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NEW YORK, SATURDAY, MARCH 10, 1900.

CONSULAR REFORM.

There is now a bill pending in Congress which is of considerable importance. In effect it will give a life tenure to all persons now in the consular service. The bill provides that men now in the service must take an examination within two years to see if they are competent to remain in it. This is the seventh bill on the subject which has been presented to Congress in the last three years, and it provides for Consul-Generals of three classes. The salaries for Consul-Generals are from \$5,000 to \$8,000 per annum and for Consuls of six classes, the salaries range from \$1,500 to \$5,000 per annum. All existing consular offices are to be reclassified, and any of them which have become superfluous shall be abolished. The service is to be arranged by classes and not by places, so that consuls may be shifted from one station to another according to the needs of the service. All the unofficial fees which the consuls are now allowed to retain, are to be turned into the Treasury, and the only compensation which they receive will be their fixed salaries; this will probably make the service self-supporting. The entrance to the consular service is to be made after a competitive examination by a board composed of the Secretary of the State or an official of the State Department, an officer of the consular service and the civil service commissioners. The names of the five persons who pass the best examination are to be presented to the President and from them he can make his nomination and a new appointee may be dropped at any time during the first year of his service, but after that he can only be removed by a properly organized board. The bill also allows the assignment by the President's order of any consul to special duty in the United States for a period of not more than one year at a time and this permits of nomination to consulates without examination of persons who may have been in the classified service of the State Department for at least two years, thus making experience gained in the foreign service available for the home office and conversely experience in the home office available for the foreign service.

The subjects of examination for entrance are to be left largely to the examining board, but it includes a knowledge of French, German, or Spanish. A certain knowledge of law is also required. Our consular service is already excellent but could undoubtedly be improved by taking it practically out of politics. The excellent consular reports which are issued daily, a number of which are published each week in the SCIENTIFIC AMERICAN SUPPLEMENT, are an example of what our agents in all parts of the world are doing to disseminate information in regard to new discoveries and foreign trade. It is probable that with the new system these reports will be increased in number and importance. A great point of value in the new bill will be that it will insure stability to the service, and instead of a consul being in a district for two to four years, as the case may be, he would practically have an unlimited term of office in one locality unless a change was necessary for the good of the service. The House Committee on Foreign Affairs reported favorably on the Adams bill on March 1.

THE IVES' IMPROVED KROMSKOP.

At a meeting of the Camera Club in this city, February 27, Mr. F. E. Ives, of Philadelphia, lectured on the latest phases of "color photography," particularly as perfected in his new stereoscopic instrument named "The Kromskop." It was a most interesting and instructive demonstration of the utilization of the three simple primary colors, red, green, and blue-violet, in the transformation of black and white photographic images into images which had the appearance of the real thing delicately and exquisitely colored in its varied hues and tints. One of the chief features is the simple but accurate means of adjustment Mr. Ives has perfected for the absolute registration of the three separate colored images superimposed over the other. He has thus been enabled to produce an instrument usable by any skilled photographer.

A group of instruments were arranged about a table in which were a number of interesting subjects. But

the lantern exhibition of merging the three different colored images into perfect registration, and the final production thereby of a beautifully-colored picture was the fulfillment of a scientific possibility that pleased everyone in the audience. We shall hope to give a further description of this instrument in a subsequent issue.

HAND AND MACHINE PRODUCTION COMPARED.

In the year 1894 Congress authorized the Department of Labor to investigate the questions of the effect of machinery upon the cost of production, and the relative power of production of hand and machine labor. The Commissioner of Labor, Mr. Carroll D. Wright, has organized and carried out his task with characteristic thoroughness, and the results which have been published afford a compendium of information on these questions which will be welcomed by all students of political economy.

It is to be understood that in the statistics presented the terms "hand" and "machine" production are not to be understood too literally. Hand operations necessarily enter to some extent into the most highly developed methods of machine manufacture of our day, and manufacture by hand, even in the simplest arts, involves the use of tools, and every tool is in some sense a machine. The actual comparison, then, is between modern methods using highly developed machinery and the methods in use in the days of hand-operated tools, when the strong arm and deft fingers of the individual mechanic took the place of the automobile power-driven machine.

It will be somewhat of a surprise to learn that in gathering the data for this comparison it was not necessary to go back further than the middle of the present century; for although it is true that the era of factories began much earlier than this, in the year 1850 the old hand processes were still very largely in use. It was not until the latter half of the century was well begun that machine production began to assert its undeniable superiority over production by hand.

