

Scientific American.

ESTABLISHED 1845.

MUNN & CO., Editors and Proprietors.

PUBLISHED WEEKLY AT NO. 37 PARK ROW, NEW YORK.

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

TERMS FOR THE SCIENTIFIC AMERICAN.

One copy, one year, postage included. \$3 20 One copy, six months, postage included 1 60

Clubs.—One extra copy of THE SCIENTIFIC AMERICAN will be supplied gratis for every club of five subscribers at \$5.20 each; additional copies at same proportionate rate. Postage prepaid.

Single copies of any desired number of the SUPPLEMENT sent to one address on receipt of 10 cents. Remit by postal order. Address MUNN & CO., 37 Park Row, 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, with handsome cover uniform in size with SCIENTIFIC AMERICAN. Terms of subscription for SUPPLEMENT, \$5.00 a year, postage paid, to subscribers. Single copies 19 cents. Sold by all news dealers throughout the country.

Combined Rates.—The SCIENTIFIC AMERICAN and SUPPLEMENT will be sent for one year, postage free, on receipt of seven dollars. Both papers to one address or different addresses as directed. The safest way to remit is by draft, postal order, or registered letter. Address MUNN & CO., 37 Park Row, N. Y.

Scientific American Export Edition.

The SCIENTIFIC AMERICAN Export Edition is a large and splendid periodical, issued once a month. Each number contains about one hundred large quarto pages, profusely illustrated, embracing: (1.) Most of the plates and pages of the four preceding weekly issues of the SCIENTIFIC AMERICAN, with its splendid engravings and valuable information; (2.) Commercial, trade, and manufacturing announcements of leading houses. Terms for Export Edition, \$5.00 a year, sent prepaid to any part of the world. Single copies 50 cents. Manufacturers and others who desire to secure foreign trade may have large and handsomely displayed announcements published in this edition at very moderate cost.

The SCIENTIFIC AMERICAN Export Edition has a large guaranteed circulation in all commercial places throughout the world. Address MUNN & CO., 37 Park Row, New York.

VOL. XL., No. 5. [NEW SERIES.] Thirty-fourth Year.

NEW YORK, SATURDAY, FEBRUARY 1, 1879.

Contents.

(Illustrated articles are marked with an asterisk.)

Table listing various articles such as 'American Millings Purifier Co.', 'Astronomical notes', 'Atmospheric air and the vacuum', etc., with corresponding page numbers.

TABLE OF CONTENTS OF

THE SCIENTIFIC AMERICAN SUPPLEMENT

No. 161.

For the Week ending February 1, 1879.

Price 10 cents. For sale by all newsdealers.

Table listing contents of the supplement by section: I. ENGINEERING AND MECHANICS, II. TECHNOLOGY, III. CHEMISTRY AND METALLURGY, IV. ELECTRICITY, LIGHT, HEAT, ETC., V. MEDICINE AND HYGIENE, VI. AGRICULTURE, HORTICULTURE, ETC., VII. MISCELLANEOUS.

SOME PATENTS THAT SECTION 11 WOULD HAVE KILLED.

The object of Section Eleven is to make void certain patents described as undeveloped and useless, yet involving principles or devices which subsequent experimenters may want to use. To accomplish this end a special tax is laid upon all patents, in a fee of \$50 at the end of four years and another fee of \$100 at the end of nine years; non-payment of either killing the patent.

It is argued that if an invention has any real merit its profitable development will speedily follow, as a matter of course; in which case the additional fees will be no serious burden. If, however, the invention is not at once profitable, or if the inventor does not believe in it sufficiently to be willing to pay \$150 for the confirmation of his right, it may be fairly presumed that the invention does not constitute a progress in the arts, and accordingly does not deserve the protection of the law. All such undeveloped inventions, it is claimed, are virtually abandoned by their owners; and, although the patentee has done nothing contrary to his agreement with the nation, nothing to warrant the forfeiture of his right, the nation may justifiably break its part of the contract and allow the inventor's right ("exclusive right," in the terms of the Constitution) to be freely invaded.

