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(Illustrated articles are marked with an asterisk.)

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THE SCIENTIFIC AMERICAN SUPPLEMENT

No. 237.

For the Week ending July 17, 1880.

Price 10 cents. For sale by all newsdealers.

Detailed table of contents for the supplement, categorized by I. ENGINEERING AND MECHANICS, II. ELECTRICITY, MAGNETISM, ETC., III. PHYSICS, ETC., IV. TECHNOLOGY AND CHEMISTRY, V. MICROSCOPY.

GOVERNMENT USE OF PATENTS.

Inventors are to be congratulated upon three recent decisions of the courts which open the way to an efficient judicial remedy for use of patents by government officers.

Although the right of an inventor as against government has been for some years recognized, to see how he could have a remedy has not been so easy. As long ago as 1858 a claim was preferred to the Secretary of War for payment for government use of the Sickles' cut-off.

In 1863, and again in 1868, suits were argued in the Court of Claims seeking to recover royalties for government use of inventions. In the first of these cases the Warden of the United States Penitentiary in the District of Columbia set up six patented broom making machines in the prison, and employed the convicts in making brooms.

Three recent decisions present the subject in new aspects, and indicate the law to be that if, upon request of the inventor, an officer competent to contract for use of an invention makes use of it without payment, the Court of Claims may award compensation to the inventor upon a theory of an implied promise to pay him, while if the invention is used against the inventor's consent, or by an inferior officer or contractor, the individual thus infringing is personally liable in substantial damages, recoverable in the circuit courts.

Another suit was brought against an officer—the Postmaster of New York—who refused to enter into any contract with the inventor, believing and claiming upon English precedents that he ought not to do so.

The third of the decisions mentioned, earlier in date than the others, applies the same principles to the simpler and easier case where certain contractors, because they were

manufacturing for government, assumed to use, as they supposed government had the right to do, the complainant's invention without paying him.

These decisions are subject to the ultimate approval of the Supreme Court at Washington. Should they be finally sustained they will enable an inventor to seek redress in the courts, whatever may be the way in which his invention is pirated under pretense of a use for government.

AMERICAN INDUSTRIES.—OUR ILLUSTRATED SERIES.

Not only our home subscribers, but our patrons abroad, express great satisfaction with the feature adopted by this journal, more than a year ago, of publishing illustrated articles on the prominent industries of this country.

Nothing like it has ever been attempted before by any weekly newspaper devoted to industrial and scientific subjects, and only to a publication having a very large circulation could the expense attending the preparation of so many costly, original engravings be afforded.

From every number of the SCIENTIFIC AMERICAN our English, French, German, Spanish, Italian, and frequently Russian contemporaries, also transfer to their pages the illustrations and descriptions of some of our best inventions and more important discoveries, and some of them have reproduced the full page cuts of some of our industrial series.

This will explain to many perplexed persons whose works or machines have been described in these columns what has been to them a mystery.

They receive letters from every part of the world inquiring about their wares or their inventions, as the case may be, often in a language they understand not, and they wonder how the writer, in such an out-of-the-way place, ever heard of them or their inventions.

The London Printing Times and Lithographer, of June 15, just received at this office, referring to our series of articles descriptive of American industries, makes mention of the three subjects in their special line which appeared in consecutive issues of this paper not long ago, with extracts from our articles.

A QUARANTINE FLEET FOR THE MISSISSIPPI.

The terrible visitation experienced in 1878, by yellow fever, by the cities along the lower Mississippi, indicated clearly to the United States Medical Department the great need of a more perfect system of quarantine regulation, inspection, and disinfection.

INCREASE IN THE RUBBER MANUFACTURE.

It is interesting to note, in connection with the extended description of the rubber manufacture we published last week, that the total imports of crude rubber and gutta percha for the United States, for the nine months to April 1, amounted to 13,444,750 lb., valued at \$7,436,560.

the earlier period being not quite 40 cents a pound, while for the nine months ending April 1 last, it was over 55 cents a pound. This average includes the importations of all descriptions, the best rubber having been all the time a good deal higher than these figures, and now being quoted by the importers at 90 to 95 cents a pound for choice Para. The advance in prices was primarily due to a speculative combination of Spanish houses in the trade, although it is also largely attributable to the greatly increased demand for rubber in Europe as well as here, and the difficulty in obtaining the requisite labor for getting it in and curing it at all the South American producing points. In the valley of the Amazon particularly, whence the choicest rubber comes, the trouble in obtaining efficient labor for any kind of work is the most serious bar to the progress of that fertile country, the climate being a very trying one, and the natives lazy and indolent.

