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 architectura' 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, APRIL 14, 1894.

Contents.

(Illustrated articles are marked with an asterisk.)

Administration building, California Fair*..... 232
Air ship, the Maxim*..... 233
Aluminum boat, Jules Davoust*..... 228
Aluminum for preparing phosphorus..... 227
Arc light carbons, making (5942)..... 237
Bahama expedition, a*..... 229
Balloon travel, fast..... 236
Belt lacing, the Bristol*..... 230
Books and publications, new..... 236
Brown-Sequard, Dr. Charles E..... 235
Business law in daily use..... 227
California Midwinter Fair*..... 225, 232
Coal vein, a great, in Tonquin..... 235
Diamonds, yellow light on..... 230
Dimension, the fourth..... 230
Dredging for sea life*..... 229
Feed bag, Terry's*..... 228
Gas from wood..... 235
Inventions, recently patented..... 236
Inventors and the government..... 226
Laundry starch (5954)..... 237
London, subterranean..... 231
Longevity of life..... 231
Maple sugar making (5940)..... 236
Maxim, Hiram, and his air ship*..... 234
Mechanic Arts Building, California Fair*..... 225
Milk, dirt in..... 232
Navies, U.S. and British, 1812..... 230
Notes and queries..... 236
Passenger cars, deadly..... 226
Patent decision on marking patented goods..... 227
Patents granted, weekly record..... 237
Photographic collodion emulsion..... 230
Photographic toning and fixing (5956)..... 237
Piping to carry water (5965)..... 237
Propelling vessels, Witte's means for*..... 228
Scientific journal, the first..... 231
Star fishes, giant*..... 229
Tehuantepec railway, the..... 226
Telegraph, new transandine..... 232
Textile fibers, distinguishing..... 227
Torpedo boat Hornet, fast time of..... 230
Tricycle, a two-seated*..... 235
War ships, British, at sea..... 228
Wood embossing..... 230
Yacht propellers (5941)..... 236

TABLE OF CONTENTS OF

SCIENTIFIC AMERICAN SUPPLEMENT

No. 954.

For the Week Ending April 14, 1894.

Price 10 cents. For sale by all newsdealers.

PAGE

I. AGRICULTURE.—Profitable Rice Culture.—ecent extension of the rice cultivation area in the dry lands of Southwestern Louisiana.—With notes on the finance thereof..... 15254
Rice Meal or Bran.—Examination into the relative qualities of these substances as food for cattle.—With analyses..... 15254

II. BIOGRAPHY.—A Beethoven Portrait belonging to the House of Brunswick.—Discovery of a new portrait of the great musician.—1 illustration..... 15239

III. BIOLOGY.—The Development of the Chick.—Development of the egg and views of an old-time naturalist thereon..... 15262

IV. CIVIL ENGINEERING.—The State Dam, Mohawk River, at Cohoes, N. Y.—A dam of novel construction to overcome special difficulties encountered.—4 illustrations..... 15247

V. ELECTRICITY.—Some Electrical Phenomena.—Account of experiments by Mr. James Wimshurst..... 15249

VI. GEOGRAPHY AND EXPLORATION.—Japanese Hot Springs.—Hot Springs in Japan.—With notes on the natives..... 15241

VII. GEOLOGY.—Supposed Evidences of a Post-Glacial Submergence in Europe.—By Prof. G. FREDERIC WRIGHT, D.D.—Examination of a popular theory upheld by geologis s.—With conclusions thereon..... 15252

VIII. MECHANICAL ENGINEE ING.—De Laval's Steam Turbine.—The celebrated steam turbine.—I s theory and practical treatment..... 15246
Water Tube Boilers.—Continuation of this article on the last phases of modern boiler work.—9 illustrations..... 15244

IX. METEOROLOGY.—The Dynamics of the Atmosphere.—The atmosphere and the role of its aqueous vapor..... 15262

X. MISCELLANEOUS.—Sledge Racing in Holland.—Sport on the ice in Holland described.—1 illustration..... 15241
Tobacco.—By H. B. COX.—A valuable article on tobacco, its different varieties and their properties..... 15253

