## CENTENNIAL NOTES.

### THE BELGIAN MINING APPARATUS.

A system of apparatus, devised by M. Chandron and designed for sinking the shafts in coal mines, is exhibited in Machinery Hall. The machines are of colossal size and form, the most prominent feature of the vicinity. There is a trepan weighing 15 tuns, which is made of forged iron, and fitted with cutters secured by taper keys, so as to make a cut six feet long. The trepan is raised by steam power to a hight of three feet, and dropped. It is turned at each elevation so that a circle, six feet in diameter, is cut. The advance in soft sandstone is said to be three feet per day. The trepan being withdrawn, a massive iron bucket is fitted into the hole to remove the *débris*. After the first tool has penetrated about 30 feet, a second trepan, much heavier than the first and having a central guide working in the opening made by the first, is used, and, in the stone above mentioned, it progresses at the rate of about a foot per day. A grapple for recovering broken rods, and a sweep to catch the sections of lifting bars, are also exhibited. There is, besides, a grapple for stones, etc., which is an ingeniously constructed pair of double lazy tongs arranged so that the arms extend to the sides of the hole as the device is being lowered, and scour the bottom as it is being lifted.

When the cutting is finished, circular plates are let into the opening, the bottom plates or cylinder sliding inside of a second ring, and being surrounded with a moss gasket compressed between the flanges. This keeps the water out of the bottom. The second ring is convex beneath and floats on the accumulated water. Then, as ring after ring is added, the water is allowed to escape, the rings sinking gradually. Guides prevent the casing from tilting until it is secured to hard impervious strata, when the shaft is pumped out and is then ready for use. This machinery and tubing has, already, we learn, been applied to 48 deep mining shafts in Europe.

### RUSSIAN RHODONITE.

We have already noted the magnificent display of malachite and *lapis lazuli* from Russia. With the malachite objects are two card receivers of a very peculiar red stone, the nature of which puzzles most people. It is rhodonite, the name being derived from the Greek work for "rose," in allusion to its color. Chemically it is a silicate of manganese, and it is found in iron mines in Sweden and in various parts of Russia. Professor Dana, in his "Mineralogy," states that it has been met with in various parts of New England, and mentions a large bed as existing in Maine. Diamond dust is needed to cut it, a fact which at once accounts for the price of the articles exhibited, $2,000 each, which will probably deter enterprising New Englanders from seeking the precious mineral in their own vicinity.

### RUSSIAN FURS.

Not the least interesting portion of the Russian display in the Main Building is the superb exhibit of furs, which, individually as well as collectively, are well worth studying. For example, there are some black fox skins which are so extremely rare as to be worth $300 each. No furs known are more expensive, with the single exception of the pelt of the sea otter. The color is a glossy black, usually with a silvery grizzle on the forehead and flanks. When this grizzle occurs the price falls, the pure black skins only costing such high figures. Some of the skins of Russian sable exhibited are valued as high as $125 each. This renders them, when size is considered (each skin would little more than cover a good sized rat), nearly as costly as the black fox fur. The darker the skins, the greater the value. But few such fine skins as are exhibited at the Exposition reach foreign markets, as they are monopolized by Russian royalty and nobility. It is stated that only about 25,000 sable pelts are yearly captured.

Besides these famous furs, superb skins of the ermine, squirrel, mink, fitch, seal, etc., are displayed, both in crude state and made up into robes, muffs, and garments. One robe of sable is valued at $2,000. A cloak lined with Thibet goat skin, a fine silky wool, pure white and glossy, is offered for $328. Fur rugs and carpets, almost unknown here but largely used in Russia, are also exhibited. We noticed one exquisite rug, made, we were told, of 2,400 small pieces of fur, of every kind and color arranged in tasteful designs. For the labor manifested in its execution the price asked ($250) seems small. The peculiarity of all the Russian furs is the skill shown in their dressing. Every particle of substance that can possibly be removed is scraped off the inner side of the hide, leaving the thin skin which holds the hair as soft and as fine as a kid glove. The method of preparation is also such as to render the furs moth proof, and even prolonged soaking in water has no effect on their pliability.

### THE SPANISH FIBERS.

Spain and her colonies contribute a collection of vegetable fibers, which are applied to a multiplicity of useful purposes. The well known manilla is shown, crude in ten feet lengths, and manufactured into ropes, twines, carpets, and artificial "switches" for ladies heads. The pina fiber is a beautiful production, as soft and as fine as raw silk. The filaments are not taken from the stalk or leaf, as in the flax and similar plants, but are thrown out from the center of the flower. A large case of fabrics from this material is exhibited in the Main Building. The cloth resembles silk, and is superbly embroidered. There is a curiosity in the millinery line, near the same case, in the shape of a rather gaudy lady's hat, interesting, however, because made from the "peel of the common daisy." Several other plants, notably the *banot*, *taloto*, *corteza de colias*, *de nabo*, *palma de buri*, and others, yield fibers of varying degrees of fineness, which likewise are exhibited, either suspended so as to show their greatest length or wound into skeins.

