

formed by these huge machines. They are used for transferring heavy freight from vessels to the docks and from the docks to vessels, for placing boilers and machinery in steamers, for lifting and carrying blocks of granite and artificial stone for engineering works, and for handling other bodies too heavy and too bulky to be handled by other means.

The derrick is carried by a large rectangular float well braced and stiffened by trusses. The tower which supports the king post and booms is about sixty feet high, and is built of large timbers well framed and bolted together. The boom is supported by a number of diagonal rods which converge near the top of the king post and are secured to it by heavy forgings which straddle the iron cap at the top of the post. All of the hoisting machinery is placed on the float under the tower and controlled by the engineer.

IRON LIGHTHOUSE FOR MEXICO.

The Keystone Bridge Company, of Pittsburg, are putting the finishing touches to an iron lighthouse ordered for the Mexican Government by Don Vincente Riva Palacia, late Minister of Public Works of the Mexican Government. The work was carried on under the Supervision of Don J. Ramon de Ibarrota, Engineer to the same government. The structure presents an unfamiliar sight to the inhabitants of the smoky city, rearing its graceful proportions high into the air near the banks of the Allegheny River. When completed the lighthouse will be taken apart, shipped by rail to New York, and thence by sea to the mouth of the Tampico River, where the structure is to be put up.

This house is a skeleton structure, made up of seven series or stories of cast iron columns, braced and tied by struts and tie rods, the whole arranged about a central stair cylinder of cast iron, so as to form a hexagonal tower, 146 feet 7 inches high from weathercock to base. The latter is 48 feet in diameter, tapering to 18 feet 10 inches at the lantern room. The lantern and revolving apparatus are awaiting the lighthouse at Tampico, having been made for this structure at Birmingham, England. Just below the lantern is the "service room," for the use of those in charge of the light. This space is roofed with the castings forming the floor of the lantern room, and a neat railing surrounds the hexagonal space embraced in this floor.

The "stair cylinder" forming the central portion of this lighthouse is of cast iron, 7 feet diameter and 1/2 inch thick, and composed of 14 sections, bolted at the joints through flanges. The spiral stairway inside the cylinder comprises 173 cast iron steps, spaced by six landings, at each of which a window is let into the cylinder. The weight of this whole structure is 150 tons, and its cost at Pittsburg about \$15,000. Another will be built for the Mexican coast by the same firm.

Before taking down the lighthouse its stability was thoroughly tested. A pressure was brought to bear against one side equal to a wind strain of 40 pounds per square foot. The area so subjected being 360 square feet, the test was equivalent to 1,800,000 pounds wind strain needing to upset the structure. The momentum of the lighthouse to resist this being 1,840,000, the surplus in favor of stability was still 40,000, and this without any anchorage whatever.

Prosperous France.

France is affording fresh proof that she is one of the most wonderful nations on the face of the earth. The disasters of the Franco-Prussian war, and the payment of five milliards of francs as the further penalty for entering upon that war, would have crippled an ordinary nation. But France is not an ordinary one, and the result is that she has not only cast off her burden, but contemplates an outlay in internal improvements such as the most prosperous country could alone entertain. It will be remembered that M. de Freycinet, the new Prime Minister of France, before leaving his old department, drew up an elaborate report embodying a gigantic scheme for the creation, extension, and union of railways and canals throughout the country. The estimated cost of these improvements is nine milliards of francs, or £360,000,000 sterling; but France is not deterred thereby, and in twelve years the scheme is to be worked out in its entirety. Already France is noted for the completeness of her railway system, which, with her rivers and canals, afford a means of communication apparently leaving little to be desired; but she is impressed with the belief that improvement is possible, and she is going to add 10,000 miles to her railways, and 900 miles to her rivers and canals. This fresh burst of enterprise on the part of France can have but one effect, and that is increased prosperity in the great industries already stirred into activity by the demands of India, America, and the colonies. Rumor is already busy, says our excellent English contemporary Capital and Labor, with the names of English firms about to contract with the French Government, while the iron and steel trades in America and Belgium must also benefit.

Interesting to Patentees.

Senator Hoar strongly advises patentees not to spend their money in trying to get their patents extended. He says that experience shows that no bill for the extension of any seventeen year patent can pass Congress. The feeling against the extension of patents is very strong. Bills have passed one house or the other, but they are always beaten in the end. He says that if he had a brother who had a patent worth \$50,000, he would not advise him to spend \$1,000 to get it extended.

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Contents.

(Illustrated articles are marked with an asterisk.)

Table listing various articles such as 'Accident on board the Greece', 'Inventions, new', 'Jugs, improvement in', 'Light, action of on plants', etc.