The fallacies which underlie this specious argument have been repeatedly exposed in these columns and elsewhere. We do not propose to discuss them here. Our purpose is rather to note briefly some of the inventions for which America is justly proud, inventions which have added enormously to the nation's wealth and power; and to ask how it would have fared with them had Section Eleven formed a part of the patent law of the past.

To no one man is this country more indebted for its industrial and commercial rank than to Eli Whitney. The world knows what a long and, for many years, profitless fight he had to wage with prejudice and injustice before his invention was so far established as to be beyond condemnation as "undeveloped and useless." What would have been the effect of adding to his already overwhelming burdens the additional fees prescribed by Section Eleven?

In 1833 Obed Hussey patented an invention which solved the problem of the harvesting machine. For many years he labored almost in vain to advance his invention to the stage of practical and profitable usefulness. Would the country have been equally benefited had his right and his efforts fallen under the encouraging (!) influence of Section Eleven? The early struggles of Elias Howe, Jr., the inventor of the sewing machine—struggles against poverty and injustice as well as the stolid prejudice of the community—are known to all. His first machine was finished in the spring of 1845. Four years after he was alone and poor in a foreign land. He was indebted to the kindness of a Scotch mechanic for a steerage passage home. He found his wife and children destitute, all their personal effects being still detained to secure the payment of their passage home. His wife was sick; ten days after his arrival she died. He was penniless; and just at that moment, had Section Eleven been in force, he would have had to pay \$50 or forfeit his right to his invention.

The real value of the Goodyear rubber patent will not be questioned at this late day. Taking up the struggle under which Heywood had succumbed, Goodyear toiled through years of terrible privation to perfect his invention. Success left him in the deepest poverty; and at no time during the entire period of the original patent was his invention a source of profit to him. Under provisions embodied in the proposed amendment to the law the spoilers of Goodyear could easily, and at any time, have dispossessed him of the last remnant of right.

The Sarven carriage wheel is known the world over. Section Eleven would have killed the patent on it most certainly and effectively. During the first eight or ten years of the life of the patent the inventor's efforts to induce carriage makers to adopt his improvement were almost fruitless. His efforts were persistent, his diligence remarkable; yet his invention was commercially "undeveloped and profitless," almost to the end of the term of the patent.

The struggles of Woodworth alone, and afterward with his partner Strong, to persuade men to adopt his method of finishing boards by machinery, up to the time of his death in poverty in the eleventh year of his patent, would make a volume. His invention was radical, valuable, era making in the art of carpentry; yet Section Eleven would have killed his patent without compunction.

Another radical and immensely valuable invention was Henry Voelter's process of making paper-pulp from wood. The best years of the inventor's life were given to the development and introduction of the improvement, and in combating the prejudice of the trade to the use of wood pulp in paper. He was able and willing to spend the greater part of the life of his patent, and \$70,000, in demonstrating the usefulness of his idea. He may have been able to pay the additional fees prescribed in Section Eleven; another inventor of the same or an equally valuable process might not. In either case would the payment or non payment of the fees have been any evidence of the intrinsic worth or worthlessness of the invention?

Daniel Lamson invented a machine for notching hoops. It was not a great invention, yet it was novel and unquestionably valuable. He was a poor man; and before he had succeeded in introducing his invention he enlisted in a Massachusetts regiment and was killed at Fredericksburg. Just at that time, the first fee under Section Eleven would have been demanded of his widow by the Patent Office—a penalty for invention!

It is needless to multiply cases. From the history of inventors and inventions in this country hundreds of similar instances might be drawn. In a very able paper lately read before the Cincinnati Board of Trade, Mr. George H. Knight has furnished a long list of them—instances of patient, persistent, and long protracted struggles against poverty and class prejudice, to bring valuable inventions up to the point of profitable and established usefulness; instances of inventors now ranked among the world's best benefactors, who would have been cheated of their rights, and the progress of the useful arts thereby delayed indefinitely, had there been any Section Eleven to thwart their efforts. From the very nature of things the most pregnant and novel inventions are the hardest to make commercially successful; and it is these rather than the trivial catchpenny inventions or the inherently worthless inventions, that would suffer most from the killing influence of the proposed amendment; and it is these that the country can least afford to discourage or to destroy.