The wonderful variety of useful articles into which rubber is worked up makes it one of the most important of our imports of crude material, and the large place it fills in the supply of such necessities as belting, hose, and packing, either in competition with or as superseding the use of leather, gives it an importance in our industries far beyond the money value that the figures showing the importations seem to represent.

A PATENT CASE OF GENERAL INTEREST.

All the shoe manufacturers in the country have been particularly anxious to know, for about a year past, how much longer they would have to pay the royalty, averaging 1½ to 2 cents a pair, on shoes bottomed by the McKay sewing machine. A case bearing upon this point came before Judge Blatchford, of the United States Circuit Court for the Southern District of New York, on the 25th ult., and his decision, though not conclusive as to the whole question at issue, has an important bearing thereon.

The patents owned by the McKay Sewing Machine Association have, from 1860 to the present time, been those under which probably nine-tenths of the machine-made shoes worn in the United States were bottomed. The association made the machines and leased them to manufacturers, under a license by which the latter were obliged to pay a royalty on each pair made, which was done by placing on the shoes stamps purchased from the McKay Association. Over one thousand boot and shoe manufacturers, embracing all the large establishments in the country, are in this way licensees of the McKay Association. This license is a very carefully drawn up document, and, besides everything else therein calculated to protect the interests of the association, it has a provision by which the licensee agrees not to contest the McKay patents during their existence. No real resistance has been made in many years to the validity of the patents, and, the business of the association having been from the first conducted with marvelous energy and ability, the patents have returned clear profits to their owners of several millions of dollars. In July and August of last year two of the most important of these patents, with the extensions which had been granted thereon, ran out, and, although the machines were covered by other and less important patents, the shoe manufacturers have, since that time, been debating the question of how long they must continue to pay these royalties. The obvious answer is that so long as they use a McKay machine, and are bound by their license, they must pay. In this connection it is important to note that the McKay Association have, during the past year, been taking back many of their old machines, where the manufacturers would allow them to do so, and furnishing in their stead new and improved machines, but the latter have patents in them bearing date of 1879, and, of course, cover their use for the full term of the last patent.

To meet this difficulty, and provide a way of using only the McKay patents that had expired, Andrew H. Jackman, of Nyack, N. Y., has lately obtained a patent on a machine of his invention, which he has used since May last, sewing 3,000 pairs of soles weekly thereon, and which he was about to offer to the trade. The McKay Association immediately commenced proceedings against Jackman, and moved for a preliminary injunction on the ground that two of their patents had been violated, one on the "process" and the other on the "product," as separate from the machine, and also because the defendant had violated his license. Considerable evidence was introduced, and able arguments were made, but Judge Blatchford finally put aside all question regarding the validity of the patents, and decided to grant the injunction on the license alone, holding that it was of the substance of a contract, and until it was broken, or the defendant released from its provisions, the association had a good case against him. The license provides several ways whereby the association may terminate it, or where it would be broken and become inoperative, but it is not at all clear that there is any easy way for the manufacturer to get rid of its provisions without the consent of the association, who are likely to be as tenacious of their contract rights under its provisions as they have heretofore been determined in upholding their patent claims.

An Opportunity for Inventors and Lock Makers.

The present kind of mail lock and key having been in use for a long time, it has been deemed expedient to make a change. To this end the Postmaster-General has just issued a notice, which will be found in our advertising page, announcing that proposals will be received for furnishing five new and different kinds of locks and keys for this purpose.

He does not prescribe a model, and on that point says that, as the public exposure and searching examination necessary to intelligent bidding on any prescribed model of a lock and key would tend to impair, if not entirely destroy, the further utility of all such locks and keys for the purposes of the mails, the Postmaster-General prescribes no model or sample for bidders, but relies for a selection on the mechanical skill and ingenuity which a fair competition among inventors, hereby invited, may develop in samples submitted by them.

