

STATUE OF CAPTAIN COOK.

The committee who have made the arrangements for the bronze statue of Captain James Cook, the great navigator, which is to stand on a lofty pedestal, 22 feet in height, overlooking Sydney Harbor, have given their sanction to the statue being exhibited for two months in London before it is shipped for New South Wales, and the colossal figure has been accordingly placed on the same square of land, between the Athenæum and the Senior United Service Club, on which the late Mr. Foley's equestrian statue of Sir James Outram, now in Calcutta, was displayed for a time for the criticism and admiration of London. The custom of preliminary exhibition in London has many advantages, and might well be made general. Mr. Woolner, R. A., is the sculptor of the fine piece of statuary which is now to be seen at the foot of Waterloo Place. He has chosen the moment when the intrepid sailor has just sighted the land of New Holland, which he called New South Wales, and took possession of in the name of the King. As we know from the narrative of his famous voyages, this was at an early hour on the morning of the 19th of April, 1770—108 years ago. The founder of the Australian colonies is represented with his right hand thrown in the air in a gesture expressing exultation; his left hand holds the telescope with which he has just seen the dim loom of the land. He wears, of course, the naval costume of the last century, and there was no difficulty in procuring an accurate likeness of him to serve as the original of the manly and intelligent face, which in the statue is thrown back as the eyes seem to scan the horizon. The Royal Society struck a medal in commemoration of Captain Cook after his tragic death at Hawaii; there is a fine Wedgwood medallion of him extant by Flaxman, and Nathaniel Dance painted his portrait. It hangs not far from the relics of Nelson in the Painted Hall of Greenwich Hospital. The back of the figure will be scrutinized by those who are interested in the old naval pigtail, which was the head ornament of all the best known maritime heroes of English history. The monument is 14 feet in height. It is at present placed on a wooden pedestal 13 feet high, and the effect is, therefore, not quite the same as it will have on the much loftier pedestal for which it is destined at Sydney. It was the work of three years, and has been cast by Messrs. Cox & Sons, who have recently sent fine statues to Glasgow. The weight of the statue is about two tons. Mr. Woolner's hand is already known in the Southern hemisphere by his statue of J. R. Godley, the founder of the Canterbury settlement, which is placed in Christchurch, New Zealand. To have executed for Sydney the statue of Captain James Cook, which after thirty years' discussion the colony is at length on the point of possessing, is to have a surer title to immortality. We take our illustration from the London News.

Temporary and Variable Stars.

Professor Bickerton, in a paper on this subject, read before the Canterbury Philosophical Institute, England, reasons thus: The existence of variable stars seems sufficient to prove the existence of gigantic feebly luminous or non-luminous bodies. The existence of variable stars seems sufficient to prove there are such bodies, and, as I have shown, all the hypotheses offered in explanation of temporary stars assume their existence. The high temperature and small relative light of celestial radiation points to the same conclusion, or to non-luminous gas. It might be asked, If there are dark bodies, why not stellar eclipses? I do not know if such have been observed; it would be wonderful if any had been, for they must be very rare, probably as rare as temporary stars, for although we have all the depths of space in which eclipses are possible, on the other hand, with temporary stars we have attraction bringing very distant bodies together. Further, the points of light of the fixed stars form but a small area in space; and, lastly, if eclipses occurred they would probably not be recorded, as small black patches of cloud so often obscure a portion of the sky that such an occurrence would scarcely attract attention. But why should there not be large dark bodies? Laplace's theory of universal nebulae may be assumed to be against it; but did Laplace assume that it was contemporaneous? If not, then even that theory does not interfere. All our conceptions seem to agree more with a rhythmic cycle than with any definite beginning or end.

If we assume this hypothesis, then the period of dissipation of energy seems indefinitely projected into futurity; for all radiation falling on the matter in space must prevent its temperature from falling so low as without this radiation, and when at a subsequent date a collision occurs, this heat must exalt the final temperature, nor does it appear that we need look forward to a gigantic dead sun as the final condition of this universe, for doubtless our universe has its own proper motion in space, which may bring us into collision with other universes. This shows gravitation to be as competent to multiply worlds as to absorb them one into another. But, after all, our hypothesis only takes us a step further back in

time, and our imaginations a step further forward into the future, thus removing further than ever from our conceptions every trace of a beginning or promise of an end.