GLUCOSE HONEY.

For a long time strained honey has been so largely adulterated with glucose, that intelligent buyers are very shy of honey in that state. Honey in the comb, however, especially if the comb is clean and white, disarms suspicion, though it is well known that respectable grocers are accustomed to surround comb honey in jars with clear honey mixed with a small percentage of glucose, to prevent the granulation which occurs in pure honey exposed to the light. One does not object to the use of a little glucose for such a purpose, though the preserving sweet is worth in market only one tenth as much as the sweets preserved. It is a very different matter, however, when the comb itself is filled with glucose, and the fraudulent substance is sold as genuine honey.

Mr. J. Hasbrouck writes to the Bee Keeper's Magazine that his attention was lately called to some fine looking comb honey sold by a grocer in Williamsburg. He bought some of it at twenty-five cents a pound. It was very white, put up in the neatest possible box, and was altogether the finest looking honey he had seen this season. It had a nice flavor of pennyroyal, and was so unlike glucose that he decided, without testing, that his friend's suspicions were wrong, and that it really was honey. It was placed on the tea table with some clover honey, and although the family all preferred the suspected comb on account of its fine appearance, the unanimous decision after eating was that the honey was not good. It was then thoroughly analyzed, and found to be "simply glucose diluted with water and flavored."

Mr. Hasbrouck carried a sample to New York, and veterans in the honey trade almost invariably pronounced it splendid honey until they saw it tested. This is carrying the matter altogether too far. It is well enough to manufacture honey comb for saving the labor of bees, so long as the bees are allowed to furnish the filling; and there may be no vital objection even to the selling of paraffin cells filled with glucose as a cheap substitute for the industrial product of bees, if any one wishes to eat it. But to sell such compounds for honey, at the price of honey, is the refinement of swindling, and ought to be punished as such.

A VEGETABLE GREEN FOR CONFECTIONERS.

It appears, according to one of our French exchanges, that from the grains of raw coffee there may be extracted a beautiful green coloring matter adapted to all the purposes of the cook and confectioner, and which will undoubtedly prove of great value as a commercial product, inasmuch as the number of green colors suitable for such uses, and which are not poisonous, is very limited. According to M. Zech, who describes the process of extraction, the coloring matter is obtained in the following way: The coffee grains are crushed and the oil is extracted by means of ether; they are then dried and agitated with the white of eggs, so as to form a sort of paste, and the latter is exposed for several days to the air. The presence of the white of eggs then determines the appearance of an emerald green. A simpler process is to merely moisten the crushed and desiccated coffee berries with water, expose them three or four days to the air, and extract the coloring matter by means of alcohol.

A NEW INDUSTRY.

For a number of years a Boston firm, emulous of the success which has attended the canning of baked beans, has been trying to discover a method for preserving the freshness and flavor of that other essentially Boston product, the codfish ball. They have at last succeeded, the Boston Advertiser reports, and the rapid demand for the article the world over seems to prove either a wide dispersion of New Englanders or else a widespread need of such an addition to the world's kitchen supplies.

The fish are killed by being stuck in the neck, and are hung up until every drop of blood is removed, and the napes are carefully scraped and cleaned. When salted and dried the fish are equal to the best Phillips' Beach fish. Nova Scotia potatoes are used, and instead of pork fat, the best Vermont and New York butter is contracted for at the dairy. The fish balls are packed solid in tin cans and hermetically sealed, after which they are put up in cases of ten dozen each, when they are ready for the market. The first sale was made in New York last May, and to such an extent has the business grown in nine months that the firm employ a force of 250 men and women in preparing and packing the fish balls, and 60 tanners in making the cans.

Since the 1st of September 20,000 bushels of potatoes have been used, and the codfish comprises several hundred quintals. The goods are shipped by the carload to Chicago St. Louis, San Francisco, Pittsburg, and other Western points. A case of the goods was on exhibition at the Paris Exhibition, for which a medal was awarded, and orders have been filled for France, England, Scotland, South America, Turkey, and China.