### TWO AUSTRIAN CURIOSITIES.

An opal, said to be the largest in the world and valued at $25,000, is exhibited in the Austrian section. It is an irregularly shaped flat stone, perhaps two inches in its greatest diameter, and comes from the mines in Hungary, whence some of the finest opals produced are obtained. Another curiosity in the Austrian section is a large chandelier made of hundreds of pieces of the finest amber. It is valued at $8,000.

### THE SMALLEST STEAM ENGINE IN THE WORLD.

On the platform of the Corliss engine is, perhaps, the smallest piece of steam machinery ever constructed. It is an engine made of gold, steel, and platinum, so minute that it has for its foundation a twenty-five cent gold piece, while many of its parts are so tiny that they cannot be seen without a magnifying glass. It has a regular steam gage; and though complete in every particular, the entire apparatus weighs only seven grains, the engine alone weighing but three grains. The flywheel is three fourths of an inch in diameter, the stroke is one twenty fourth of an inch, and the cut-off one sixty-fourth of an inch. The machinery, which can all be taken apart, was packed in films of silk. The constructor is Mr. Levi Taylor, of Indianola, Iowa.

### VEGETABLE TALLOW AND CINCHONA.

The leaves, fruit, and wood of the *tingkawang* tree, also the pulp, from Borneo, are exhibited in the Netherlands section. The produce of this tree is known as vegetable tallow, and is obtained from the fruit.

The tallow, carefully prepared, is used by the natives for cooking purposes. A common article, prepared with less care, is used for lamp oil, for lubricating machinery, and other purposes where fats are required. The roots of the tree are successfully applied in healing wounds, and the wood is a very good timber.

In a large case on the west side of the pavilion is exhibited an herbarium, illustrating cinchona cultivation in Java. The danger that the cinchona tree would be extirpated in South America led to an attempt at its cultivation in Java, which has been entirely successful. In 1852, cinchona plants and seeds were sent to Java, and their cultivation was commenced on a large scale. At the end of March, 1875, the government cinchona plantations contained 2,020,810 plants, of which 1,819,710 were planted in the open air and 201,100 were kept in nurseries.

There are seven plantations, having together an area of about 1,500 acres. The trees from which the bark is to be taken are cut off about eight inches from the ground and stripped of their bark, which is dried in the sun. From the base of the stems which have been cut, a number of shoots spring up, of which one or two are left, which will grow in seven or eight years to a tree that may be again cut off. The herbarium contains samples of the bark and wood, both rough and polished, showing the section both lengthwise and across the grain, the seeds and leaves of the plant and specimens of quinine, cinchonidine, quinidine, cinchonine, and a namorphous alkaloid, made from the Javanese cinchona tree.

### THE DUTCH AGRICULTURAL EXHIBIT.

In Agricultural Hall, the Dutch contributions comprise a remarkably large variety of animal and vegetable products. Among the grains we notice a prepared flour so treated as always to keep fresh in the hottest climate. It is put up in hermetically sealed cases, and has we learn, been successfully subjected to the severest tests. Yeast cakes, made from corn meal and oil pressed from corn, are likewise a novelty. There is an interesting display of beet root sugar, produced by the centrifugal process. Beekeeping is represented by a few straw hives of the ancient pattern, and a dress for apiculturists consisting of a bonnet and cape of wire cloth. A large exhibit is made of canned goods, some which, the descriptive card states, were put up in 1852 and have made several voyages to India and back, remaining in excellent condition. Cod liver, rapeseed, linseed, and other well known oils are represented by samples of much clearness and purity. Dutch flax, hand-scutched and mill-scutched, is shown, the fiber being from three and a half to four feet long. A specimen from New Zealand is almost as white and as glossy as silk fiber. Especial attention is directed to the white blossom linseed, which is exported from America to be manufactured into oil. The fiber of this flax is coarser than that of the blue blossom; but it is said to be superior in value. A very marvelous piece of work, partly the handiwork of nature and partly of art, is shown in a lattice or screen, the meshes of which are about six inches square, and formed of interlaced twigs which have grown into each other at the intersections. The lattice is about 8 feet high and 5 feet broad, and the rods are 1½ inches thick.

