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## 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.