

## THE INCREASING WEALTH OF THE WORLD.

We are at present in such a stage of the development of the industry of all civilized nations that the increase in producing capacity far outstrips increase of population, so that the amount produced and consumed on an average by every person far exceeds in quantity and value that which was ever before known. It should not be lost sight of that only food, drink, fuel, and clothing are entirely consumed, but that all the other products of industry are utilized for building and manufacturing, by which operations nothing in reality disappears; but, on the contrary, the value of the manufactured material is increased. Thus the stone and timber are transformed into dwellings and furniture, the iron into railroads, engines, and steamships, and the products of metallurgy into all kinds of tools and machinery, all much more valuable than the material used to produce them; so that in their case the value of property is raised by two steps, first by the production of the raw material, second, by the use of this in making the objects desired. Even the fuel consumed under the steam boiler of a manufactory gives more than its equivalent in the products of the manufacture; and who will deny that the value of the development of human society is not worth a great deal more than the value of the food and other necessaries consumed by the human race? Therefore, strictly speaking, even in this case nothing can be considered lost, but humanity in general is the constant gainer. So the workman who earns his wages gives the products of his labor back to his employers, a value surpassing that of his earnings if this was not so, he would not have been employed; and thus the workman has, besides earning a living for himself and his household, contributed his share to the increase of the wealth of the world. Even the Chinaman who, after several years of toil here, returns to his native home, carrying some of his earnings with him, if looked at from this point of view, leaves behind him in the results of his labors a greater value than all that he can possibly carry off; he has thus been a benefit to us, and has the full right to go where he pleases.

If we look at the statistics of the increase of productive capacity in various branches among different nations, we are especially struck at the development that has taken place during the last decade. Let us, for instance, take the single article of iron. In the United States, in 1860 it was confined to half a million tons, while in 1870 it was increased to over two million tons, employing 150,000 workmen; while 850,000 men are employed to work this iron into all kinds of machines, etc., making one million men employed by the iron industry alone. The value of the raw material is estimated at \$200,000,000, increasing by further labor to \$1,000,000,000. The production of steel manufacture in Germany is still more startling; in 1860 only 250 tons of manufactured steel, worth three millions of dollars, was produced by 4,000 workmen, while in 1870, 2,000 tons, worth twenty millions of dollars, was the result of the labor of 14,000 workmen.

Let us take a totally different branch, cheese; in 1853 one million pounds of cheese were exported from here to England, and in 1870 seven million pounds. The State of New York alone has now nearly 1,000 cheese manufactories, which use the milk of more than 250,000 cows, making therefrom 80,000,000 pounds of cheese, which is 1,000 pounds of cheese for every three cows. The cheese production of the whole United States is now over 100,000,000 pounds, of which 60,000,000 are exported. England exports scarcely 3,000,000 pounds, while little Holland, which used to be the principal cheese producing country of the world, exports at present 25,000,000 pounds. This latter fact suggests the extent which the cheese production of the United States may reach in the course of years, and the wealth which its exportation will bring back, as the Hollanders used to boast that their cheese production alone was more valuable and reliable than a gold mine, very few of which surpassed the Dutch cheese in the profits realized.

We could easily fill many pages with other illustrations of the immense increase of the production which, as it continually far outstrips the increase in population, cannot fail to increase the sum total of valuable property. This view of productive capacity and its results is the best argument against that conservative class of people who sometimes raise their voices against useful inventions and new patents, under pretext that such improvements often take the bread out of the mouth of the workmen, who are unable to compete with hand labor against machine labor. Experience has proved that all such fears are totally groundless, and in every case have the machines which increased production been a blessing in the end, giving more labor and higher wages to those using them than they could obtain by their unimproved methods and much smaller productive capacities. So since the art of printing has superseded manual copying, there are probably a thousand printers for every manuscript writers of the olden times; when at a recent period the sewing machine superseded a great many of the most tedious duties of the seamstress, the prophecy that its use would impoverish a large class of women who made their living by sewing was not fulfilled. On the contrary, the sewing machine has been a benefit all round; and so it must be with every invention which enlarges the total amount of the valuable products of labor, and therefore contributes its share to the increase of the world's wealth.

## Commissioners to Vienna.

There are a sufficient number of Commissioners to the Vienna exhibition appointed by the President to make a respectable show here if they would remain at home. Some eighty have been appointed and confirmed by the Senate, and we are informed that the end is not yet.

