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SCIENTIFIC AMERICAN SUPPLEMENT

No. 953.

For the Week Ending April 7, 1894.

Price 10 cents. For sale by all newsdealers.

THE ANNUAL REPORT OF THE COMMISSIONER OF PATENTS FOR THE YEAR 1893.

The Annual Report for the year 1893 of the United States Commissioner of Patents has been published. It appears in the official *Gazette* of March 27, and in every way is a noteworthy document.

The ground is taken that the race retains the power of great conceptions and that the World's Columbian Exposition will make itself felt in stimulating invention. Of recent criticisms passed upon the patent system, those complaining of the inconsiderate grant of invalid patents are treated as most germane to the question of administration of the office. The Commissioner upholds throughout the report the expediency of the office granting only valid patents. A classification division for systematizing the records of the history of invention, making as far as possible the scientific and patent literature of the world accessible, is proposed. A salaried force of fifty-two employes is needed for this, some, however, giving but a part of their time to the classification work. The idea is to make the office search for novelty more thorough, and to give the office a higher standing upon the question of invention.

A study of eighty-one court patent cases, in which the patents were declared invalid, was made, and disclosed the fact that in twenty-six the references which defeated the patents were not shown to have been cited by the office, in twenty-nine a part were so cited, leaving twenty-six which were decided on office references. Again, in 988 court cases (1886—1892), 436 patents were sustained, and 532 were declared invalid in whole or in part. Of the latter, 428 were declared so by reason of some fault of the office, and 124 on new evidence. The results of a law firm's examination of fifty claims in ten patents held that thirty-five were invalid. The Commissioner cites the above and he feels that they and their like indicate the necessity for a more thorough search by the office. By classification and indexing the library and records in general the Commissioner hopes to effect an improvement in the search operations.

Recently three primary examiners resigned. The cases they had passed to issue were re-examined, and in one hundred and fifty cases the applications were withdrawn from issue, upon the ground that patents if granted for them would be void. This fact also is cited in the report to emphasize the importance of the classification of records and publications.

Various other points are spoken of. The office hereafter will make photographs of the drawings of patents in those cases where changes in the drawings are required or permitted, and will make the photographs part of the files of such cases. This is an excellent rule, as giving a full record of the original application. Precedence is to be given from the outset to actions upon the merits of applications; requirements in matters of form are to come after the other has been acted on, and after patentable matter has been found. Division of applications is only to be insisted on when an attempt is made to put several distinct inventions in one patent.

The *Gazette* now publishes the claims and principal drawings of patents which expire just before the date of the *Gazette*. This innovation, the Commissioner believes, will be a benefit to the public, partly as giving present subscribers, in a sense, the benefits of the *Gazette* of seventeen years ago.

The Patent Office exhibit at the World's Fair is alluded to. It has, as far as possible, been kept intact, and is now on exhibition in the Patent Office.

Legislation is recommended in several directions. The price of copies of patents, the Commissioner believes, could in many cases be advantageously lowered. The limitation of the term of American patents to the period fixed by the expiration of foreign patents for the same invention, the Commissioner would have changed, so that an American patent for full term could be granted if applied for within six months of the date of application in any foreign country. Legislation in the direction of establishing a patent bar is also recommended.

The business of the office for the year 1893 shows total net receipts of $1,242,871.64, against an expenditure of $845,403.36 under the appropriation, with approximately $295,635.09 additional, giving a balance in the office's favor of $101,833.19. There were 38,473 applications for patents, including 1,000 applications for designs and 120 for reissue. Twenty-three thousand six hundred and seventy patents were issued and 99 reissued. The patents issued and reissues granted during the year were less than those in 1885, 1889, 1890 respectively. Up to January 1, 1894, 521,700 patents have been granted by the United States, against 817,362 by all other countries. The year 1890 with 26,292 patents and reissues granted remains the banner year of the office.