**THE LAUNDRIES OF NEW YORK.**

The manager of one of the larger laundries of New York lately said that there were between five and six hundred important laundries in the city, counting steam laundries that do the work of large manufacturers of white goods and of hotels and restaurants, and the hand laundries doing household work. The first steam laundry was started in Boston, in 1853. Several steam laundries in New York employ from 100 to 150 hands. The Empire Laundry, doing the work of fifteen hotels and restaurants, turns out 40,000 pieces a day, or more than 1,000,000 a month, washed, dried and finished. These pieces include sheets, pillow cases, white towels, silver towels, brown towels, brown table cloths, white table cloths, napkins, curtains, jackets, aprons, counterpanes, blankets, bed covers, pillow covers, chair covers, table covers, crumb cloths, and doilies. In the performance of this work there are used \$4,000 worth of soap, \$1,000 worth of starch, \$250 worth of bluing a year, and the pay roll amounts to \$25,000 yearly.

Another laundry manager said that the amount of private washing done in the public laundries has increased immensely since the establishment of the first large public laundry, the New York, at Bergen, N. J., in 1866. The largest are the St Denis, California, Home, Stuyvesant, and New York. The work they do is mainly for persons living in flats, boarders, bachelors, and transient hotel guests. Notwithstanding the great facilities offered by the public laundries, most housekeepers prefer to have their washing done at home. The public laundries that do private washing do not use steam or any machinery except the simple "patent wringer" and "housewife's washboard," because no machinery ever invented could do the necessary fluting, puffing, scalloping, and doing up. The charges range from 75 cents to \$9 a dozen.

The laundry business requires very little capital; the work is simple and the terms are invariably cash. No class of business men lose so little money from bad debts as the laundry men, and the reason is plain; they always have ample security for their bills in the clothing that they wash, and clothing is never returned until the bill is paid.

It is estimated that from one and a half to five million dollars are invested in laundries in New York, giving employment to from ten to twenty thousand persons.

**HAECKEL ON EVOLUTION.**

In his reply to Professor Virchow's charge that the evolution theory is as yet a matter of opinion, not a demonstrated position in science, Professor Haeckel takes occasion to state very forcibly the nature and scope of the theory of descent and the broad ground of fact on which it rests.

However complex in its details, the great problem of organic derivation is essentially simple. Species must have come into existence in one of two ways—by natural development or by supernatural creation. There is no third way. On the one side is the old theory that organisms were created specifically distinct, as they are, as they were, as they ever must be, independent in origin and permanent in form and character. On the other hand stands the theory that the different species of organisms are intimately related, have developed naturally from earlier forms, have descended from common ancestral types. On which side lies the weight of evidence? At starting, Professor Haeckel concisely defines the relation of the three great theories of modern biology: 1. Monism, the universal theory of evolution, or the monistic progenesis theory, is the only scientific theory, which rationally explains the universe and satisfies the desire for causality in the human mind, since it brings all natural phenomena into a mechanical causal connection as parts of a great and uniform (*einheitlich*) process of development; 2. Transformism, or the theory of descent, is an essential and indispensable part of the monistic evolution theory, because it is the only scientific theory which explains the origin of organic species in a rational manner, namely, by transformation, and reduces this transformation to mechanical causes; 3. The theory of selection, or Darwinism, is up to the present the most important one among the different theories, which try to explain the transformation of species by mechanical causes; but it is by no means the only one. Even if we suppose that most species have originated through natural selection, yet we know, on the other hand, that many forms called species are merely hybrids from two different species and are propagated as such; at the same time we can easily conceive that other causes may be acting in the formation of species, causes of which we have no idea at present. To decide what importance natural selection has in the origin of species is left to the judgment of the various naturalists, and in this question the authorities differ materially even to-day. Some ascribe a greater, others a smaller importance to it. But the different estimation of the value of Darwinism is quite independent of the absolute validity of the theory of descent, because the latter is up to the present the only theory which explains, in a rational way, the origin of species.