The report includes the statistics of eighty eight "main" industries, while nearly seven hundred branches of these have been investigated and the results tabulated. When we bear in mind that the number of separate operations in most of these is large—over one thousand, for instance, in the manufacture of watch movements—some idea may be gathered of the enormous labor of securing and tabulating the matter contained in the report. From the mass of data we select a few facts which show the extraordinary results obtained in certain industries.

A comparison of the production of 10 ploughs in 1850 and 1896 shows that the number of different operations involved has risen from 11 to 97, while the number of workmen required has risen from 2 to 52. This shows that modern manufacture is more complicated, the artisans of earlier days performing work that is now subdivided among many operatives. But when the element of time is brought in, we find an enormous economy, the total numbers of hours required by the two workmen being 1,180, as against only 37½ hours required by the 52 machinists or machine tenders. Here we have a reduction in time of 31 to 1 in favor of automatic machinery. Not all of this, however, is gain, wages having risen from 60 cents to \$1.25 and \$2.60 a day; although even at this higher wage the economy is about 8 to 1, the cost of the labor necessary in making the ten ploughs having fallen from \$54.46 in 1850 to \$7.09 in 1896.

In the iron trade we find that the labor necessary to produce a file has been reduced one-third, while a rifle barrel which took 98 hours to make by hand in 1857, is now produced with a total 3½ hours of labor. In 1835, it took 84½ hours of hand labor to produce 100 feet of lap-welded pipe; in 1895, the same length was turned out with less than 5 hours of labor. Half a century ago 500 ½-inch bolts, 6 inches in length, complete with nuts, could be made complete in 43 hours; whereas modern machinery can turn out the same amount in 8 hours. One of the most remarkable comparisons is that between the manufacture of cut nails in 1813 and to-day; for our forefathers took 130 hours laboriously to produce an amount, which automatic machinery can now turn out in the space of one hour.

As one contemplates these remarkable figures, he may be pardoned if he fall into the error of supposing that modern machinery must mean the displacement of labor. As a matter of fact, it means the exact opposite; for in the first place the figures quoted take no note of the labor employed in making all this labor-displacing machinery, and, in the second place, the decreased cost of production, due to machinery, has lowered the selling price and increased the demand, and therefore the total volume of production, so enormously, as to make the final effect a large increase in the demand for labor.

Modern machinery, again, has so greatly enlarged the productive power of the workman that it becomes possible to pay him wages far in advance of those earned by his hand-labor predecessor, and the same labor-saving devices, while raising his wage, have in-

creased its purchasing power by lowering the cost of food and clothing and many of the luxuries of life. Hence, the automatic machine is not, as the agitator will even yet suggest, the enemy of labor, but is in every respect its best friend.

PROTECTION OF INVENTIONS EXHIBITED AT PARIS.

The Paris Exhibition will be officially opened on April 15, 1900. Many inventors will take advantage of this opportunity to bring their productions to the notice of the large crowds of visitors that are expected to come to the French capital from all countries of the world. According to the French patent laws, public disclosure of an invention before the filing of an application for a patent, often deprives the inventor of his right to a valid French patent. The law of May 23, 1868, provides, however, that inventions exhibited at International Expositions may be protected, as if they were patented, from the time they are received at the Exposition, until three months after the closing of the exhibition. This temporary protection is secured by depositing a specification and drawings of the invention, together with a certificate stating that the object has been admitted as an exhibit, at the office of the governor (préfet) of the Département de la Seine. These documents must be filed within a month after the opening of the Exposition, that is, before May 15, 1900. The exhibition of the model will be no bar to the securing of a French patent.

Persons who have already secured French patents, will secure material benefits by exhibiting at the Paris Fair. The French patent laws allow the privilege of importing patented goods into France only to citizens of certain countries, while Germans, Russians, and others would lose their French patent rights by such importation and would, therefore, be prevented from exhibiting their patented manufactures. The law of December 30, 1899, however, allows all foreigners to import any patented article into France for the purpose of exhibiting it at Paris, without endangering the validity of their French patents, provided these exhibits are again exported from France within three months after the close of the Exposition. Another provision of the law of December 30, 1899, which will be valuable to all foreigners, including our own citizens, makes the exhibition of a patented invention at the Paris Fair equivalent to manufacture in France, and as the French patent laws require that the manufacture should not be interrupted for more than two years, it will be sufficient for exhibitors to again manufacture their inventions in France within two years after the close of the Exposition. Furthermore, exhibits cannot be confiscated on account of alleged infringement of patents or trademarks, until three months after the close of the Exposition, but they may only be held temporarily, without withdrawing them from the Exposition. Even this temporary relief, however, will not be granted unless the complainant enjoys protection for his invention or trade mark in the alleged infringer's country. Should such infringing article be sold in France or remain there more than three months after the close of the Exposition, they will become liable to seizure.