An exhaustive report upon the scientific library of the Patent Office is included as an appendix to the Commissioner's report. This gives the history and present condition of the library, its scope and the condition of its indexing. An earnest plea is made for more money, and the need of further expenditure for its maintenance seems very clearly shown. During the year over thirty-one thousand journals and articles have been indexed. An appropriation of but $2,500 was allowed for purchase of books and periodicals and for transportation. The present effort is to make an adequate card catalogue with cross references. Within a few months it is hoped that the catalogue of about 100,000 cards will be thrown open to the public.

We cannot let the occasion pass without expressing our appreciation of the ability shown in the report. In some ways it is an innovation, the present Commissioner holding very definite views of his own upon the subject of the administration of the office, and expressing them very clearly. Much of his work is worthy of high commendation, although we cannot agree with him in all his views. The report, curiously enough, illustrates the great difficulty and virtual impossibility of the Patent Office making an adequate examination into the novelty of an invention—an examination which the Commissioner wishes to have a *sine qua non*, in the fullest degree of adequacy, for the issuance of a patent.

PREVENTION BETTER THAN CURE.

"An ounce of prevention is worth a pound of cure" is an old proverb, but one which men have been slow to apply.

The State enlarges its prisons and reformatories and asylums for the insane, instead of enforcing truant laws, preventing the opening of dens of iniquity, and forbidding the housing of human beings where disease festers and spreads with the very breeze which keeps the tenants from stifling.

But there are many signs that changes for the better have begun. The laws which science has discovered are making their appeal to the reason of more people than in any previous time and preventive measures are used where a few years ago they were unknown. It is no longer necessary that typhoid or scarlet fever, or even the lesser children's diseases, go through a well-conditioned family. The patient is now quarantined in the most remote room of the house; indeed, the best constructed houses have a room intended for temporary hospital use, with appliances which make its almost complete isolation possible. The mother is no longer considere unfeeling if she does not nurse her sick child, or the daughter unfilial if she commits the care of an invalid parent to a trained attendant. People with common sense now perceive that to sacrifice nervous energy is not the best way to show affection, and that the member of the family who is ill can be helped back to health much faster by some one who knows symptoms and how to act upon a change for the worse before the doctor arrives than by one whose only fitness for the post of nurse is relationship to the patient.

Probably not a philanthropic organization of today is doing better work than the Red Cross Society, and its work is largely preventive.

It gives courses of lectures on "First Aid to the Injured" to policemen, firemen and others. It pays the salary of nurses who are sent among the poorest people in our cities. While they care for the sick in these miserable tenement houses, they act as teachers to the well, incidentally giving lessons in cooking and the laws of health, including cleanliness, which will do more to prevent a recurrence of disease than any other means yet devised.

Now that medical science has made so great advance in the study and treatment of the eye, we may reasonably hope that the day is not far off when it will be considered just as necessary to have the little child's eyes examined to see whether they have congenital defects as it is to have him vaccinated. As a matter of fact, the chances of his ever taking smallpox are small in comparison with the chances that he has been born with astigmatism, shortsightedness or some other defect of vision, which treatment may remedy in childhood while the muscles and ligaments of the eyes are in their most elastic condition, but which, neglected, may cause most serious disorders. Experiments go far to prove that epilepsy and insanity are traceable to imperfect eyes.

The study of sanitary science as carried on at the Massachusetts School of Technology is one of the noteworthy advance movements of the day.

The ventilation of rooms, the purity of the water supplies of the State, the best methods of the filtration of water, the condition of milk, the determination of the best kinds and qualities of food for the maintenance of health, are all made subjects of investigation; the principles discovered are applied in the institution and elsewhere as people learn what service students who have had this training can give in these most vital matters.

The study made of foods by Mrs Richards, of the Institute, by Professor Atkinson and others, and the consequent opening of "New England Kitchens," where nutritious food at a low price may be had by the poor, cannot fail to help in lessening the tide of intemperance and its numberless attendant miseries.

The work of the Woman's Christian Temperance

Union in inducing the State legislatures to introduce into the public schools instruction on the effect of alcoholic and other stimulants upon the system is probably the most telling work that organization has done—telling because preventive.

A noteworthy movement in England is about to result in the founding of an Institute of Preventive Medicine.