BURNING OF OIL TANKS BY LIGHTNING.

The suggestions recently made by us in connection with the late disastrous fire at Titusville, Pa., caused by the firing of an oil tank by lightning, have called forth a variety of interesting communications from different correspondents. Our suggestion was that the light vapors from the oil, rising high above the tanks, formed a conductor and led to the firing of the gas in the tank.

One of our correspondents, whose letter we publish in another column, suggests a different theory. He thinks that the electricity enters the tank by running along the oil supply pipe, and that sparks are discharged from the end of the pipe at its termination within the roof of the tank. He further thinks that the electrical charge may fall upon the pipe at some distance from the tank and yet the gas in the tank will be ignited. Our correspondent may be right. His theory is worthy of careful consideration. The smallest spark produced in this way will do the business. We all know how minute an electrical spark will fire an explosive mixture of gas. Even the rubbing of the feet on a carpet and a touch of the finger to an open gas pipe will light the gas.

Although it might be expected that any electricity received by the underground tank pipe would be wholly dissipated before reaching the tank, still if the original electrical charge were sufficient, and if the exterior of the pipe was more or less insulated, as it might be if it passed through dry earth, or if its surface were covered with oil, it would seem that there might be a leap of a spark from the extremity of the metallic pipe, within the roof of the tank, to the side or interior casing of the tank, and mischief would result.

When the tank is made wholly of iron, and the end of the supply pipe, where it enters the tank, is attached to and forms a good contact with the iron of the tank, then no spark could be expected. But if the roof of the tank is made of wood, and the sides of iron, as is frequently the case, no actual connection existing between the iron casing and the supply pipe, then some portion of a charge of electricity, running along the pipe, might enter the tank and leap from the pipe as we have mentioned. As a measure of prudence it would be advisable for tank owners to connect their ground pipes electrically with the iron casings of the tanks. This may be readily done by means of stout copper or iron wires outside the tanks, the ends of the wires being well soldered respectively to the pipes and to the iron casing, so that if any electricity comes along the pipes it will pass, without resistance or sparking, to the iron case and so to earth.

We are greatly obliged to those correspondents who have sent us their views on this matter, and we hope to hear from others. The subject is one of such importance that it ought to be discussed and studied until a sure protection is discovered and an end put to the long series of lightning disasters that for years past have regularly occurred in the oil regions.

The fire at Titusville on June 11 was followed June 30th by the burning of another iron oil tank, at Olean, N. Y., holding 25,000 barrels, which was also set on fire by lightning. This tank belonged to the Acme Refinery.

SERIES FORTY-NINE.

Not with egotism, but with a commendable pride, do we direct the reader's special attention to the beautifully executed engravings which embellish this number of the SCIENTIFIC AMERICAN. The reader will also find profit and be interested in the somewhat lengthy description of the extensive industry carried on by the Kingsford Starch Works, whose product is not only laundry starch, as the title of the works might imply, but a dietetic commodity which is favorably known in every part of the civilized world.

The Kingsford Works, illustrated in this week's issue, comprises the forty-ninth of our industrial series already published; and we would here announce that we have in preparation engravings of a number of other extensive establishments, illustrating the processes of manufacturing other articles, not generally known, which we are confident will be of equal interest to any of the industries which have been already illustrated and described in these columns.

London's Stock Companies—Limited.

The English people are famous for forming stock companies (limited) in conducting all sorts of enterprises. Some time ago Truefit, the celebrated London barber, converted his shaving and hair cutting establishment into a stock company, at which some of the newspapers made considerable fun, naming several lords and bankers as among the shareholders. But Truefit understands his business, and, it is said, has made a fortune out of it, and in all probability the stockholders in his company will receive larger dividends and be more secure in their investments than if they placed their means in some other more pretentious companies. Mr. Truefit's business is certainly legitimate, and a useful one, and can only be made profitable by industry; therefore we

see no reason for our London contemporaries casting slurs at any of the stock owners, if they be princes or lords.