XI. NATURAL HISTORY.—About Castoreum.—The beaver, its habitat and notes on its natural history and products.—4 illustrations..... 15248
Notes on Fishes.—Florida ponds and their life and mystery to be explained..... 15251
The Walking Fish.—A fish that cannot swim.—A curious example in natural history.—1 illustration..... 15248

XII. NAVAL ENGINEERING.—How War Vessels are Prepared for Trial.—By ROBERT W. PECK, New York.—A graphic and popular article on the trial trip of a ship of war..... 15248

XIII. POLITICAL ECONOMY.—The Relation of Machinery to Commercial and Industrial Depression.—A much-discussed question considered.—The possible good and bad effects of modern improvements..... 15240

XIV. PRESTIDIGITATION.—The Magic Tambourine.—A showy trick in natural magic fully described.—7 illustrations..... 15241

XV. RAILROAD ENGINEERING.—A Railroad Over the Neva.—A species of Russian mountain for crossing the Neva on the ice.—2 illustrations..... 15247

XVI. THERMO-DYNAMICS.—Refrigerating Apparatus. By Prof. CARL LINDE.—Investigation of apparatus for producing low temperatures, with formulæ and diagrams.—Elaborate examination of freezing processes.—11 illustrations..... 15242

INVENTORS AND THE GOVERNMENT.

The treatment of inventors by the United States government, as exemplified in its courts, in the War and Navy departments, and in the Patent Office, has of late been the subject of very varied comments. A reporter's interview with a typical American inventor, now and for some years resident abroad (Mr. Hiram Maxim), has been somewhat extensively circulated, in which he states that he has received much better treatment abroad than at home. He claims that a disposition exists in this country to rob the inventor of his rights. When an invention is made, the first effort, he says, is to push forward some alleged improvement on it, or some variation which will afford a ground for escaping from the original patent. He accuses the government of not awarding him his just rights; or at least of not giving due consideration to his work—work, it should be stated, entirely in the direction of munitions of war. England, according to him, is a better field for the inventor, and the government there seems to have treated him as he desired, and as he feels is just. The United States government, through its officers, has, he claims, a way of taking out patents on top of his, and of so appropriating his inventions.

It is, however, in its character of purchaser of patented things that our inventor complains of the government. It is very true that until recently inventors of improved arms and munitions of war had but little chance to deal with the Federal authorities. There was little or nothing needed. The country drifted along very peacefully without an extensive navy, and with but the skeleton of an army. But now a change has come. The navy is being built up as quickly as possible, and we soon may be a participant in the race of the great powers for naval supremacy. The army, while not increased in numbers, is being supplied with new arms—arms due unfortunately not to an American inventor—and of small caliber, in sequence with approved European practice. Harveyized steel, American made projectiles and American machine guns are now freely purchased, simply because our country has a navy on which to employ these products.

It would appear therefore that as a purchaser of patents the government is not so very much to blame.

The authorities have to exercise care in such matters, and their fate is to be besieged by patentees desirous of having their inventions adopted. The absence of a large standing army, and our fortunate exemption from imminent danger of war, have operated to cut off one of the largest markets for inventions.

The subject of the inventor and of how he should be treated by the public is a very wide one, on which different opinions may be consistently or at least honestly held. But the enlightened opinion can be but the one. The inventor should be encouraged. He is one of the few definitely provided for in the constitution, and the patent statutes are built directly on the provisions of that instrument. The administration of the Patent Office should be conducted for his good, the very establishment of the office being based on the theory that the inventor is a public benefactor. If an application is made for a patent, the examiners of the case should strive to discern the invention which may be in it, and not endeavor to reject it for want of this indefinable quality. The highest courts have their principal difficulty in patent cases in deciding as to invention, its presence or absence. It seems absurd, therefore, at the outset of the career of a patent application that this most difficult question should be adjudicated by the first official dealing with it.

Many lawyers have felt that a more liberal treatment should be awarded patents by the courts. The virtual abolishment of the right of reissue has done away with what should have constituted an effectual remedy for inadequacy of claims. The Patent Office should therefore not err on the side of severity; it should be the inventor's friend and critic, not his enemy, and should not constitute itself a court of first resort.

The Deadly Passenger Car.