Such men as Sir Joseph Lister (the president), Sir Henry Roscoe, Professors Michael Foster and Victor Horsley, are members of the council who have the work in charge. The money is in their hands to begin to build and to carry on investigation in laboratories. Lectures and systematic instruction are to be given in bacteriology, and arrangements may be made for admission to the institute by those who wish to make original research there.

The day may come when we shall prefer to pay a doctor for keeping us well to curing us when we are ill.

The Utilization of Garbage.

Mr. Louis C. d'Homergue, in a communication to the *Sanitarian*, referring to a paper in the same publication by Dr. Bruno Terne, read before the Franklin Institute last June on the utilization of garbage, relates his experience and views on the subject as follows:

Having been largely engaged for fourteen years in fertilizing products, and introduced the drying of menhaden fish pumice, which has, in this country, superseded to a great extent Peruvian guano, the difficulties of drying economically large quantities of bulky articles of low values have been practically realized.

Machines which will dry or desiccate fruits or other high-priced materials are valueless in drying garbage, because, while drying a few tons of fruit daily would be profitable, that daily quantity of garbage would not pay expenses.

For example, the daily quantity of garbage of New York and Brooklyn is at least 1,000 tons, and at the estimate of Dr. Terne it would contain 15 per cent of grease to be extracted. It requires five handlings to place it in the extractors and remove it into the evaporators, and from thence to the storage sheds; then it has to be put into bags and barrels, weighed and shipped.

The usual evaporating capacity of coal in large furnaces is about one pound of coal to evaporate eight pounds of water. By scientific tests, under the best conditions, eleven pounds of water have been evaporated by one pound of coal at Woolwich. In materials containing 15 per cent of fat the best results have been, so far as I know, one pound of coal to six and a half pounds of greasy waters. The naphtha process possibly is cheaper, but very dangerous, and hence would not be allowed in cities. Hydrocarbon oils for fuel can be used at less cost than coal or naphtha. Now, if the garbage of New York and Brooklyn had to be disposed of in this way, it is apparent that the plants necessary to effect it promptly, before the mass would begin to ferment, would be of enormous capacity—otherwise the extracting or evaporating process is far more difficult.

Fifteen per cent of grease to be extracted from 1,000 tons of garbage would be equal to 150 tons daily, leaving 850 tons, from which 70 per cent would have to be evaporated to bring it down to *8 per cent* of moisture, instead of 4·41 per cent, as given in Dr. Terne's figures, because, if dried down to this, it would reabsorb up to 8 per cent moisture from the atmosphere at ordinary conditions; so it is waste of fuel to dry it down lower. This would then net 255 tons of dry material. Now, if this material at 4·40 per cent of moisture would show but 3½ per cent of ammonia, at 8 per cent of moisture it would only show a little over 1¾ per cent of ammonia, which, at $2.30 per unit of ammonia—the present quotations—would only be $4.02½ per ton. But the low percentage in phosphoric acid—potash, as given in Dr. Tere's analysis—I am afraid would not be considered merchantable; for at present the agriculturists of the country are awakening to the fact that it is not so much ammonia which the plant can absorb through their leaves (lungs) from the atmosphere that is wanted in a fertilizer as it is phosphoric acid, potash, and lime, which render the earth silicatessoluble and absorbable by plants, to give strength to their stalks and life to develop their growth. So that ammonia (except in trucking) as a basis of value in a fertilizer is now being largely discounted.

On the basis of 1,000 tons per diem treated as indicated in the foregoing, the following results show that it may be done advantageously if a market could be found for the products:

Grease suitable for lubricating and rough soap about:	
150 tons at $8 per ton (grease)	$1,200
225 " " $4 " " (fertilizer)	1,020
	$2,220
I figure using oil as fuel, handling, etc	1,405
Per day	715

Certainly this is alluring enough to capitalists if a market could be found; and possibly the fertilizer would sell readily at an advanced price if so treated as to bring up its percentage of phosphoric acid and potash. It is a great question of practical sanitation as well as commercial interest, and I hope to see it practically tested.