The theory of creation explains nothing, and is inconsis-

tent with a vast multitude of demonstrated facts and laws. The scientific certainty of the theory of descent, on the contrary is based upon the totality of biological phenomena. Professor Haeckel shows that all phenomena of morphology and physiology, of chorology and oecology, of ontogeny and palæontology, can only be explained by the theory of descent, and reduced to mechanical causes. The guarantee of the truth of the theory lies particularly in the fact that the last simple causes are the same for all these complicated phenomena, and that other mechanical causes cannot be imagined. If further proofs are demanded, where are they to be looked for? In Professor Haeckel's words, "where in the world are we to find 'facts' which speak louder than the facts of comparative morphology and physiology, the facts of rudimentary organs and of embryonal development, than the facts of palæontology and of the geographical distribution of organisms—in short, than all the known facts from the most various biological domains?"

If the theory of evolution is not amply proved by the facts already in possession, then, Professor Haeckel asserts, the theory never will be proved.

**A GREAT MARKET FOR OUR CATTLE AND OTHER PRODUCE.**

Under rules lately adopted by the British Government, which went into effect on New Year's Day, the United States will have the advantage over many other countries in landing cattle in the United Kingdom, as from Russia, Austria-Hungary, Turkey, Greece, Italy, and Roumania live cattle cannot be landed, and from Germany, Holland, Belgium, and France cattle can only be landed at six ports, under strict inspection, to be slaughtered within ten days of their arrival; but cattle from Denmark, Sweden, Norway, Spain, Portugal, and the United States are exempt from compulsory slaughter or quarantine.

The immediate effect of these rules will be to confine the large supply of cattle required by England to a few purveyors, among which the United States is much the largest producer, as the severity of the regulations will practically prevent the nations in the second list from engaging actively in the live cattle trade, and those in the last list, with the exception of Canada, have comparatively few cattle to export.

More than 60 per cent of the people of Great Britain are dependent on foreign food supplies, while her steadily growing population is increasing this dependence every year.

The numbers of live animals imported into the United Kingdom during the year 1877 were about 300,000 cattle, 1,000,000 sheep, from 40,000 to 50,000 swine, 30,524 horses, and the imports of last year are believed to largely exceed those numbers. Since the 1st of last May and up to the 1st of September there have been an average of 3,000 cattle a week shipped to Great Britain from Montreal, Boston, New York, Philadelphia, and Baltimore. This trade, however, is in its infancy as yet, and will, without doubt, grow immensely before long, when the best methods of shipping have been devised and the prejudices against American meat been overcome. With the immense quantity of cheap grazing lands we have we can defy competition to other countries in raising cattle.

Returns of British grain imports from the various countries for a period of nine months ending October 31, 1878, show:

From.	Cwts.
Russia.....	7,432,443
Germany.....	4,112,184
France.....	11,061
Turkey, Wallachia, and Moldavia.....	200,857
Egypt.....	193,194
United States (on Atlantic).....	20,903,997
" " (on Pacific).....	4,208,942
Chili.....	49,994
British India.....	1,577,342
Australia.....	1,309,559
British North America.....	1,968,244
Other countries.....	214,285
Total.....	42,182,102

From this it will be seen that the total quantity received from the United States was 25,112,939 cwts., or 59½ per cent of the total importations.

The annual importation of food into Great Britain is about \$800,000,000 worth, of which a large proportion will be drawn from this country if we pay proper attention to the business. To make the most of this grand market every facility should be given to shippers by cheapening freights, lessening the amount of handling or transferring from cars to vessels, or *vice versa*, and increasing our inland water transportation facilities, as the difference of a cent or two per bushel in the cost of freighting or handling grain may largely influence the trade in that article and make all the difference between a very profitable business and a losing one.

**A HINT FOR AN INVENTION.**

We call the attention of inventive and practical men to the defects of locomotive boilers, and the advantages which would result from their improvement.

A locomotive boiler has three principal parts, all imperfect in greater or less degree. These are the fire box, the tubes, and the smoke box. The fire box has rectangular walls, surrounded by water, except under the grate, and where the fire door is placed. This is an arrangement necessitated by the requirements of science and not indicated by rules of utility

or good construction. The flat form of the fire box walls and of that part of the boiler which covers it, takes away from them strength of resistance, save what is given to each by the other by stays in immense number. These must resist an enormous pressure, especially the roof of the fire box, where it is not counteracted by any opposite pressure, and sometimes may amount to 200 tons.