Manufacture of Smyrna and Persian Carpets.

Turkish and Persian carpets have for centuries held a prominent position in the markets of the world on account of their durability and the exceeding beauty of design; and though Halifax and Kidderminster produce truly magnificent fabrics for the decoration of our floors, the Oriental carpets are still held by dealers as sumptuous beyond comparison. As far as the quality is concerned, we believe, says the *Textile Manufacturer*, imitation would not be difficult, for they are in reality only Axminster or velvet pile, *i. e.*, cut carpets; the beauty of the design and the blending of the colors are, however, a peculiarity of the Eastern na-

much against their more general adoption, for in most of our houses the flooring boards are not of a nature to be left bare without greatly offending the fitness of things in æsthetics.

We have been led to these remarks by an article in the German *Polytechnic Gazette*, wherein it is stated that for some time past these Turkey and Persian carpets have been manufactured to a considerable extent by a firm in Silesia, and sold in Paris and in England as the real and genuine productions of the indolent Orientals, a description which with true German philosophy is considered justified because they are so like the real articles.

We learn that the first step in the manufacture of these counterfeits is the production of the design, which is drawn in the usual manner, and sometimes, in order to attain perfection and avoid mistakes, it is even a proceeding not unlike calling out Goliath to whip David. These designs are submitted to the buyer (for the carpets are all made to order), and the disposition of the colors or their shades modified to suit his ideas in art. When all the details of the order are given, the design is divided into sections, and each of these transferred on design paper by a number of specially trained young ladies—a work which is similar to the well known "Berlin wool work," only that in place of wool and canvas, paper ruled in squares and colors are used. The transference requires considerable skill so to bring out the intended forms in the angular lines of the little squares as to closely imitate the curved lines of the original design. The wool to be used is specially selected, and, in order to copy the Oriental mode as much as possible, it is spun in the establishment in one operation. The wool is usually kept in the gray; only colors in constant request, such as black, white, scarlet, blue, and green, can be kept in stock; all others are dyed on the premises as required for the orders in hand. This facilitates the selection of tints by the buyer, and is a great desideratum at the present time, when there is such a wide variety of neutral tints capable of producing the most happy combinations. The actual production of the carpets is a knotting, combined with the most primitive mode of weaving; but which in this case has also been imitated, in order to produce the "real article." The loom used differs principally from all other looms by the total absence of all provision for the production of any shed or pattern; there being no jacquard, dobbie, treadles, or tappets, the pattern is simply formed by hand. All that the loom contains is a yarn beam and a cloth beam, both occasionally turned by a crank and handle, and a slay. There is no kind of contrivance for throwing the shuttle. The warp is generally of hempen cord, or, where desired, of woolen yarn, and is mounted in the loom in such a manner that from the breast beam toward the yarn beam it rises at an angle of 60 degrees. Each weaver has a width of about a yard to attend to, so that there are, according to the width of the carpet, from eight to ten maidens employed in the loom. Each girl has before her the section of the design she has to produce, and within easy reach a certain quantity of the woolen threads assorted according to their colors. Each little diamond of the pattern or design paper is represented by a knot consisting of two or more woolen threads, which encircle two warp ends, and whose open ends are turned toward the weaver, thus forming the face or pile of the carpet, which projects a quarter to half an inch. It is cut level by nippers, and the girls acquire such skill in cutting all the ends to one length, that the last process, namely, cropping by machinery, has only to remove slight irregularities. When a whole row of knots from one selvedge to the other has been inserted, they are beaten home by a special tool with a handle, and much in the form of a garden hoe, after which a weft thread is inserted; this is done by the simple expedient of the outer girl throwing the shuttle between the warp as far as it will go, when it is taken up by another girl, and passed on, until ultimately it makes its exit at the other selvedge. When a few rows of knots have been inserted in this manner, they are beaten up with the heavy slay, in order that they may not deviate from the straight line. By this procedure it is possible to give the carpet any desired shape to fit the room, which is a decided advantage over the Oriental carpets, the outline of which are always rectilinear.

The material for all the marketable varieties of these carpets, with the single variation of the warp, as above indicated, is always the same; the difference in quality is produced by the greater or shorter length of the pile, or the greater or less density or compactness in which the same is laid.