ANNUAL REPORT OF THE COMMISSIONER OF PATENTS.

The annual report of Commissioner Duell will be welcomed as showing that the business of the Patent Office is rapidly recovering from the depressing effects of the late Spanish war, and although the figures are still far short of the high-water mark of the year 1897, the upward trend is so marked as to encourage the belief that the phenomenal business prosperity of the current year will carry the total number of applications to a point never reached before.

The total number of applications for 1899 was 41,443, as compared with 35,842 for 1898, the lowest for ten years, and 47,905 for 1897, which was about 4,000 more than were received in any previous year. These applications were divided as follows: 38,937 for patents, 2,400 for designs, 106 for reissues, 2,059 for registration of trade marks, 629 for registration of labels, and 143 for registration of prints. There were 25,435 patents granted, 92 patents reissued, 1,649 trade marks registered, with 511 labels and 100 prints. During the year 18,135 patents expired, 8,037 were awaiting the payment of final fees, while 3,997 were forfeited for the non-payment of fees.

The Patent Office again sustains its reputation as a self-supporting and surplus-earning institution. With a total receipts of \$1,325,457 and a total expenditure of \$1,211,783 there is the handsome surplus of \$113,673. In the sixty-three years of its existence there have been only eight years in which the Patent Office has failed to show a surplus, the last case occurring during the war in 1861. Since that year the lowest surplus occurred in 1898, the distractions of war being the cause of the falling off to \$1,538 from \$252,798 in 1897. The largest surplus occurred in 1883 when it rose to nearly half a million dollars. The total balance to the credit of the Patent Office on the first of this year was \$5,086,649.

An extremely interesting table in the report is that showing the number of patents issued in each State and the ratio of population to each patent granted. New York, as we should expect, heads the list with a total issue of 3,798 patents, followed by Pennsylvania with 2,355, Illinois with 2,152, Massachusetts with 1,774, and Ohio with 1,501. In the table showing the ratio of population to patents issued the citizens of Connecticut are found to hold a long lead, one patent being issued to every 945 inhabitants. Next in order are the following: District of Columbia, 1 to every 1,151; Massachusetts, 1 to every 1,262; Rhode Island, 1 to every 1,270; while New York comes eighth, with 1 to every 1,579. The fewest patents granted in proportion to the number of inhabitants were in the Southern States, South Carolina receiving 1 to every 25,024 inhabitants; North Carolina, 1 to every 21,012; and Alabama, one to every 17,195. It is thus that the New England States continue to stand pre-eminent for the inventive and mechanical bent of its people.

The statistics of patents granted to foreign inventors show that England maintains her lead, with Germany a good second. There were granted to residents of England 1,072 patents, and to those of Germany 888, while Canada received 371 and France 292. In making a comparison of the past four years we find evidence of a growing appreciation among foreign nations of the value of United States patents. The most remarkable figures are those for England and Germany, which have risen respectively from 617 to 1,072 and from 543 to 888. Canada, although possessing not over one-sixth the population of France, is a more frequent applicant at our patent office, 371 patents being granted in Canada as against 292 in France. Indeed in proportion to her population, Canada takes out by far the most American patents of all foreign countries.

UNITED STATES PATENTS GRANTED TO FOREIGNERS
FROM 1896 TO 1899.

	1896	1897	1898	1899
England.....	617	706	964	1,072
Germany.....	543	551	634	888
Canada.....	244	286	345	371
France.....	194	222	258	292

That the examining work of the office has been kept well in hand is shown by the fact that while there were 5,467 applications awaiting action on December 27, 1898, 5,392 were awaiting action on December 26, 1899, and at both dates substantially all of the divisions were taking up amended cases for action, within 15 days after the amendments were filed.

A considerable portion of the report is taken up with a description of the "classification division," which has been actively at work through the year, and Commissioner Duell is able to report "considerable progress" although we note that the long-standing complaint of "lack of room" has still to be made. Limitations of space prevents any detailed review of the new system of classification, and we refer our readers to the current issue of the SUPPLEMENT where the report is printed in full. It is sufficient to say that the system adopted, being based upon the accumulated experience of over 60 years of work is comprehensive and adequate to the solution of a complicated and difficult problem,—how difficult and complicated may be judged from the facts that the present field of search consists of about 700,000 United States patents, 1,250,000 foreign patents and 74,000 volumes in the Patent Office library.

We regret to note that the Commissioner's expectation that in a few months some additional room would be placed at the disposal of the Patent Office has not yet been realized. Even when the Land Office vacates the Patent Office building, adequate accommodations will be wanting. Proper provision for the Patent Office and the construction of a fireproof building for its records are among the crying necessities of this institution.

