



THE GREAT EXPOSITION—LETTER FROM UNITED STATES COMMISSIONER PROFESSOR R. H. THURSTON.

NUMBER 11.

VIENNA, August, 1873.

While there is not very much that appears new or specially interesting among the metal or the

WOOD-WORKING TOOLS

of the exhibition, there is occasionally one which attracts the attention of the American mechanic by its novelty; such, for instance, is the combination of wood-working tools referred to in the preceding letter and known among English builders, as well as at home, by the name of the "universal joiner," and the planer also there referred to. Among them may perhaps be also included the dovetailing machines of Hall in the United States section, and of Armstrong in the British section. The former, by the ingenious application of boring tools, cuts a peculiar and very pretty form of dovetail, and the latter, by an equally ingenious use of circular saws having parts of their edges turned over to form portions of cylindrical saws, cuts the usual form of dovetail in a very neat and rapid manner. Both of these machines are most creditable in design, workmanship, and performance.

A considerable amount of

SAW MILL MACHINERY

is exhibited in other sections than in that of the United States. We have none at all on show. The British exhibit is by far the most extensive, and is the best in all respects. Some German firms present good exhibits, however, and, in the Austrian section, one or two of the most creditable of all their exhibited machines are of this class.

The general design of these machines presents no important novelties. For log sawing, the use of the circular saw seems quite unusual. The best machines are what the builders call the portable or, more usually, the semi-portable log frame. In these machines the frames are made stiffer and stronger than we are accustomed to make them in America; the saw frame is carefully counterbalanced; the balance weights are placed at the side and quite out of the way, below the level of the floor, and the machine as a whole is strong and compact, and its performance seems most satisfactory. These frames are constructed to take logs of two and a half feet in diameter, and they find a market in all parts of the wood-producing States of Europe and the British colonies. They require comparatively light foundations; and as they may therefore be readily removed from one locality to another, they are very well entitled to the name which has been given them. One of these machines, which seems, if possible, a better specimen of the type than its neighbors, takes a log sixteen inches in diameter and is said to weigh four tons. The Armstrong dovetailing machine and several of the tools made by Ransome & Co., including the band saw and their mortising machine, are recognized at once as American designs; and in every part of the exhibit of wood-working machinery, we find familiar types, usually strengthened and made somewhat more substantially than at home, by continental as well as by British builders. The fact is simply another illustration of the extent to which our people and our institutions have benefitted those older countries from which our population has been derived.

The visit to the Exposition of a large

PARTY OF ENGLISH WORKMEN

has excited some interest, just now, among all classes. A society of mechanics and of those interested in the "promotion of scientific industry" has sent to Vienna thirty-five delegates from among its working members. The London *Engineering*, in an article referring to this delegation, remarks, very justly, of the English mechanic, that while he may have no superior as a workman, "he is behind the average continental mechanic in mental and scientific training," and that "England is no longer without rivals in industrial production," and further that the British are "heavily weighted with the evils of discord between capital and labor." Still, while laboring under the disadvantage of a lack of opportunity for obtaining the superior education of the German, and while having no such inducement to exercise that native inventive talent which he undoubtedly possesses in a hardly less degree than the American, and while involved in those sad quarrels which are a natural consequence of a misapprehension, by both masters and men, of those laws of political economy which control the relations between capital and labor, the English mechanic holds a position here which commands the highest respect; and it may well be a

cause of pride that we who are most closely competing with him are his nearest relatives. Other nations have, like the United States and Great Britain, sent corps of observation to Vienna, in which are included some of their most skilled artisans; and it may be fully expected that this enlightened policy will produce most valuable results. No nation, however, has as many representatives from among the class of "practical artisans" as the United States. Large numbers of our most intelligent and most experienced mechanics have visited Vienna to see for themselves what the world on this side of the Atlantic is producing that is worthy of imitation. All are, probably, in some degree disappointed in their expectation of finding a large proportion of novelties here, yet probably none will go home feeling that the time and the money expended has been lost. From