From the foregoing, it is evident the process of manufacture is a very simple one, although calling for a tolerable amount of manipulative expertness. The design and arrangement of the colors has so far been the chief difficulty, but has now, we are assured, been successfully overcome by the firm in question; there is, however, one point of great importance, namely, the production, which, notwithstanding the high price commanded by the carpets, can only be made profitable where labor is cheap. This not being the case in



BRONZE STATUE OF CAPTAIN COOK FOR SYDNEY, AUSTRALIA.

tions, if we take as illustrations the Indian shawls and the Moorish decorations still existing on old buildings, such as the Alhambra, in Spain. These carpets are made in the East by very small manufacturers, if so we may call them; in fact, they are nothing but home made articles. After being bought up by dealers, they find their way to Europe through the hands of a few importers. As in the East they are mostly put on the floor in the middle of a large apartment, upon which the family may sit or recline, or are used for kneeling upon during prayer, there is no attempt made to fit them to any sized room; they are thus only squares or parallelograms of certain stated and customary sizes; and when used as a covering for the floor in this country are taken as near as possible to the size of the room, minus a bare margin, which is generally left along the walls, from the sheer impossibility to find a carpet the exact size of the apartment. This drawback of fitting has militated very

our country, it is hopeless to expect this interesting branch of the textile industry to be introduced among us in the way it is carried out by the German firm, who, we understand, are at present executing a larger order for the Italian Court, including carpets at £150 and £250 each.

Proofs of Progress.

Joseph Nimmo, Jr., Acting Chief of the Bureau of Statistics, has issued a special report on the foreign commerce of the United States, from which it appears that the total foreign commerce of the United States—imports and exports—during the year ending June 30, 1878, was larger than during any year prior to 1873. The exports of domestic merchandise from the United States, during the year ending June 30, 1878, were larger than during any previous year in the history of the country. From the year 1863 to the year 1873, the net imports of merchandise into the United States largely exceeded the value of the exports of domestic merchandise from the United States, the excess of imports ranging from \$39,000,000 to \$182,000,000. During the years ending June 30, 1876, 1877 and 1878, however, the exports of domestic merchandise from the United States greatly exceeded the net imports of merchandise into the United States, the excess of imports increasing rapidly from year to year.

The principal commodities showing an increase in the quantity exported are:

Articles.	1868.	1878.	Increase.
Agricultural Implements	\$613,381	\$2,575,198	\$1,901,817
Living Animals	733,395	5,844,653	5,111,258
Bread and Breadstuffs	68,980,997	181,774,507	112,793,510
Coal	1,516,220	2,359,467	843,247
Copper and Brass, and Manufs. of	939,250	3,078,349	2,139,099
Cotton Manufactures	4,871,054	11,435,628	6,564,574
Fruits, all kinds	406,512	1,376,969	970,457
Iron, and Manufactures of	6,040,961	10,696,970	4,656,009
Steel, and Manufs. of, ex. Firearms	348,468	1,389,078	1,038,610
Leather, and Manufactures of	1,414,372	8,077,659	6,663,287
Oil Cake	2,913,448	5,095,163	2,181,715
Coal Oil and Petroleum	21,810,676	46,574,974	24,764,298
Provisions	30,278,253	123,549,986	93,271,733

What the Reaping Machine has Done.

An exchange says: "When the reaping machine—that *bête noir* of the tramp who sits in the shade and listens to the man who tells him that he ought to ride in his carriage—was introduced to the country in 1850, the number of farmers and agricultural laborers in the twelve States in which it is now chiefly used was 1,301,863, and in 1870, 2,641,830. The difference in wages was still greater. In 1850, farm hands were paid \$9 a month, and harvest hands from 80 cents to \$1.50 a day; while in 1870 the wages of the former were \$30 a month, and of the latter from \$2 to \$3.50 a day. This year farmers willingly paid harvest hands from \$1.50 to \$2.50 per day, while the manufacture of reaping machines is giving employment to thousands of skilled workmen. The same remark is applicable to all kinds of machinery, the hands employed during the last twenty years having more than doubled, and the wages quadrupled, while the population increased only 67 per cent. Comment on such a change of things is superfluous."

American Locomotives for Australia.