The report concludes with the statement that the Commissioners appointed by Congress to revise the statutes relating to patents, trade and other marks has submitted a preliminary report and will shortly present a full report on this most important question. The Commissioner further states that a feature of this report which is of particular interest will be a proposed revision of the trade mark law to provide for the registration of trade marks used in interstate commerce, and to encourage a more generous registration of trade marks by reducing the registration fees.

The attention of Congress cannot be too strongly invited to the necessity of taking some measures to give manufacturers greater protection in regard to their property rights in trade marks. No more crying evil exists to-day than the anomalous condition of our trade-mark practice, and it is high time that the manufacturers of the country should demand legislation for protection of their rights, especially at a time when our foreign trade is advancing by leaps and bounds and American manufacturers are competing so successfully with foreign competitors in their home and colonial markets.

CALIFORNIA BIG TREES THREATENED WITH DESTRUCTION.

A project is seriously entertained by a company of lumbermen to cut down the grove of "Big Trees," which form one of the most striking natural features of Calaveras County in the State of California. These trees are perhaps one hundred in number and was discovered in 1852. Their fame has grown with the years, and thousands of visitors have gazed in amazement at these sublime instances of forest growth.

Compared with the greatest of trees in other parts of the world, they dwarf by their magnificent dimensions any others now known.

The Calaveras grove is situated near the Stanislaus River, about twenty miles distant from Murphy's Camp. Visitors to the Yosemite Valley often go out of their way to gaze upon these wonders, though, until recently, the trip involved a long and dusty journey.

A new railroad has invaded the locality and, consequently, has made the marketing of the timber a commercial possibility. A sawmill is being erected on the spot and operations are threatened with the advancing season. The prospect of a wholesale mutilation of the grove is imminent and the entire State is aroused at such a sacrilege. There are but a few groves of these trees in the Sierra Nevada's. None outside California. At Mariposa and on King's River there are scattering trunks but great as they are, there are none that compare in girth or altitude to those of Calaveras. The Sequoia gigantea is arrogant in its choice of locality, while the redwood, Sequoia temper rireus, flourish in profusion on the coast, in an atmosphere of fog and mist. The Sequoia gigantea lives only on the western slope of the Sierras, and derives its nourishment from the dry warm sunshine of the south. Beyond the latitude of San Francisco it will not flourish and either above or below an altitude of from 4,000 to 6,000 feet it grows only in dwarfish form. Efforts to transplant under other conditions, than these have all resulted in failure, only in England does partial success encourage the trial. In their native haunts the immense size of these trees is hardly comprehended. The Grizzly Giant is over 40 feet higher than the spire of Trinity church, New York. Its trunk at the base is 93 feet in circumference and 31 feet through. The height to the first limb is over 150 feet and these are from 3 to 6 feet in diameter where they spring from the trunk. The proportions are fine, and its age is estimated at 3,000 years.

There are in all only about one hundred of these trees, all confined in an area of 2,000 acres. It is believed that some of those which have succumbed to age and the elements attained an altitude of 450 feet. The wood is different in color from the redwood, being dark brown, but is equally useful. As a cabinet wood it has no superior. The amount of lumber contained in one of the larger of these trees is said to exceed 250,000 feet. Compared to the redwood the greatest of the Sequoia gigantea will grow to more than double the height the former ever attains. The people of California are unanimous in their determination, that the Calaveras grove shall not be destroyed. This will involve the purchase of the land, and provision for future care.

DISSOCIATION OF AIR AT ORDINARY PRESSURE.

Prof. Raoul Pictet, of Geneva, Switzerland, whose name is identified with the early liquefaction of air and gases, recently made a demonstration, says The N. Y. Sun, of a process of his invention for the separation of the oxygen and nitrogen of the air at ordinary pressure.

It is said that the process is one that is about to be introduced in this city on a commercial scale. Prof. Pictet's process as described consists in the initial production of a certain quantity of liquid air which is stored in tubes. Then through this is forced under a pressure of only about one atmosphere or fifteen pounds to the inch a stream of atmospheric air. This is cooled in the liquid air, but as it rises in a chamber beyond the gases of which it is composed separate themselves by gravity and run off in separate tubes. The oxygen being slightly the heavier, flows out through the lower tube, while the nitrogen goes off above. In addition to these gases, the air contains as an impurity carbonic acid gas, and this, it is asserted, leaves the machine in a liquid form being reduced to that form by the low temperature. In ordinary liquid air as it is produced by Tripler, Ostergren and others, the carbonic acid gas is frozen and gives the liquid air a milky appearance. It is taken out by pouring the liquid air through an ordinary paper filter.