But a new joint stock company (limited) has just been registered which is nothing more nor less than an old curiosity shop. From the prospectus we learn that the company seeks to raise £2,000, and proposes to buy, sell, and exchange works of art, books, and used foreign postage stamps. No doubt the venture is a *bona fide* one, and it is satisfactory to note that the promoter takes 1,000 of the 2,000 shares. But it is somewhat of a *reductio ad absurdum*. *Capital and Labor* thinks, to turn such a business into a joint stock company. Will there be any directors? the writer inquires; What will be their remuneration, and where will they meet? Perhaps, he adds, in the shop among the old foreign stamps, the works of art, and the books and mummies! The capital of the company is certainly not extravagant, but probably sufficient to conduct the canceled postage department, if it does not go far towards purchasing "old masters."

Basal Plane Quartz Crystals.

Until within a very few years crystals of quartz with the basal plane have been accounted excessively rare. So recently as the year 1877, Professor Egleston, of Columbia School of Mines, remarked, in a lecture before the Academy, on some rare quartz crystals, that five years before "only three crystals of quartz with the basal plane were known to the scientific world: one owned by the British Museum; one by the Imperial Museum at Vienna; the other in St. Petersburg, and these came from Brazil. They were considered priceless treasures, and the very *ultima Thule* of rarity in the mineral kingdom."

In a communication dated Morgantown, N. C., May 20, Mr. W. E. Hidden, mineralogist, informs us that in a locality in the South Mountains of Burke county, North Carolina, quartz crystals with the basal plane are comparatively abundant. Mr. John T. Humphreys, who discovered the locality, has more than a dozen of them, and Mr. Hidden himself has seven. In these specimens the apex of the pyramid of the crystal is cut off at an exact right angle to the sides of the crystal, as shown in the annexed cut.



THE BOSS PUZZLE ABROAD.

The "fifteen puzzle" epidemic, which prevailed so alarmingly here last year, has extended to England and the Continent, and our foreign exchanges come to us laden with solutions of the problem. Scientists even have taken the subject up, and communicate to their favorite papers the formula which expresses the mathematical possibilities of it, and editors write columns on the subject for their respective papers. It was a good while reaching the other side of the ocean, but, like the phylloxera, is doing its devastating work.

The American Science Association.

The twenty-ninth meeting of the American Association for the Advancement of Science will begin August 25, in the Massachusetts Institute of Technology, Boston. An exceptionally large gathering of prominent scientific workers is anticipated. One of the morning sessions will be held at Cambridge, and the rest of the day will be devoted to an inspection of the various departments and museums of Harvard University and the Observatory.

DISASTROUS STEAMBOAT ACCIDENT.

On the afternoon of June 28 the fine passenger steamer Seawanhaka, carrying 350 or 400 passengers, while going at full speed up the narrow and dangerous pass known as Hell Gate, between New York and Brooklyn, was discovered to be on fire. The flames spread with amazing rapidity. Captain Smith with remarkable bravery kept his place at the wheel, was surrounded with fire and badly burned, but nevertheless directed and grounded the boat on a safe point ashore, free from rocks. But during the brief period that elapsed before the boat touched, many of the terrified passengers were compelled by the flames to leap into the water. About sixty lives were lost.

The cause of this accident is not yet known; but so far as we can gather from the newspaper reports we are inclined to think it was due to the bursting of one of the boiler flues.

It would seem from the reports that the boat was carrying about all the steam allowed by her certificate, that a slight explosion was heard, that steam first appeared in the upper cabin, then fire, and that flames blew out of the furnace door. These circumstances indicate a probability that by the bursting of a flue the gases of the furnace fire were driven out against the woodwork of the vessel and instantly set her in a blaze. The steamer carried two boilers, set in the hold. Whether our theory of the cause of the fire is correct cannot be determined till the boilers are raised.

This dreadful disaster forms but another evidence of the inadequacy of the present means for safety on steamboats. We hope that our inventors will exercise their ingenuity in discovering new appliances by which such accidents will be rendered impossible. A light fireproof material, to take the place of the dry woodwork now used for cabins, is especially needed.