The Baldwin Locomotive Works, of Philadelphia, whose advertisement has for some time past been published in the SCIENTIFIC AMERICAN Export Edition, has lately shipped to Australia, by the clipper ship Colorado from this port, three powerful locomotives for Sydney, New South Wales, where they will be used on the railways owned by the Australian Government. The shipment comprises one passenger locomotive and two freight locomotives. The passenger locomotive has cylinders 18 inches by 24 inches, four driving wheels, 63 inches in diameter, and a four wheeled swinging bolster truck, with wheels 30 inches in diameter. The tender is on four wheeled trucks, in accordance with the usual American practice. All the truck wheels are steel tired. The two freight locomotives are of the "consolidation" type. These engines are of the largest and most powerful freight locomotives constructed. They weigh in working order, exclusive of tender, 102,000 pounds each. Their dimensions are: Cylinders, 20 inches by 24 inches; they have eight driving wheels, four feet in diameter. On one occasion, on the Susquehanna Division of the Northern Central Railway, where the grades are very light, one of these engines drew a train of 160 empty cars. The total length of the train was one mile. The usual work of engines on that division of the road is from ninety to one hundred loaded cars each trip.

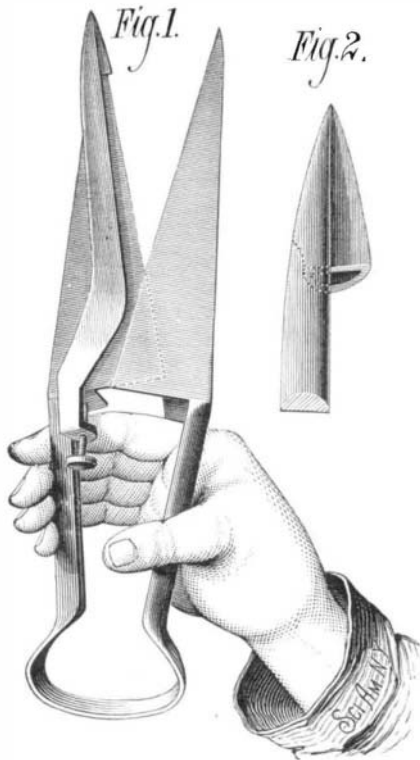
American Electro-Plate in England.

On first appearances it seems somewhat strange that American manufacturers should be successfully competing with Sheffield houses in the manufacture of silver-plated goods. Yet really it should not be a matter for surprise, for in America there are some of the best workmen whom Sheffield ever sent across the Atlantic. This, of course a great advantage in itself, is heightened by the large employment of labor-saving machinery, and the result of the combination is that the American goods have a smarter and more perfect appearance than have those made here. That American electro-plate, however, should find a market in England is certainly somewhat singular; but such is the fact. We hear of one or two large export houses that are buying American plate almost exclusively, and who have well nigh discarded the goods of Sheffield houses. That the trade is developing is evident from the fact that American travelers

in this line visit England three or four times a year, and that their pattern books are freely distributed.—*British Mercantile Gazette.*

NEW GUARD FOR SHEEP SHEARS.

With sheep shears of the ordinary form the experienced shearer is liable to cut the sheep in the operation of shearing, and in the hands of the unskilled the common shears are sure to work injury to the sheep.



HELMECKE'S GUARD FOR SHEEP SHEARS.

To facilitate the operation of shearing and to render it perfectly safe, Mr. Frederick A. Helmecke, of Round Top, Fayette Co., Texas, has devised the improvement shown in the accompanying engraving. It consists in a guard applied to one of the shear blades, and arranged nearly parallel with its cutting edge, and at such a distance from it that the opposite blade may readily pass into the space between the guard and the blade.

The guard has a socket for receiving the point of the shear blade, and a binding screw which engages the heel of the blade.

It is obvious that the blade thus protected cannot come into contact with the skin of the sheep. It will also be seen that when the guard is employed the shearing can be more closely and thoroughly done than without it.

For further information address the inventor as above.

NEW MEASURING STOPPER.

In the accompanying engraving is represented a little device, the invention of Mr. W. L. Keller, of Baltimore, Md., which must prove of great utility to druggists and chemists.



MEASURING STOPPER.

It will be readily understood from the cut. Upon the inner end of the stopper is formed a small graduated measure, which is similar to those commonly used. The stopper has a flat head that forms a stable base for the measuring glass. This invention obviates all loss of liquid, as it is returned to the bottle after the stopper is replaced. The glass need not be cleaned, as it is always used in the same liquid.

Labor in Massachusetts.

