer. They are common in Java, I judge, for here are models of those in different parts of the island; they are beautifully made; one is covered, and all have a considerable span and breadth. Finely executed photographs and paintings of fair merit testify to the artistic taste of the people in Batavia.

The specimens of woods from a number of the colonies are noteworthy. They possess a variety of valuable qualities, perhaps none more than the pyinkado, which is shown in large planks and in paving blocks, in the Indian section of the English department, for it comes from Burma.

This timber is produced by a large tree belonging to the order Leguminosae, and sub-order Mimosae. Large claims are made for it by P. J. Carter, "the conservator of forests in the Pega Circle," who states that the crushing strain per square inch it will resist compares thus with some other timber:

	Tons.
Pyinkado	5,208
Teak	2,838
Kari (eucalyptus)	5,140
Oak	3,411

Its durability is proved by the fact that it was used in 1877 for sleepers on the Burma State Railway, and most of them are still sound. This timber can be bought in Rangoon at $20 a ton for small planks suitable for conversion into paving blocks.

Along with this wood there is a small collection of beautiful fabrics in silk and wool from Indian looms, and some wood and metal work, such as are found everywhere in Oriental shops. In general, it must be said that from anything to be seen here, one would get a very false notion of the resources of the English colonies. That they are almost boundless was the impression made by the magnificent array sent to Chicago from Canada, Ceylon and Australia. Here they do not compare favorably with those of the minor powers already mentioned.

It is clear from a study of these colonial exhibits, brought from the four quarters of the globe, that there has come to be a much wider distribution of products than was to be found a few years ago. For example, tobacco and Indian corn are sent from many of them; coffee, tea and sugar are now cultivated far from the regions where they are indigenous.

It would seem to be a foregone conclusion that all these nations which have possessions in Asia, Africa, Polynesia and the other important islands near or distant from their own shores, will soon be independent of each other as far as the supply of liquors, tobacco, food and clothing for their people is concerned. It looks as if the day when princely fortunes can be made from the exportation of certain commodities to every part of the civilized world were passed. A prophet might be able to discover in these facts signs that the very unequal distribution of material things is to be changed by what might be called a natural method, and as a result the value set upon them may be lessened. A. D.

The Great Falls of Labrador.

The Toronto Daily Mail gives a dispatch from Quebec, dated August 31, containing the following interesting information:

Sixty thousand square miles of an iron-bearing formation, a new lake larger than Grande Lac Mistassini, and the proof of the fact that the big falls of the Hamilton River are the largest in America, if not in the world, are among some of the many discoveries of value made by Messrs. Low and Eaton on their sixteen months' exploration of the interior of the great Labrador peninsula, which has terminated by the return of the explorers to Quebec and their disbandment here to-day. After traversing Labrador last year from south to north, and sailing from Ungava Bay to Hamilton Inlet, where they spent the winter, Messrs. Low and Eaton ascended the Hamilton River to the grand falls on ice, and succeeded in taking a splendid lot of photographs of it with ice cones and other surroundings. The remains of the burned boat belonging to Bowdoin College expedition were found below the falls, and, further on, the bottle containing a record of their trip to that point.

The river falls 800 feet in less than six miles, with one clear steep fall of more than 300 feet. The stream above the falls is as large as the Ottawa. Below the falls it narrows into a canyon of only 30 or 40 feet wide, with steep walls on either side, hundreds of feet high. Mr. Low brought back beautiful specimens of labradorite of the most valuable kind of the gem. It exists in large quantities.

The iron ore deposits to which reference has been made extend from latitude 50 to Ungava, and are very rich. Whole mountains of the ore were found corresponding with the ore of Marquette, Michigan, and containing millions of tons. The large Lake Michikamaw, in the northeast, is more than 100 miles long, not narrow and full of islands like Mistassini, but from 30 to 50 miles wide. Several lakes larger than Lake St. John were seen by the party. The country to the north is a perfect network of waterways, and these contain such fish in abundance as ouananiche brook and lake trout, whitefish, etc.

DECISIONS RELATING TO PATENTS.

U. S. Circuit Court—Eastern District of Missouri, Eastern Division.

H. TIBBE & SON MANUFACTURING COMPANY v. MISSOURI COB PIPE COMPANY et al.

Letters Patent No. 208,816, granted July 9, 1878, to Henry Tibbe, for a corncob pipe having its exterior interstices filled with a plastic self-hardening mass, which rendered the pipe durable and efficient.

Thayer, J.