We are all going to be poisoned now by the deadly passenger car. In the laboratory of the Imperial Board of Health of Germany experiments were made between January, 1891, and July, 1892, by which the seeds of consumption were found in abundance in the dust collected, not only on the floors, but on the walls and seats, of cars. Samples of dust were taken from 45 compartments of 21 different passenger cars and 117 animals were inoculated with them. Part of these died very soon thereafter of various contagious diseases before they had time to develop consumption; of the rest, killed four to six weeks after inoculation, three had tubercles. These three, however, were inoculated with sleeping car dust, taken, not from the floor, but from the walls, cushions and ceilings. Bacteria at the rate of 78,800 per square inch were found on the floor of a fourth class car, and 34,400, 27,200, and 16,500 per square inch on the floors of the third, second and first class cars. Thus, even in the latter, the average passenger, who usually has at least half a compartment to himself, say 3,000 sq. in. of floor, has an army of 49,500,000 deadly enemies aiming at his vitals on the floor alone, to say nothing of other millions in front and rear, on both flanks and overhead. It would seem impossible to escape; but the board of health is said to have reported measures for removing or reducing the danger, which the railroads are considering.—*Railroad Gazette.*

The Tehuantepec Isthmus Railway.

The March number of the *Engineering Magazine* contains an interesting article on this subject by Senor Romero, the Mexican minister at Washington, from which we take the following:

The Mexican Congress, by an act of June 2, 1879, gave a charter to Edward Learned, a citizen of the United States, or the company that he might organize, to build the Tehuantepec road within three years and four months from the date of the charter, and offered a subsidy of $7,500 for each kilometer of road built by the company and actual land opened. Mr. Learned organized a company in New York which held the grant for several years and built, in a provisional way, a few miles of road from the mouth of the Coatzacoalcos River toward the south.

After long experience in ineffectual efforts had shown that it was not possible to secure this road even under the liberal concessions made by the Mexican government, it was suggested that the government should undertake the work on its own account. Congress, therefore, authorized the executive, on May 30, 1882, on account of the state, to build the Tehuantepec Railway or to contract for its construction with a company.

By virtue of this authorization the Mexican government signed, on October 15, 1888, a contract for the construction of the road with Edward McMurdo, the representative of Salvador Malo, authorizing a loan of £2,700,000 for the expenses of the same, which was raised at London, Berlin, and Amsterdam by the sale of five per cent bonds at about seventy per cent. This contract was approved by an act of the Mexican Congress of December 19, 1888, and was modified by another contract signed on October 15, 1889, also subsequently approved by Congress.

To carry out this purpose it was necessary first to terminate the contract still pending with the Learned company. This company agreed to give up the contract, receiving a compensation for expense and damages of $1,500,000 in United States gold, which I paid in New York on behalf of the Mexican government.

As the proceeds of the loan of £2,700,000 were not sufficient to finish the road, part of another loan of £3,000,000, recently contracted at the city of Mexico, has been applied to that work. On December 6, 1893, a contract was signed at that city for the construction of the fifty-nine kilometers of road unbuilt, and it is provided in the same that the line shall be finished on September 6 of this year, with an additional expense of over $1,000,000.

The Tehuantepec road is now practically completed, and Mexico offers the result of all this work of many years to the commercial interests of the world.

The comparative advantages of the Tehuantepec interoceanic route over the Panama route, in reference to geographical and commercial features, are great. Any map showing the two routes will prove in a general way the geographical advantages of the Tehuantepec route in reference to the coastwise commerce of the United States, and, in a measure, its advantages in relation to the business of western Europe.

The shortest sail or steamer route from eastern Asia to any point on the Pacific coast of the American isthmus passes in close proximity to the shore line of Tehuantepec; in fact, the shortest great circle from Panama to Hong Kong will pass through Tehuantepec, east of San Francisco, and nearly up to the Aleutian Islands. Even the shortest route from Panama to the Sandwich Islands will pass close to Tehuantepec.

It is only a little over 810 miles from the mouth of the Mississippi River to the eastern terminal of the Tehuantepec Railroad. The total distance by rail and water from Chicago to the Pacific Ocean via Tehuantepec is only 1,875 miles.

The nautical conditions for sailing vessels are much more favorable at Tehuantepec than at Panama.

The interoceanic route established at Tehuantepec will connect, at the best possible location, the eastern and western coasts of the United States and Mexico, and will develop a coastwise business of great magnitude and of vast importance to these two countries, if controlled and managed by United States interests.