TABLE OF CONTENTS OF THE SCIENTIFIC AMERICAN SUPPLEMENT

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Table listing contents of the supplement by section: I. ENGINEERING AND MECHANICS, II. TECHNOLOGY AND CHEMISTRY, III. ELECTRICITY, MAGNETISM, LIGHT, ETC., IV. ASTRONOMY, V. PHYSIOLOGY AND MEDICINE, VI. MINING, VII. ART, VIII. OBITUARY.

WORK AND WAGES.

We have been surprised that the volume published a few months since by the National Government on the "State of Labor in Europe," has not received more general attention than it seems to have attracted. The statistics, as furnished by the various United States consuls, purport to cover the rates paid for labor in all the leading industries, together with the cost of living in Great Britain and in nearly every country on the continent of Europe. Elaborate tables are also given comparing the averages thus obtained with the rates of wages paid and the cost of living in this country. In addition to the above, our accomplished Secretary of State, who himself obtained the home statistics relative to labor and the cost of living, carefully edited the volume, and, in an extended introduction, gives us a synoptical resumé of its contents, together with some general conclusions of his own.

Now every one will concede that Mr. Evarts, with his wide and varied culture, is a close reasoner, and there is hardly a subject of general interest on which he cannot write or speak so as to command the attention of all thinking men. In treating of this subject, however, it may well be doubted whether he does not carry his generalizations much too far; for, certainly, the tenor of his whole discourse is to point out that our workmen must accept lower wages in future. The mechanics and artisans in the housebuilding trades, and in every local as well as general occupation, must, according to his argument, in the near future be content to accept for their remuneration wages more nearly approximating to those obtained by European workmen. The principal ground on which this reasoning is predicated lies in the much higher rates per day now paid to American workmen, which, the Secretary argues, cannot be permanently maintained when we are exporting largely of domestic manufactures, in competition with the products of the cheap labor of Europe; yet, in another place, he says: "The average American workman performs from one and a half to twice as much work, in a given time, as the average European workman." It is quite a different thing, as every employer knows, to compare the wages per day or hour of different sets of workmen, from what it is to estimate the cost of labor under differing circumstances, as shown in the completed work. The former method is the one generally adopted by those who talk or write on the subject; the latter must control the operations of all who succeed in every line of business. The English workman who receives the highest average wages in Europe comes nearest to doing as much as the American workman, but on the Continent, where wages are lowest, so also is the quantity and quality of the work. The consul at Leipsic writes that "an active American workman will do as much work in a given time, at any employment, as two or three German workmen," and the volume abounds with such remarks, which do not put the case a whit more forcibly than we have often heard it stated by American manufacturers who have investigated the matter in personal visits to foreign workshops. The fact is, in making comparisons of this kind, so many things have to be taken into consideration to make the conditions equal, that they seldom give one more than an approximate idea of the situation.

But if it is inevitable that we are to have a sort of leveling process in the rates of wages in "the world of educated and progressive labor," why is there not good reason to suppose there will be some "leveling up"? The average rates of labor throughout Europe have advanced from 25 to 50 per cent since 1850. The upward movement was checked when the speculative era following the Franco-German war reached its climax, and since then, contemporary with the extreme depression which was felt here from 1873 to the commencement of 1879, all branches of productive industry have been undergoing a severe strain. This, however, has not caused any very material reduction in the rates paid for labor, and with the first indications of returning prosperity it is probable that wages will at once be advanced in proportion there, as they already have been in many kinds of business here. A great improvement in trade and manufactures has already been experienced in England, notwithstanding the general failure of the crops there the past year, and, although Mr. Evarts' conclusions were formed eight months ago, we have yet to see the evidence that any considerable number of English workmen are "sorrowfully standing between their idle factories and the emigrant ships."

COTTON SIZE AND COTTON SIZING.

Not long since we had occasion to notice a legal trial in England in which the work of the professional cotton sizer played an important part. From the evidence which the judge required to be given in open court, it appeared that it was a common thing for English cotton goods to be loaded with size, so as to double their natural weight, while in some cases the fiber carried two and a third pounds of size for every pound of pure cotton. In commenting upon the case the judge said that the manufacturer and the warp sizer had entered into a conspiracy to defraud the public; and to the American mind that seemed a fair description of the transaction. English manufacturers and traders, however, do not so regard it.

We have before us a large and well made octavo volume of some three hundred pages ("Sizing and Milling in Cotton Goods," Manchester: Palmer & Howe), about half of which is devoted to the art of sizing. Its authors are three Manchester chemists of good repute; and in a letter commending the work to our favorable notice, the publishers assure us that this is the first time the subject has been