A few weeks ago Carroll D. Wright, Chief of the Massachusetts Bureau of Statistics, was called as a witness before the Congressional Labor Committee, and testified as follows:

"In my official capacity I have given special attention to labor statistics, and am the author of the recent report which has been given to the public through the newspapers and otherwise. I have compared that report with the census of 1875, and find the two entirely in harmony. The number out of employment is about the same as in 1875, though the census of 1875 does not take into account the laboring men out of employment. In it there is a column of those never employed—persons of leisure. Both reports exclude those in almshouses; it may be that there are a few more now than in 1875; but the difference is very little. After the panic of 1873, there was an increase in the number of paupers all through the country; this has since been decreasing steadily; I have made very extensive inquiries throughout the United States, and have found no such condition of things as has been represented before this committee; I have no doubt the reports of destitution in the coal region are correct, but it is diminishing; I cannot tell the causes of this any more than I can tell how an apple grows; I have found as great difficulty in accounting for periods of prosperity as of suffering; I do not believe that the relief has come very greatly from the removal of the unemployed to other places; you cannot make a State prosperous by depopulating it."

Mr. Wright said that the shoe manufacturers of Massachusetts were enlarging their works, and the Amoskeag Print Works, at Worcester, N. H., was putting in 900 extra looms. Mr. Crompton, the loom manufacturer, had more orders than he could fill. The same improvement appeared in other States, and in all branches of trade, except the iron industry.

"Last year the work of laborers in Massachusetts on boots and shoes averaged eight hours a day; that of operatives in cotton mills from nine to ten hours a day; and that of carpenters and joiners about nine hours a day. Machinery does not take the place of labor; it calls for a higher class of labor. The wages of carpenters have increased from \$1.75 in 1859 to \$3.50 in 1868, and thence have fallen to \$2 in 1878. The purchasing power of the wages is not quite so great now as it was in 1859. The wages and the moral, intellectual, and physical condition of the workmen have been steadily improved during the last 100 years by the use of machinery. In Massachusetts it would require a population of 9,000,000 to do the work without machinery, which is now done with a population of 1,650,000; the accumulated property of the State would be used up by this extra population in less than two years, and the condition would then be worse than in China and India now."

Labor and Trade in Italy.

Mr. Charles McMillan, United States Consul-General at Rome, reports that in that part of Italy labor is in excess of demand. The wages of woolen, cotton, and silk spinners and weavers have not increased during the last 10 years. There has been a slight increase in the wages of masons, bricklayers, blacksmiths, and servants. Carpenters' and joiners' wages have increased 40 per cent.; tailors', shoemakers', and stonecutters', 20 per cent.; machinists', 15 per cent. A day's work is 10 hours, with half an hour for dinner in winter, and one and a half in summer. The advance in wages since 1873 is slight, and bears no proportion to the advance in the cost of living. When Rome became the capital of Italy, owing to the great influx of people, rents advanced from 75 to 100 per cent, where they still remain. Articles of food advanced in price 25 per cent, and have not yet sensibly decreased. Wages also increased at the same time—in some cases 40 per cent. The commerce of Italy has fallen off in imports and exports during the last five years, owing to the Eastern war, overstocked markets, and uncertainty as to the ratification of a commercial treaty with France. As regards Rome, there has been a slight improvement in its commerce and in its exports to the United States. Its principal articles of export are wool, cheese, hides of small animals, statuary, and other works of art. Manufactures of wool, cotton, silk, and leather are absorbed at home and in the neighborhood. The expenditures of the large number of visitors to Rome form a considerable part of its trade. The United States is now represented in Rome by 17 sculptors and 18 painters. The imports from the United States consist almost wholly of petroleum, cotton goods, sewing and agricultural machines.

MR. J. E. MONTGOMERY, United States Consul at Geneva, Switzerland, reports to the Department of State that he is constantly receiving letters from the United States upon the subject of introducing goods and products into Europe. He recommends generally, as the most effectual, if not the only method of increasing our trade with Europe, that manufacturers, producers, and others, should forward samples of their respective goods to responsible firms in the chief cities, with explicit statements as to the cost of importation of said goods to wholesale dealers in Europe.

THE rage for exhibitions has now spread even to Central Asia. The latest news from Tashkend states that an agricultural and industrial exhibition is about to be held there. Great preparations are being made for it at Samarcand, and the government has promised gold and silver medals to the exhibitors, as well as—honorary caftans!