[FROM THE LONDON PALL MALL GAZETTE.]

Steering by Telephone.

For some time Mr. Charles A. Stevenson has been making experiments for locating the position of vessels at harbor entrances, which would be of service when, during certain states of the weather, other observations cannot be easily made. He proposes that a cable might be laid down in the sea, and, by changing the electric state of the cable, vessels passing near or over it might be able, by means of a detector on board, to discover that they were in its vicinity. Some experiments showed the method to be feasible, since the sea offers no insurmountable difficulty, and he has constructed two instruments which will act through 180 feet of water.

The first instrument is a coil of uninsulated copper wire rope dipping into the water at the bow of the boat, and a similar water connection at the stern. If these are joined by a wire with a telephone on the circuit, it will be found that, even without an induction coil or other arrangement to magnify the effect, a very sensitive instrument is produced, and that, when the wires from bow to stern of the boat are at right angles or nearly so to a cable laid in the water at some distance from it, the sounds produced by a magneto-electric machine connected to one pole of the machine are audible in the telephone. If the water connections are equidistant from the cable, as they would be if the boat were immediately over the top of it, or lying broadside on, no sound is heard. The action takes place when the coils in the water are insulated. The cable also may be insulated or uninsulated. The action is similar with an induction coil, and will also act if the potential of the cable is charged and is then kept so. With the coils separated ten feet (at the bow and stern of a small boat put down from the vessel) and an insulated wire 400 feet in length, laid through a small lake of brackish water 15 feet deep, the alternations produced by the bobbins of a magneto-electric machine were perfectly distinct at the end of the lake 340 feet away from the wire, and the limit of audibility could not be ascertained. Further trials will be necessary to determine the law of the falling off of the intensity of sound with the increase of the distance from the cable for a given fixed distance between the water connections, as well as to determine the law of increase of intensity for any increase of distance between the bow and stern connections for a given fixed distance from the cable.

Mr. Stevenson's second instrument is a coil of insulated wire surrounding a core (that is, an electro-magnet with a telephone in the circuit of this coil). With this instrument the making and breaking of the current produced through a wire 200 feet in length could be detected through 60 feet of salt water. When sunk in water the sound seems just as loud. He is of opinion that the action of the instrument consists in the break, if broken sufficiently rapidly, inducing a current in the coil, which the core intensifies immensely. The sound in a Bell telephone with the instrument was almost deafening with 15 feet depth of water. This electro-magnet system of induction, in contradistinction to the parallel wire system, has no earth connection, being entirely insulated, and must, therefore, be a case of true induction through water.

Sugar Items.

On several well organized beet farms recently visited in France, cows receive 110 pounds of residuum beet pulp per diem, to which is added 44 pounds of a fermented product, consisting of chopped straw, etc. The cows under this ration yield on an average 12 quarts of milk daily. As the season advances the pulp ration is reduced.

We are informed that recent improvements in the Barbet distilling appliances permit the production of alcohol that is so pure that a permanganate solution produces no discoloration, even after one hour. A few years since, in alcohol made in stills, the chemical in question would show itself after a few minutes. The Barbet methods for alcohol analysis have become standard, and have been officially adopted by several governments of Continental Europe.

The total sugar production was less during last than in previous campaign; the causes are numerous. The area devoted to beets was about 500,000 acres. When it is considered that $4,000,000 are paid in wages at factories and several millions for farm labor, the beet sugar industry of the country has obtained a position upon which much of the general prosperity of the state depends.

The average sugar made in a French beet sugar factory is purer than sugar obtained elsewhere. It has been found, for example, that for sweetening purposes twice as much Austrian sugar is needed to produce certain results as would be required of the French product. The low price at which the rival sugars are sold is misleading the general Eastern public. In Damascus, for example, a certain paste is made, in which large quantities of beet sugar are used; for same price the manufacturer gets volume, but not quality.

During 1892 about 30,000 tons beet sugar were employed in strengthening wines and cider by fermentation. It is interesting to note that the quantity of sugar used for this special purpose was less than during the previous year—due to the fact that the grapes were of a better quality than during 1891.