In a demonstration recently, the apparatus used was of the laboratory character, and the proof of the effect was made by exposing a burning bunch of tow to the end of the pipe whence oxygen was expected to flow, where the combustion was made more intense, while at the end of the other pipe the neutral nitrogen diminished or extinguished the flame.

In the commercial machine, it is promised that with an expenditure of 500 horse-power the daily output will be 500,000 cubic feet of oxygen, ranging from 50 to 90 per cent in purity, and 1,000,000 cubic feet or more

of nitrogen of similar quality. In addition it is promised that 1,500 pounds of liquid carbonic acid will be produced.

The two products for which a direct commercial use are expected to be found are the oxygen and the liquid carbonic acid gas. The latter already has a fixed place in the market and large quantities of it are saved in well-equipped breweries where it is produced in great bulk through the fermenting of the beer. It is pumped into steel tubes under a pressure that liquefies it. It is worth about seven and one-half cents a pound.

The great market which Prof. Pictet expects to find for the oxygen is to support combustion at high temperatures in furnaces where coal is burned, making such fires available for purposes which only the electric arc is now suitable for as well as making a great economy in producing heat for ordinary purposes. In burning fuel with the oxygen of the air there must be admitted to the furnace about three times the bulk of oxygen or nitrogen, and this absorbs a large quantity of the heat. If an excess of air goes into the furnace, this also takes up and wastes heat. By admitting oxygen these losses can be saved. This saving, Prof. Pictet thinks, would equal 40 per cent of the present fuel bill.

It is proposed to put the oxygen in tubes or tank cars and ship it to consumers. Of the theoretical value of it there can be no doubt. The commercial feature remains to be demonstrated. The nitrogen, it is asserted, can be used for the production of nitric acid and Prof. Pictet says that by a process of his invention he can combine it into ammonia directly by exposing hydrogen and nitrogen to the electric arc under certain conditions. If this be true, Prof. Pictet has solved a problem of wonderful value which has defied the researches of the ablest chemists of the world.

HORSEFLESH IN AMERICA.

Certain butchers in San Francisco have been detected in using horseflesh as a substitute for beef in sausages, Hamburg steaks, etc., owing to the cheapness of the equine flesh. The local Board of Health carefully investigated samples and has brought the offenders to justice. The flesh of horses selected with proper care and killed under proper conditions is by no means an unwholesome article of diet, says The New York Medical Journal, but there is no excuse for foisting it under false pretences upon customers in place of more expensive beef and other meats. If intended to be used as a food it should be sold openly, so that those who partake of it may know exactly what they are to consume and get the benefit of the difference in price.

In France, Germany, Austria, Belgium and other countries there are hippie butchers who make a specialty of this food, and, as is well known in Paris, the sale of horseflesh is very considerable. The butchers, however, are licensed, and the animals are slaughtered with as much attention to sanitation as are bees. Fortunately, it is very easy to detect the presence of horse meat even in as small percentages as five per cent. Twenty grammes of sausage finely minced are boiled from a half hour to an hour in 100 cubic centimeters of water. The volume of water is then reduced by evaporation to thirty cubic centimeters, then the liquid is cooled and filtered. About ten cubic centimeters are tested with a few drops of compound iodine solution (one part of iodine and twelve parts of potassium iodide in 100 parts of water). A fugitive reddish violet coloration indicates the presence of horse meat. The re-agent must be added carefully, so that no excess is added, as this is apt to change the color to a reddish-brown. It is probable, as our medical contemporary hints, that a little investigation in various cities will bring to light the mysterious hidden ways of the sausage vender.

THE BEET SUGAR INDUSTRY.

Two-thirds of the world's sugar is now produced from beets. Prior to 1871-72 the world's production of beet sugar had reached a million tons; in the present crop year it is, according to latest estimates 5,510,000 tons, while the cane sugar crop which in 1871-72 was 1,599,000 tons is in the present year 2,904,000 tons. Thus cane sugar production has scarcely doubled during the period under consideration, while that from beets has more than quintupled. Meantime the price has fallen more than one-half, the average cost in foreign countries of all sugar imported into the United States in the fiscal year of 1872 being 5.37 cents per pound, and in 1899 2.39 cents per pound. These facts are interesting in view of the consideration of matters by Congress relating to the sugar-producing islands which have recently come into closer relations with the United States.

The sugar-producing area of the world has in less than half a century been shifted from the tropics northward and the farmer of the temperate zone has shown his ability not only to compete with the low-priced labor of the tropics, but in doing so to reduce by one-half the cost of the article produced.