Eighty Miles in Forty-five Minutes.

M. Latruffe, whowent up in a balloon recently, at Courbevoie, outside Paris, and who was supposed to be lost, succeeded in safely reaching firm earth. His ascent (says the Paris correspondent of the *Daily Telegraph*) was to have been a short one, but he had no sooner reached the upper air than he was carried away in a northwesterly direction. He descended with much difficulty at a little place called Beauvarde, between Chateau-Thierry and Epernay, in the Champagne district. He had thus traveled eighty miles in three-quarters of an hour.

How to Distinguish Textile Fibers.

It is customary, says *Textile Industries*, to mix, spin, and weave fibers in various proportions, and as it is important to know the quantities of different fibers contained in goods to be imitated, researches have established a number of tests for this purpose, with which every manufacturer and manager should be thoroughly conversant.

In a fabric composed of linen and cotton, a strong potash solution will color the linen fiber a deep yellow, while the cotton will be only slightly tinged with the color; a mixed yarn or fabric will, therefore, assume a spotted or striped appearance in the liquid. If a sample of the linen to be tested is dipped into olive or rapeseed oil, the fabric will quickly absorb it. When the excess of oil has been removed and the fabric appears striped, it is not pure linen, but mixed, and, further, the linen thread becomes transparent and the cotton thread opaque; while, if the linen saturated with oil is laid upon a dark substance, the linen threads will appear much darker than the cotton on account of this transparency. In order to destroy or dissolve cotton by a process similar to carbonization, the fabric to be tested is laid in a mixture of three parts sulphuric acid and two parts saltpeter for eight or ten minutes, then washed, dried, and, finally, treated with ether containing alcohol. The woolen and linen fibers have remained uninjured, while the cotton has been dissolved.

In order to distinguish animal from vegetable fibers, they may be boiled in caustic potash lye. Both wool and silk will be dissolved thereby, but not linen and cotton. If a sample of woolen goods is to be examined to see if it contains cotton, place it in a concentrated sulphide of sodium solution; by this, the wool is dissolved and can be entirely washed out in hot water. The residue will be vegetable fiber, and, if the sample was at first weighed exactly, the actual percentage of wool can be ascertained by weighing the remaining vegetable fibers. Such a fabric can be analyzed with still greater facility in an undyed condition. Wool and silk, when plunged into picric acid, are dyed a fairly fast yellow, while both linen and cotton remain white.

A silken thread, when exposed to a flame, ignites, evolving a smell of burning feathers, but continues to burn only as long as it remains in contact with the flame, and is extinguished when taken away, the burnt end forming a black, charred substance, thicker than the thread. Wool behaves similarly, but the odor is more repugnant.

The surest and best test, however, is the microscope, which gives unerringly the component fibers of the fabric under examination. For this purpose, several threads must be drawn out of the fabric in question (an operation best performed under water) and subjected to an examination with a power of from 200 to 300 diameters.

The linen fibers appear as cylindrical formations, with nodular swellings, the former sometimes split into thinner fibers, especially in the case of linen which has been used.

Cotton fibers, however, will show themselves as flat ribbons, and are very thin as seen where the edge is shown. With mixtures of linen and cotton, the examination of the fibers can be conducted with still greater facility, by opening a small strip of the material to be investigated, introducing it into a dilute alcoholic solution of aniline red (fuchsine), but only for a very short time, after which it is well washed, and then immersed in caustic ammonia for two hours. In this operation the linen fibers are dyed rose red, while the cotton fibers take no trace of color, and their examination is thereby rendered much more easy.

The fibers of wool appear under the microscope as cylinders covered with scales, and their delicate structure is rendered still more visible by treatment with sulphuric acid, which dissolves the yolk that fastens these scales to the fibers; but the different qualities can also be comparatively tested to ascertain the uniformity, firmness, or strength. The microscope is a means of distinguishing the relative value of the different wools better than is possible by any other mode. For this purpose, a "wool gauge" has been constructed, consisting of a brass frame screwed to the stage of the microscope, into which the wool fiber is fastened in such a manner that it is first loose, but is gradually tightened with a screw for that purpose, when the diameter can be measured with a micrometer and an exact measurement of the fiber obtained. But as all the fibers are not equally thick, it is necessary, of course, to measure several, to obtain the average. To measure the elasticity and strength of the fiber, it is first drawn tight, the index placed upon zero, and the tension increased by the gradual drawing with the screw mentioned until the fiber breaks. The index will show on the scale how many millimeters a fiber may be stretched before it breaks. It is evident that this experiment must be repeated with several fibers, and that the same apparatus can naturally be used for this purpose for all kinds of fibers.