## SCIENTIFIC AND PRACTICAL INFORMATION.

## GOLD IN LAPLAND.

Traces of gold had been discovered years ago in different parts of Lapland, but not until a certain Ewast, formerly a California miner, with some companions explored the country was much attention given to it. They found in a short time gold to the value of more than \$190. A large number of adventurers rushed to the gold districts, many of whom were without means and had had no experience in mining. By a ukase of the Senate of Finland, dated April, 1870, it was decreed that the privilege of obtaining gold should be granted only to applicants who had sufficient capital for the effective prosecution of the work. Several companies were then formed, and about 19 of them were registered towards the end of June, 1870. They began near Ivalo, on the river Tanna, where large buildings for the workmen were erected. This river forms the boundary line between Lapland and Norway, and the working was soon extended along its shores near Vasko and Tanna-Juk, also along the rivers Kenna and Kytinen. The greatest yield was obtained from the river Tanna. The gold found showed traces of platinum. The gold-bearing sand of the river showed great resemblance to that of the river Sacramento, Cal. The method of obtaining the gold was similar to that used in California, namely, by washing it out in a wooden trough.

In July, 1870, a Norwegian captain named Daal explored the western shore of the river Tanna, and the result was that the greatest yield was discovered at the confluence of the Ivalo and Tanna. The Norwegian government then granted to the Russian companies the privilege of extending their works to their side of the river. In the middle part of September, every vestige of vegetation disappeared, owing to the approach of winter, and compelled the abandonment of the work till the following spring. In the seven weeks from July 21 to September 9, 124,141 cubic feet of gold-containing sand were washed, yielding 615 ozs. of the precious metal.

## INK PLANT.

The botanists of Europe are endeavoring to acclimatize a plant growing in New Granada, which is valuable for the manufacture of ink. The juice, called "Chanhi," is reddish, but changes after a few hours into a deep black, and is then ready for use. The "Chanhi" has less destructive influence on the steel pens than common ink. Experiments made in Spain demonstrated that the ink was not even spoiled by sea water, which is invariably deleterious to ordinary ink.

## TESTING GOLD USED IN GILDING.

P. Guyot proposes for this purpose the use of a solution of chloride of gold or a solution of nitrate of silver. Neither affects at all the genuine gilding, but imitations, when touched with the former solution, show a brown spot, and with the latter, a gray spot. The gilt designs of wall papers are examined by Guyot with chloride of sulphur. One drop of this salt, placed on imitation gold paper, produces a dark brown rim, which does not appear when gold has been used. Thin gold leaves, if placed with chloride of sulphur in closed bottles and well shaken, show no change, but alloys of base metals gradually blacken. If the gold is placed in hermetically closed bottles under a slight aerostatic pressure, it will disappear in a short time and combine with the chlorine to form chloride of gold.

## CONSUMPTION OF TIN.

According to the *Polytechnisches Central Blatt* the annual consumption of tin in America and Europe was in 1868 and 1869 about 22,000 tons; in 1870, 24,000 tons; in 1871, 27,000 tons. Should the consumption increase in the same ratio, possibly the production will not be equal to the demand, as during the last year only about 27,593 tons were produced, as follows: Of English tin, 10,500 tons; of Banca tin, 90,000 tons; of Straits tin, 9,500 tons; of Billiton tin, 2,700 tons; total, 27,593 tons.

## CINCHONA TREES IN INDIA.

In the plantations of the English government on the Neilgherry hills, there are about 2,600,000 cinchona trees, which cover over 950 acres of land. The largest trees are 30 feet high with a circumference of three feet. The quantity of 7,295 pounds of splendid bark was sold last year in London at the price of from 50 to 60 cents per pound. There were also furnished about 35,000 pounds to the Indian depots, so that the proceeds amount to about \$8,000. The capital invested by the government for the introduction of this important tree will soon have been repaid with interest. Hundreds of natives have been cured of fever annually with the quinine obtained, and the object of the beneficent intention of bringing the antidote of fever within reach of the poorest has been fully realized.

## TO PRESERVE CHEMICALS.

Earthen vessels are now constructed with a groove near the top. The groove is filled with castor oil, with which the cover is brought in contact in closing. The connection with the outer air is thereby totally interrupted. Chloride of lime, for instance, was preserved in this manner for two years, without deteriorating in the least by the absorption of moisture.

## SOLIDIFICATION OF NITROUS OXIDE.

Mr. T. Wells exhibited, at a recent meeting of the Chemical Society in London, the formation of solid nitrous oxide in large quantities. Liquid nitrous oxide quickly solidifies if a current of air be passed through it. Unlike carbonic acid, the liquefied gas can readily be preserved for some length of time in an open vessel, provided it be kept still. Liquid carbonic acid becomes solid immediately it is allowed to es-

cape from the vessel containing it, since the vapor tension of the carbonic snow at the time of its formation is much above the atmospheric pressure: whilst liquid nitrous oxide boils at 1.92 Cent. and solidifies at 1.99°, so that the vapor tension of the solid is less than one atmosphere. The density of the liquid at 0° is .9004, and, like liquid carbonic acid, it is very expansible and immiscible in water.