An interesting method for the manufacture of levulose with beet molasses has met with some success (?) The saccharose is first transformed into dextrose and levulose. If lime be added, there will be formed a precipitate of levulosate of lime, almost pure, while the coloring and other substances remain in the solution. By a careful filtration and carbonatation it is possible to obtain pure levulose. About 100 pounds molasses are dissolved in 6 pounds water, and the amount of acid used depends upon the alkalinity of the residuum being treated.

A new process for the purification of beet juices with an iron chloride is said to offer satisfactory results. It is claimed that the purification is more complete than possible to obtain with lime and the regular method of carbonatation. The chloride used precipitates the albumen, and other organic substances are also precipitated at same time. Raw juices from the battery are mixed with lime until their alkalinity is about 0·08 per cent, and to 30 gallons of juice is added one quart of iron chloride. Lime is then mixed in and the liquor heated to 176° Fah. Second carbonatation follows, and to 25 gallons of juice ½ pint chloride is added. The saturation that follows should bring the alkalinity down to 0·05; and when this purification is properly done, there remains no trace of iron.—*The Sugar Beet.*

Testing Twelve-Inch Shot.

A very successful trial of 12-inch shot took place at the Sandy Hook proving ground, March 29. The expenses incurred by the government and the manufacturers amounted to over $17,000, the armor plate alone, which was used as a target, costing $12,600. The trial of the 12-inch armor-piercing projectiles was made with the 12-inch guns supplied by the Watervliet Arsenal, while the projectiles were made by the Midvale Steel Company, of Philadelphia, and the Carpenter Steel Company, of Nicetown, Pa. The new shot are three and one-half feet long and weigh about 1,000 pounds. The heads of the shot are hardened by a secret process. The target was an oil-tempered, annealed, nickel-steel plate made by the Bethlehem Iron Company. The plate was 13½ inches thick, the length was 16 feet, the width 9 feet and the weight was 35 tons. In all four shots were fired, and a number of spectators were present in spite of the cold rain storm. The plate was set up 150 yards from the gun and the charge used was 355 pounds of brown prismatic powder; the chamber pressure was 23,000 pounds. All of the projectiles pierced the plate, which was cracked in all directions. The first (Carpenter) shot when dug out of the sand bank was found to be broken, the other shots were not broken. The heat generated by the force of impact on the plate was about 600° Fah. The behavior of the projectiles was regarded as highly satisfactory. The government has contracts for about 250 of the 12-inch shot.

Mercurial Soap for Cholera.

According to the *American Architect*, two chemists of Hamburg, MM. Forster and Nijland, have published some studies on the cholera infection, from which it appears that soap is one of the best known sterilizers of water suspected of infection. For a long time after the cholera epidemic of last summer, the people of Hamburg were afraid even to bathe themselves with Elbe water, but MM. Forster and Nijland show that ordinary toilet soap, added at the rate of an ounce to about twelve quarts of water, will kill the cholera bacilli in ten minutes. This would be a large proportion of soap to use in a bath, but as most people, instead of dissolving soap in the bath water, apply it to the skin with a sponge, it is probable that the water actually brought in contact with the skin is generally soapy enough to be harmless. If, however, it is desired to obtain greater security, a soap containing a small quantity of corrosive sublimate may be used. Many "complexion washes" contain this drug, which is said to have a beneficial effect on the skin, however dangerous it may be internally, so that no hesitation need be felt in employing soaps medicated with it, and a very small quantity is sufficient. With a soap containing one per cent of corrosive sublimate, added at the rate of a quarter of an ounce of soap to sixty quarts of water, all the cholera bacilli will be killed in one minute, and half the dose will kill them all in ten minutes; while the sublimate alone is still more active, an ounce being sufficient to destroy, in five minutes, all the cholera microbes in about a million quarts of water.

THE strongest timber known is the "Bilian" or Borneo ironwood, whose breaking strain is 1·52 times greater than that of English oak. By long exposure it becomes of ebony blackness and immensely hard.