Other animal hair used for textile fibers, goat hair, horse hair, etc., can also be recognized and distinguished by the microscope. As for silk, it presents no peculiarities, but is simply a homogeneous cylinder without the scale layer, marrow, and bark substance of hair. The optical difference of all these fibers is aided by the micro-chemical investigation. Iodine and sulphuric acid may be used as reagents, whereby the vegetable fibers, consisting of cellulose, are always colored blue, which is not the case with animal fibers. Silk differs from the latter in that it is dissolved in concentrated muriatic acid.

Aluminum for the Preparation of Phosphorus.

The applications of aluminum in the arts multiply with much the same rapidity as do those of electricity. The *Berichte* describes a new method of preparing phosphorus by its use as a reducing agent. The process is so simple that it can easily be illustrated on the lecture table. Hydrogen ammonium sodium phosphate is fused in a porcelain crucible until it is changed into sodium metaphosphate; aluminum turnings are then dropped into the liquid, and the freed phosphorus bursts into flame. Now if the experiment is tried with a glass tube, instead of a crucible, a slow current of dry hydrogen being passed over the mixture of the salt and aluminum, the phosphorus distills into the cooler part of the tube without the formation of any phosphureted hydrogen. The residue consists of alumina, sodium aluminate and a phosphide of alumina—Al^2P^2.

By these steps in the process only 30 per cent of the phosphorus in the mineral used can be obtained; but the phosphide is decomposed entirely by heating with silica, and this may be added at the beginning of the experiment and the reaction proceeds without difficulty and without loss.

It is advised that for the lecture table a combustion tube a yard long be used; two and a half parts of aluminum, six parts of sodium metaphosphate (obtained from heating previously the hydrogen ammonium sodium phosphate) and two parts of finely pulverized silica are placed in the tube, a slow current of hydrogen is passed through, and heat is applied until the reaction begins. This is shown by sudden incandescence, and phosphorus is seen to condense in globules on the cooler part of the tube, at the end where the hydrogen escapes.

Instead of this phosphate, any ordinary phosphate may be used, but experimenters are warned not to use the superphosphates containing calcium sulphate mixed with them, such as are used for fertilizing purposes, because the sulphate is suddenly decomposed by the aluminum with an explosion when a certain temperature is reached.

Business Law in Daily Use.

Herewith are the most important laws, succinctly stated, that touch the needs of the average business man. An observance of them will enable one to avoid many mistakes that may be serious, and steer the innocent from many pitfalls that may be calamitous. They contain, in few words, the essence of a large amount of legal verbiage not always very intelligible.

Each individual in a partnership is responsible for the *whole* amount of the debts of the firm, except in cases of "special" partnerships.

Contracts made on Sunday cannot be enforced.

A contract made with a minor is void.

A contract made with a lunatic (or with one who has a general reputation for weak-mindedness) is void. (The latter case must, however, be *clearly* established.)

The acts of one partner bind all the other partners.

It is a fraud to *conceal* a fraud.

No consideration is sufficient in law if it be illegal in its nature. (Many "failures" are upset because of this law.)

A receipt for money is not alway *conclusive*.

An agreement without consideration is void.

The law compels no one to do impossibilities. (This must be liberally construed.)

Ignorance of the law excuses no one.

Note especially the following, as affecting the giving and taking of checks and notes:

A note made on Sunday is void.

A note made by a minor is void.

A note obtained by fraud, or from a person in a state of intoxication, cannot be collected. (This is a corollary to the law governing contracts with the weak-minded.)

Notes bear interest only when so stated.

If a note is lost or stolen, it does not release the maker; he must pay it if the consideration for which it was given, and the amount, can be proved.

Signatures made with a lead pencil are good in law.