## ADULTERATION OF RHUBARB AND YELLOW MUSTARD.

When rhubarb or mustard is adulterated with turmeric root, the adulteration is easily detected by shaking it for 1 or 2 minutes with absolute alcohol, filtering and then adding, first a concentrated solution of borax and then some hydrochloric acid. If the solution turns brown on adding the borax and retains its brown color on the addition of the acid, it indicates the presence of turmeric. This is a simple case of reversing the usual turmeric test for borax, and making the borax the reagent which detects the turmeric. It seems strange enough that until recently this had not been thought of.

## IODINE IN SUBSTANCES CONTAINING TANNIN.

It is a well known fact that iodine, when dissolved in liquids containing tannin, cannot be detected by the ordinary starch test. Tessier has found, however, that on adding to such a solution a few drops of a neutral solution of chloride of iron, the iodine is at once set free, and can be detected by covering the test glass with a watch glass or an inverted funnel, coated on the inside with a starch paste.

## UTILIZATION OF SOAPSTONE CLIPPINGS FOR BUTTONS, ETC.

The powder or other filings of soapstone (steatite) obtained in the manufacture of gas burners is saturated with soluble glass, dried, and ground. In a suitable press, buttons and similar articles are pressed from this powder, burned in retorts, dipped again in solution of glass and once more burned. They are then placed in a rotating cask, polished by water, dried and again polished by rotation in a similar cask with soapstone powder. Dominoes and dice are pressed in similar manner in dies of brass or steel, and then polished.

## Hygiene.

A new fortnightly journal of sanitary science, bearing the above title, comes before the public in an attractive form from the press of G. P. Putnam's Sons, New York city. \$2 per annum. From the last issue we extract the following:

REGIMEN FOR SPRING.—The amount of work done in the human body during the winter, in the mere maintenance of our normal 100° of heat, would of itself be sufficient to overload the system with tissue waste by the return of spring. But when to this is added the special nerve waste caused by the wear and tear of the brain and nervous system, in the whirl of excitement and mental activity of a city winter, there should be no wonder that March is accredited with bringing "humors" and giving rise to "pains." Increased production and reduced excretion of waste, or refuse matter, of the ashes of the human furnace, are the real causes, and not any occult influence of the season. Knowing this we are the better able to understand why roots and salads, "green food" and little meat, are now craved by the natural appetite; and to recognize the wise hygienic principle in the observance of Lent, with its meager diet and abstinence from worldly gaiety and excitement. What we need, physically, in this milder weather, is to "train down;" to favor the "moulting of the tissues," as Chambers says; and, mentally, to get rid of brain fag and worry—for only by rest can the nervous system be restored.

Abundance of exercise, free bathing, spare diet, should be the rules for the coming month or two. To use the furnace illustration again, the amount and quality of fuel should be reduced, and the flues and pipes be cleansed. Exercise and bathing, by favoring excretion and elimination, will do the latter, and rid the system of much perilous stuff accumulated during the suspension of out door exercise. As to the fuel, fish, with its food for the brain and nerves, but scanty supply for adipose and muscle, should enter largely into the spring dietary. Fruits also, of which, thanks to modern methods, there is abundant supply even now, and vegetables, too, favor the "wasting" process. The class of agents of which we wrote in our last—tea, coffee, tobacco and alcohol—which retard tissue change should be used either more sparingly or not at all; and thus the usual "bilious" and other complications of spring may be largely avoided.

## A Voice from Colorado.

MESSRS. MUNN & CO.,

Gentlemen:—I hereby acknowledge the receipt of the SCIENTIFIC AMERICAN for all of the members forming the club which I sent you, also of two copies of the Science Record, and of one copy of your splendid steel engraving, which came in good shape. All of the subscribers express entire satisfaction, and many much regret not having taken your paper years ago. Everybody should have it; lawyers, doctors, ministers, farmers, mechanics, all classes should have it, as it contains the most authenticated, useful and interesting matter published. Accept my best wishes.

Yours truly, JOHN H. PRICE.

ALL new subscriptions to the SCIENTIFIC AMERICAN will be commenced with the number issued in the week the names are received at this office, unless back numbers are ordered. All the numbers back to January 1st may be had, and subscriptions entered from that date if desired.

THE winter in the vicinity of the White Mountains was very severe. Snow to the depth of twelve feet fell, while the thermometer indicated forty degrees below zero on several occasions.