The Patent and its Construction.—This patent is for a new article of manufacture, and although it did not involve a high order of invention, yet it led to the production of a new article—namely, a corncob pipe having its exterior interstices filled with a plastic self-hardening mass, which rendered the pipe more durable and efficient. (Tibbe & Son Mfg. Co. v. Heineken, 47 O. G., 1221; 43 Fed. Rep., 75; Tibbe & Son Mfg. Co. v. Lamparter, 61 O. G., 427; 51 Fed. Rep., 763.) Pipes thus made immediately came into great demand, and the result of the invention has been the establishment of a new industry, not on a large scale, but sufficient to give employment to a considerable number of persons. Tibbe was the first person who conceived the idea of filling the exterior interstices of the cob so as to render the pipe more durable. He was the first manufacturer of a pipe of that character. He is accordingly entitled to a liberal interpretation of his claim—such an interpretation as will protect him during the life of the patent in the manufacture of what he has invented, and such an interpretation as will prevent others from appropriating the substance of his invention by a colorable departure from the process of manufacture which he describes. The fact that several attempts have been made by persons engaged in the manufacture of corncob pipes to appropriate the idea which was first suggested by Tibbe and yet to evade the claim of his patent by one means or another inclines the court to scrutinize closely and to view with suspicion all processes of making corncob pipes in which the exterior interstices are filled with a gummy or mucilaginous substance of whatsoever nature. In view of the liberal construction which the patent is entitled to receive, the court holds that finely pulverized cornmeal made of parched corn and mixed to any considerable extent with liquid shellac must be regarded as a plastic self-hardening cement, within the meaning of the Tibbe patent, if such a mixture is used to fill the exterior cavities of the cob. Such a mixture undoubtedly sets or hardens, although the elements do not unite chemically, and by so hardening and adhering to the cavities the pores of the cob are closed and the fundamental feature of Tibbe's invention is appropriated. In the case of Tibbe & Son Mfg. Co. vs. Lamparter, supra, this court held that a mixture of cob dust and corn starch, when treated with alcohol and used as a filler, was an infringement of the Tibbe patent, and that it made no difference whether the mixture was made before it was applied to the cob or whether it was made in the act of applying it. The same ruling was repeated on the application for a preliminary injunction in this case.

The Facts.—After a careful perusal of the evidence produced on the final hearing of the case, the court has become satisfied that when liquid shellac is applied to the exterior surface of the cob, according to the process now in use by the defendants, it penetrates to some extent into the finely pulverized cornmeal, with which the interstices have previously been filled, and thereby forms a mixture which hardens and adheres to the cavities and effectually closes the pores of the cob. I have no doubt that it is true that there are many cavities that are of such depth that the liquid shellac does not penetrate to the bottom of the same at their deepest point. On the other hand it is evident that many of the cavities are so shallow that the liquid does penetrate practically to the bottom of the cavity, and that it serves to fill the entire space with a homogeneous mass which is self-hardening. It must also be borne in mind that the cavities of the cob at their point of greatest depth are quite shallow and that the sides thereof slope, so that in any event it seems more probable that by the application of liquid shellac a considerable portion of the cornmeal in each cavity is saturated and formed into a cement. Enough is so saturated to effectually hold the filling in place and bind it to the cob. I can conceive of no sufficient reason for filling the cavities with cornmeal and then applying liquid shellac unless it is intended to penetrate the filler to some extent and make it adhesive and self-hardening.

The court does not consider it necessary to establish the charge of infringement that the proofs should show that the liquid shellac penetrates to the bottom of all the cavities and forms throughout each cavity a homogeneous mass. It is sufficient, the court thinks, that enough of the mass is permeated by the liquid to change its orginal character in part, bind it to the cavity and effectually close the pores of the cob. Upon the whole, therefore, the court has concluded that the charge of infringement is established and that a decree should be rendered in favor of the complainant.

It is so ordered.

How to Silver Mirrors.

BY J. MILLER.

The glass for making mirrors must have its surface optically worked. The following solutions are required, viz.:

(a) Eighty grains of nitrate of silver dissolved in two ounces distilled water.

(b) Eighty grains of pure caustic potash dissolved in two ounces distilled water.

Ammonia solution is added to a, drop by drop, continually stirring, until the whole of the silver is deposited and redissolved. When all the silver has been redissolved, the solution becomes clear. The potash solution, b, is then added, when the solution again becomes black. More ammonia solution is added drop by drop, stirring as before. The slower the ammonia is added, the finer the division of the silver is. When the solution again becomes clear, the action is complete. A weak solution of nitrate of silver is then added, drop by drop, until a very pale brown color is attained. Errors may be corrected by adding more silver or ammonia as may be necessary. The silver should be slightly in excess in the final solution. This solution should not be kept, as it becomes a powerful explosive.

Filtering is not recommended. Two and three-quarter ounces of solution are taken, and water added to make it up to eight ounces. The glass for the mirror having been made chemically clear with nitric acid, and washed in distilled water, is placed in a bath face downward, but supported, to prevent the face touching the bottom of the bath. It is then covered with the solution for a few minutes. Half an ounce of reducing solution (ten per cent solution of sugar of milk or grape sugar) is then taken, and the solution from the bath poured into it. It is then poured back carefully over the mirror, avoiding the formation of air bubbles, when the deposition of silver begins to take place, and the solution becomes muddy. The slower the action takes place, the harder the deposit. Leave until all the silver has been deposited, then pour off the solution, wash with distilled water several times. Dry carefully to avoid markings, and polish the face of the mirror with rouge when it is completed, and may be kept for use wrapped in velvet. Two mirrors were successfully made by the demonstrator.—South London Society.

© 1894 SCIENTIFIC AMERICAN, INC.