A note indorsed *in blank* is transferable by delivery, the same as if made payable to bearer.

The maker of an "accommodation" note (one for which he has received no consideration, having lent his name and credit for the accommodation of the holder) is not bound to the person accommodated, *but is bound to all other parties*, precisely as if there was a good consideration.

If the maker of a check or draft has changed his residence, the holder must use "due diligence" to find him.

Checks or drafts *must* be presented for payment "without unreasonable delay."

Ignorance or oversight of or willful inattention to these fundamental injunctions is the frequent source of annoying and expensive litigation.—*The Keystone.*

DECISION RELATING TO PATENTS.

MARKING OF PATENTED GOODS.

Supreme Court of the United States.

DUNLAP ET AL. V. SCHOFIELD ET AL.

Decided March 5, 1894.

Appeal from the Circuit Court of the United States for the Eastern District of Pennsylvania.

This was a bill in equity, filed May 7, 1889, for the infringement of letters patent issued April 2, 1889, for the term of three and a half years, by the United States to Julius Stroheim for a design for rugs.

The plaintiffs asked for an injunction and for damages in the sum of $250 as penalty and damages under the act of February 4, 1887, chapter 105, and waived all right to any further damages, or to an account of profits. The court, on May 13, 1890, entered a decree for the plaintiffs accordingly, and the defendants appealed to this court.

Mr. Justice Gray (after stating the case) delivered the opinion of the court.

By section 4,900 of the Revised Statutes of United States (which, by virtue of section 4,933, applies to patents for designs), it is made the duty of every patentee or his assigns, and of all persons making or vending any patented article for or under them, to give sufficient notice to the public that it is patented, by putting the word "Patented" upon it, or upon the package inclosing it, "and in any suit for infringement, by the party failing so to mark, no damages shall be recovered by the plaintiff, except on proof that the defendant was duly notified of the infringement, and continued, after such notice, to make, use or vend the article so patented."

The clear meaning of this section is that the patentee or his assignee, if he makes or sells the article patented, cannot recover damages against infringers of the patent, unless he has given notice of his right, either to the whole public by marking his article "Patented" or to the particular defendants by informing them of his patent and of their infringement of it.

One of these two things, marking the articles or notice to the infringers, is made by the statute a prerequisite to the patentee's right to recover damages against them. Each is an affirmative fact, and is something to be done by him. Whether his patented articles have been duly marked or not is a matter peculiarly within his own knowledge; and if they are not duly marked, the statute expressly puts upon him the burden of proving the notice to the infringers, before he can charge them in damages. By the elementary principles of pleading, therefore, the duty of alleging and the burden of proving either of these facts is upon the plaintiff.

In the present case, although the plaintiffs had manufactured and sold goods with the patented design upon them, they made no allegation or proof that the goods were marked as the statute required. They did allege in their bill that they notified the defendants of the patent and of their infringement; but this allegation was distinctly denied in the defendants' answer, and the plaintiffs offered no proof in support of it. They could not, therefore, recover, even if this were a suit for damages within section 4,900 of the Revised Statutes of the United States.

But these plaintiffs, waiving all right to an account of profits, or to other damages, sought and were allowed to recover the fixed sum of $250, in the nature of a penalty, imposed by the act of February 4, 1887 (ch. 105), upon any person who, during the term of a patent for a design, and without the license of the owner, applies the design secured by the patent, "or any colorable imitation thereof," to any article of manufacture for the purpose of sale, or sells or exposes for sale any article of manufacture to which "such design or colorable imitation" has been applied, "knowing that the same has been so applied." (24 Stat., 387.) This statute, according to its clear intent and effect, requires that, in order to charge either a manufacturer or a seller of articles to which has been applied a patented design, or any colorable imitation thereof, he must have been "knowing that the same has been so applied," which is equivalent to saying "with a knowledge of the patent and of his infringement." The reasons for holding the patentee to allege and prove either such knowledge, or else a notice to the public orto the defendant, from which such knowledge must necessarily be inferred, are even stronger, in a suit for such a penalty, than in a suit to recover ordinary damages only

In none of the cases on which plaintiffs rely, and by which the court below considered its judgment as controlled, was there any adjudication inconsistent with this conclusion.

Decree reversed and bill dismissed.