This arrangement prevents proper cleaning of the outer walls of the fire box and the inner walls of the boiler plates opposite. It is about the same thing where the tubes are; and these, rarely over 2½ inches in diameter, are so numerous that it is as difficult to clean them exteriorly as it is to clean that portion of the boiler surrounding them.

The draught, urged by the jets of exhaust steam in the stack, is so strong that the air and gases in passing through the tubes at a high rate of speed drive with it a considerable quantity of fine dust, the residue of combustion of coke or other fuel; this dust scratches and cuts the tubes so as to necessitate their renewal. The dilatation and contraction of these tubes also cause leaks and repairs. The forced draught also costs dear in another way; because this steam jet creates a back pressure in the cylinders, frequently amounting to one third the effective pressure. Further, the space left above the tubes and the smoke box is so small as to reduce too much the proportion between the steam volume and the heating surface. It is also not unfrequent that the steam carries with it half its weight of water.

**Ancient Letters in Modern Tattooing.**

At a recent meeting of the British Anthropological Institute Mr. Park Harrison read a paper on some characters which are still in use as tattoo marks by the Motu, a people located in the southeastern peninsula of New Guinea, and described by the Rev. Dr. Turner as a race superior to the Papuans, from whom they differ both in color and customs. About half of the more distinctive forms tattooed on a Motu girl, carefully copied by Dr. Turner, correspond with letters in the Asoka inscriptions in India, which are believed to be allied to Phœnician, while several others resemble letters admittedly derived from the same stock, but independently acquired. The marks are mostly arranged in groups of three; on the right arm, however, nine or ten are apparently connected by a line running above them all. The characters are twenty-three in number, and are formed of straight lines in the following combinations, viz.: five of 2 lines, nine of 3 lines, five of 4 lines, and three of 5 lines, much in the same proportion as in the Rejang and Lampong alphabets of Sumatra, the letters of the former of which have been shown to be identical with Phœnician characters reversed. Archaic forms of letters have also been met with in several islands of the Indian Archipelago and Melanesia, but are now without meaning. The Motu characters are used simply for ornament or as charms. As an example of the use of letters for tattoo marks, the case of the Austrian subject was cited, who, having been taken prisoner in Burmah, a few years ago, was there tattooed with letters and other patterns. Besides the characters on the Motu girl, there were various pictures, or hieroglyphics, consisting of eyes and eyebrows, a lunar crescent, and other forms.

**How Diphtheria was Spread.**

A few weeks ago a little girl in St. Albans, who had just recovered from diphtheria, was taken by her parents to visit a family in a neighboring town. She slept with the children in that family, and shortly afterward three or four of them were taken with the malady, and some have since died. The family permitted relatives and neighbors to visit them, and the result is several cases in the neighborhood. They had public funerals, even keeping the remains of one child an unusual time, waiting for another to die, so as to bury them together; and this also spread the contagion. The physician was not powerfully impressed—as some physicians are not—with the contagious character of the disease; therefore, he did not take the necessary precautions for the protection of the neighborhood or of his own family, and the result is that one of his own children has died and another is dangerously ill. A lady who went to one of these houses to robe the victims for the grave has called at houses in the vicinity where there are children, without any change of her garments or any attempt at disinfection, and has fondled the children in those families, apparently in utter ignorance of the danger to which she was exposing them.—*St. Albans (Vt.) Messenger.*

**Women Inventors.**

The question is often asked us: Do the inventions of women ever amount to anything? From our long experience with inventors of both sexes, we conclude that a larger proportion of inventions patented by women prove useful and profitable than those of the sterner sex. We see by the *New York Sun* that the Metropolitan Elevated Railway Company has selected a device, from the many that have been under consideration, for lessening the noise of the trains, and that it is the invention of a Mrs. Walton, of this city. The plan consists of boxing the rails in a mixture of sand, tar, and cotton, and has been under test for two months on several blocks of the road in Sixth avenue. The ringing of the wheels on the rails, which makes a large part of the objectionable sound, is considerably deadened. She gets, according to the *Sun*, \$10,000 for the use of the invention on the Metropolitan line, and the company is to control its adoption on other roads, paying her a royalty.