THE GERMANS

they learn the value of a practical mental and scientific training, and see what it has done for a nation that cannot be termed a nation of mechanics. They learn also how splendidly the Teutonic nations have developed this kind of education, and how much we, and still more the British, have been left behind in that great field of culture. They learn from

THE FRENCH

that we do not excel in the combination of the useful with the ornamental, or in the exhibition of good taste in general work, or in the manufacture of those delicate kinds of apparatus and those marvellously perfect constructions which have become the ordinary tools of scientific work. From

THE BRITISH

they learn to admire that simplicity of form and that substantial construction which distinguish the mechanical works of that nation to a degree that we may well hope at some future time to imitate, though perhaps hardly to excel. They learn, finally, that, while we may feel proud of the position already attained, we have still ample opportunity to improve in many ways.

The exhibition of machinery for

MAKING CLOTHES AND FOR WORKING TEXTILE MATERIALS

is exceptionally large, and includes a most interesting variety. In this department, the United States exhibits almost nothing, but every other manufacturing nation is quite well and, in some cases, magnificently represented.

The Avery continuous wool spinner [deservedly attracts much attention. It is the machine which excited so much interest in the Fair of the American Institute of 1872, with one or two small but valuable improvements in details. The machine spins continuously and rapidly, and does its work well. It is compact and forms a remarkable contrast with its only competitors, which, however, are now placarded "Hors Concours." This machine is claimed to be specially adapted to working short wools, and, on trial, to have worked a very large percentage of shoddy. Wool-preparing machines are largely exhibited. Cards are present in some variety, and at least one example of a comber is exhibited in the British section. Platt Brothers, of Oldham, exhibit a fine collection of cards and the comber referred to. These machines are well known in the United States, and no very remarkable novelties are found here. They are all well and neatly made, and are capable of doing the best of work. The whole exhibit of textile machinery is far more remarkable for its magnitude than for novelty. In the exhibit of Bede & Co., the use of friction gearing is an innovation which, if as successful as it is claimed to be, will be largely imitated.

The exhibition here, of one of our best card setting machines, of our harness making machines of some of our well known inventions, and of our standard machinery in this important department, would have added immensely to the interest of the United States section of the exhibition contained in the machinery hall. The manufacture of

SILKS

is with us a comparatively youthful branch of industry, although the Cheneys and a few other manufacturers have, in isolated cases, been long engaged in it. Naturally, it has no representation in the United States section. France and Switzerland have very interesting exhibits of silk-working machinery, and it is easy to trace the whole process of silk manufacture, from the winding of the fiber from the cocoon to its final appearance in the woven goods.

In one of the annexes may also be seen illustrated the whole previous history of this invaluable textile material. Beautiful specimens of many varieties of the moth are shown; the eggs, the grub, the cocoon, are all exhibited, and the whole process of treatment, not only of the cocoon but of the butterfly and its eggs, is fully exhibited. With the baking of the cocoon, for the purpose of killing the unfortunate insect within it, the process of silk culture ceases and that of manufacture begins. The thread is wound from the cocoon by means of winding or reeling machines, which are, in some examples seen here, so contrived as to slightly twist the fiber while winding it.

The process of spinning is remarkably well and largely illustrated in the Swiss section. It is quite different from cotton or wool spinning, and consists merely in twisting together the requisite number of fibers to produce the desired size of thread. The "drawing" which is so important a part of the process of spinning textile materials of short fiber is not necessary or possible here. Among the silk looms are several very fine specimens, which are at work weaving silks of various widths and patterns.

Switzerland exhibits some examples of waste silk working machinery. As the fiber is, in this case, much broken up, and resembles more nearly those more familiar textiles, cot-

ton and wool, the process of working is intermediate between that by which new silk is worked and the ordinary method of working long wools.

If we may judge by what is shown here, the silk manufacture of Switzerland must be a large and an exceedingly important branch of that nation's industry.