### TROPICAL WOODS.

Over 1,500 specimens of woods from the Philippine Islands are shown in the Spanish Government building. The specimens are about eight inches square, one side of each being polished and the other plain, and one end is shaved down in a bevel to show the grain. The bark is also left on the block. Amomg the more valuable of these woods is the narra, a reddish brown timber resembling walnut, and sometimes showing a bright red color, which variety is more highly esteemed. It is in demand for cabinet work. A large plank of this wood, which is 7½ feet wide and 11½ feet long, is on exhibition. Very many varieties are marked as valuable ship timbers. These are tough, close-grained woods, and oak and teak, the latter resembling live oak or black walnut.

In this collection of woods is shown a mahogany log from Cuba, about 25 feet long and 18 inches square. The value of this timber for veneers may be appreciated from the fact that the Commission has been offered $2,000 for this stick. Other woods from Porto Rico and Cuba are also exhibited with that from the Philippine Islands. The prices at which these woods are contracted for, cut, at the province Tayabas, as a principle producing center, are for the narra timber, 1 foot square and 30 feet long, $5 in gold, and the same for the molave timber.

In the same building is a piece of rattan 550 feet long and only 1½ inches in diameter at the butt. It is coiled up like a cable.

## RAMBLING NOTES.

NUMBER I.

### WATER WHEELS AND THEIR MAKERS.

"I saw Root last week for the first time in three months. He has a first rate mill site out on the Pappillion, and has just finished his mill. He expects to start up next week. In speaking of the wheels he had purchased, he brought forcibly to my mind a business principle well worth considering.

"He had his own prejudices regarding wheels, as every mill man has, but before ordering he sought and received my advice on the subject. I may state here that I have my prejudices on the water wheel question as well as he, and I will further state that he ordered three wheels, neither his own pets nor the ones I had recommended. When he first spoke to me about the matter, I recommended a certain wheel and at the same time gave him the addresses of all the wheel builders in the country. Last week, at the meeting mentioned, he told me his story. He had written similar letters to all the builders, stating the case and soliciting terms, financial and dynamical. He received many courteous replies and gorgeous catalogues. The respondents explicitly stated that in the last seven years they had sold such a number of wheels—had replaced such a number of So-and-So's wheels—have 200 wheels running in the State of New York alone—'a wheel of our make was placed in the mill of Mr. Sample in New Jersey, under circumstances identical with those named in your letter, and performed perfectly satisfactorily—have several wheels in your county and enclose you addresses of users who will speak for them—send you herewith names of 1,000 users of our wheels, which list speaks for itself of their merit—think three of our new forty inch wheels will suit you—call your attention to our prices—call your attention to the fact that all the wheels in use in our own county are of our make—enclose you Mr. Emerson's report of test of our wheels—advantage of turbines over overshot wheels no longer a question,' and numberless more such items. But one concern wrote as follows: "Three of our forty-two inch wheels, placed as you state, will do the work specified in your letter. Would be pleased to receive your order with that understanding." Now here is a party not afraid to say 'will,' and the banks say Y. 18. Of course the wheels were ordered from these last parties, who seemed to know something about what their wheels will do, as well as what they have done. Root says he cannot lose, even if the wheels fail. The concern furnishing them is responsible, and under the circumstances the price does not become a matter worth consideration.

'There may be a moral to Root's story worthy the attention of manufacturers of the solid order. I mean, of course, solid capital behind solid merit in the product."

### THE WASTE OF COAL BY SMOKE.

"From my office window I can see a paper mill chimney of imposing hight. Night and day for two years, that chimney has not ceased to belch out its solid volumes of smoke, solid enough apparently to hold up the chimney if the positions were reversed. That smoke must cost the mill owners a great deal of money; and a great deal of it finds its way into my office in the form of palpable soot. The fact is that this whole smoke business is an abatable nuisance and a sign of waste. Furnaces constructed especially for the economical consumption of fuel are required, on general principles, to burn the smoke. It is not found difficult to so construct a furnace as to attain this end. Smoke is composed of carbon which is visible, and hydrogen which is invisible. Had these products, when first set free in the furnace, been supplied with exactly the proper amount of oxygen, they would have turned into carbonic acid and have been consumed. The proper adjustment of the combination of these gases forms the basis of design for smoke-consuming furnaces.

"But plenty of furnaces are now in use in places where it is desirable to burn the smoke, without entirely reconstructing the furnace or going to any such expense. Many ingenious contrivances have been invented, intended to be a simple attachment to the ordinary furnace and to answer the purpose of originally designed smoke consumers. They consist generally of peculiar dampers or peculiar doors, of air holes behind the bridge wall, or of some arrangement of steam jets in the furnace. The behavior of some of these affairs is remarkable. Some fail entirely, some succeed perfectly, while some burn the smoke, but at great expense.

"Any ordinary coal-burning boiler furnace may be made to consume nineteen twentieths of its smoke, and to effect some slight saving in fuel, without any alteration, and without a penny expense, by proceeding as follows: First,