SEWING MACHINES

can hardly be classified with the textile machinery, but they are hardly second to them in importance, and they appear in every section of the machinery hall in wonderful variety and in great numbers. As a matter of course, the more important and most effective of these machines, wherever exhibited, are of American make or are copies, made with great accuracy frequently, of American machines. The manufacturers of Great Britain and on the continent have imitated our methods of manufacturing, and sometimes produce exceedingly creditable work. The exhibit of sewing machines in the United States section is very extensive, and all of our standard machines are well represented. This is one of the most attractive departments of the whole *Welt-Ausstellung*, and interests all classes of visitors. Examining carefully the construction of these machines and comparing those of foreign make, it is soon discovered that, where defects occur in the latter, they are generally the result of a lack of knowledge of the proper distribution of material. The machines are made of standard forms and their parts are always made to gage and are interchangeable; but still the fits are sometimes a little loose, and the neat adaptation of the special qualities of steel and of iron, or of case-hardened iron, which invariably distinguishes the American productions, is sometimes not seen in the foreign copies.

The large number of ingenious and convenient attachments, which accompany the American machines is also one of the distinguishing characteristics. The foreign manufacturers do not invent them, and they are somewhat slow in adopting those invented in the United States. It is not at all remarkable that, notwithstanding the fact that so many sewing machines are now built in Europe, hundreds of thousands are still annually exported from America. Even the humble cottagers of Bohemia and the semi-civilized people of Russia and of Turkey are now becoming purchasers of these universally useful little "labor savers." An old subscriber to the *SCIENTIFIC AMERICAN*, who resides in Sweden, states that the poor peasants of that country also are succeeding frequently in satisfying the ambition, which is common to all, of possessing an American sewing machine. The sewing machine has thus become one of the most important aids in the advancement of civilization. Increase of production and the decrease of prices are therefore matters of great moral, as well as commercial, importance. The expiration of the last of the important patents upon essential details will now soon take place, and these very desirable consequences must soon follow.

R. H. T.

The Multiplex Telegraph.

On page 64 of our current volume, we called attention to an article in a contemporary, describing a French invention by which four operators can, it is asserted, each work a telegraphic communication over a single wire in one direction simultaneously; and not only this, but four others can operate at the same time in the other direction. A correspondent, J. T., writes to inform us that the honor of this invention belongs to the United States, and that the original and only inventor of the system by which more than two telegraphic instruments can be worked at the same time over one wire is Mr. Merritt Gally, of Rochester, N. Y., the inventor of the "Universal" printing machine. Mr. Gally's telegraph improvement has been patented in the United States and in some European countries.

Our correspondent states as follows: "By the use of Mr. Gally's invention a large number of operators at different stations along a single wire can be simultaneously employed sending different messages in either or both directions without conflict, each accomplishing as much or more work than would be possible for him to do by the use of the Morse key. Mr. Gally has adapted his system to each and every kind of receiver or register. The operator can receive his letter in print or by sound, or both simultaneously; or by the embossing, marking, or the electro-chemical recorder; and his instruments are so simple and accurate in their manipulation that it seems impossible that a mistake could occur in their operations. No time whatever is wasted in adjusting the instruments. They are always in readiness, and the first stroke of the operator sends the first letter of his message. Each touch of the key board represents a letter or other signal complete. The operator may be sending a message to a distant station, be receiving another from an intermediate or more distant station, and through a third part of his instrument be in active communication with every office on the line, receiving or sending calls or explanations; while on the same wire numerous other operators, all along the line, may be similarly employed. By using the electro-chemical recorder, on Mr. Gally's system, at least sixty operators may be simultaneously employed upon a single wire sending messages to any destination along the line; thus entirely doing away with the necessity of previously preparing the messages in punched slips of paper, as is done for the automatic machine."

The writer makes other claims as to Mr. Gally's invention; but the above will suffice to show the nature and great importance of the discovery. We hope soon to publish full particulars and illustrations of this last addition to and improvement in our telegraphic apparatus, the capabilities of which multiply with astounding rapidity.