Mechanics—(*Continued.*)

UTILIZATION OF STEEL SCRAP.—The rapid development of the use of steel for shipbuilding in Scotland, has brought out an interesting question in regard to the utilization of the large amount of steel scrap which the shipyards now find accumulating on their hands. It appears that the shipbuilders were much dissatisfied with the low rates paid them by the Steel Company of Scotland, the chief producer of steel and only user of scrap who were not willing to take it back at less than scrap iron. The question is now solved, it seems. A Coatbridge ironmaster found that he could work it up into rods almost as easily as scrap iron, but his experience showed him that it required a much higher heat to weld the pieces into a solid billet. In testing the rods it was found that, while the average of the bars made by the Steel Company of Scotland stood a tensile strain of 28.3 tons per square inch, the rods made from the steel scrap only bore a strain of 26.6 tons per square inch, with an equal extension of 20 p.c. The bars made from the steel scrap have not been tested for their shearing strain; but it is thought that they would stand better than the Steel Company's bars. The great advantage in the scrap steel is its price, as it can be produced at about £2 per ton less than steel bars direct from the steel makers. As Lloyd's and the Board of Trade only required steel to stand a tensile strain of from 24 to 26 tons per square inch, welding up and working the scrap steel into bars will, it is thought, prove a decided success.

REFRACTORY BRICKS AND FURNACE LININGS.—A new material for basic linings and bricks has been recently made by S. G. Thomas, of Battersea Park, England. He mixes lime with liquid tar, so as to moisten it and render it somewhat plastic. When the silica and alumina are low a little oxide of iron may be mixed with the lime before adding the tar, the oxide of iron acting as a binding material. He uses these mixtures either to ram the interior of converters or other iron and steel furnaces, particularly their bottoms, or to make it into bricks and tuyeres under very great pressure. The bricks he prefers to fire at an intense and prolonged heat. He also uses this mixture when made rather liquid as a cement for calcareous bricks; crude creosote may be substitututed for tar when it is readily obtainable. He also uses a mixture of very highly fired hard shrunk lime made from the silico aluminous magnesian limestones (such as described in a former specification) with crude petroleum or similar cheap oils as a material to use for rammed linings, particularly bottoms and hearths, and also to make bricks of. In all cases when using this mixture of petroleum and highly fired shrunk lime he exposes the linings and bricks (after the linings are in position or the bricks made) to a further very intense and prolonged firing. This mixture also may be used as a cement for basic bricks.

HINTS CONCERNING SAWS.—A saw just large enough to cut through a board will require less power than a saw larger, the number of teeth, speed and thickness being equal in each. The more teeth, the more power, provided the thickness, speed and feed are equal. There is, however, a limit, or a point where a few teeth will not answer the place of a large number. The thinner the saw, the more teeth will be required to carry an equal amount of feed to each revolution of the saw, but always at the expense of power. When bench saws are used, and the sawing is done by a gauge, the lumber is often inclined to clatter and raise up the back of the saw, when pushed hard. The reason is that the back half of the saw, having an upward motion, has a tendency to lift and raise the piece being sawn, especially when it springs and pinches on the saw, or crowds between the saw and the gauge, while the cut at the front of the saw has the opposite tendency of holding that part of the piece down. The hook or pitch of a saw-tooth should be on a line from one-quarter to one-fifth the diameter of the saw; a one-quarter pitch is mostly used for hard, and a one-fifth for softer timber. For very fine-toothed saws designed for heavy work, such as sawing shingles, etc., even from soft wood, one-quarter pitch is best.

A SCHOOL OF MECHANICAL HANDIWORK.—Following the excellent example of the Worcester Free Institute, and in obedience to a long-felt want for such a school, the managers of the Spring Garden Institute, of Philadelphia, have decided upon the establishment in connection with this institution, of a school where apprentices and amateurs may acquaint themselves practically, with the use of tools for working wood and metal, and, at the same time, acquire a knowledge of mechanical principles. This branch of the Institute is now ready to go into operation, and a circular has been issued announcing that the managers are ready to receive applicants for admission. The pupils, we learn, will be furnished by the Institute with work-benches and the tools and materials required for practice. There will be conversational lectures on the nature of properties and materials, and practice shops, in charge of experienced workmen as instructors, fitted with improved appliances, where the learner will be taught the right mode of holding, using, and caring for tools, etc. The practical instruction will include, in wood-work, carpentry, and joining, wood-turning, and cabinet and pattern-making; and, in iron-work, forging, foundry-work, and machine-tool work. This is the plan of the school, and the managers expect to gradually develop it fully up to this pattern as rapidly as the number and requirements of its pupils demand. The design of the school is most admirable, and it is sincerely to be hoped that it may really become what the managers announce their design to make it.

SLAG BOILER COVERING.—Mr. Franz Buttgenbach, the well-known metallurgist, gives the following method for the utilization of blast furnace cinder as an insulator for steam pipes, etc.: Mix 150 parts of cinder dust, 35 parts by weight of fine coal dust 250 parts of fire clay, and 300 parts of flue dust, with 10 parts of cow's hair, add 600 parts of water into which 10 to 15 parts of raw sulphuric acid has been poured, and make a stiff dough of the whole. This is thrown in small amounts upon the warmed pipe, hardening rapidly. Upon this rough coat, a second, third, etc., is laid accordingto the thickness which is to be used. By the action of sulphuric acid gypsum is formed, and the silica, rendered free, hardens. The mass becomes as hard as porcelain, and is still porous. It adheres firmly, and never cracks. Mr. Buttgenbach states that he has tested its merits by ten years' use, and has found it to meet all requirements.

THE STRENGTH OF WHEELS.—"I wonder," said a veteran wheelwright, the other day, "how many who see slender wheels flying over the road stones, or a massive wheel slowly drawing a mass of iron or stone along the cobble stones, ever pause to think what a perfect piece of mechanism a wheel must be to stand such continuous wear and tear. Every spoke must have a perfect bearing, both at the hub and on the felloe, lie exactly on the same plane as the others, and be of equally well-seasoned timber. The felloes must be of equally good fit at the joints and upon the spokes. They must form at the circumference a perfect circle, and be strong enough for their duty without being too heavy. I tell you that a ton weight continually thumping at a wheel will soon flatten out the weak spots, and bad-fitting and insufficiently-seasoned timber will soon give a loose tire, boys."

SOMETHING NEW IN BOILER MAKING.—We learn from English journals that a few weeks ago a number of engineers visited the Park View steel works, Owlerton, near Sheffield, for the purpose of seeing Mr. George Whitehead's new process for producing weldless and seamless steel and iron boilers. A ring of steel is cast and heated. Then it is placed upon a large roller, and by the aid of smaller rollers it is enlarged to the requisite dimensions. The ring is run from one end of the roller to the other, and is returned by a reversing of the machinery. The other portions necessary for the completion of the boiler are subsequently put on with bolts. Mr. Whitehead states that boilers constructed on this process will stand twice the pressure of those made of riveted plates.

TO PROTECT IRON FROM RUST.—Iron can be protected from rust and made very pleasing in color by a method invented by Mr. Dode. He coats the surface with a thin film of borate of lead, in which some oxide of copper has been dissolved, and some scales of platinum held in suspension, by means of a brush or bath. He then heats the composition until it is diffused. The result is a thin, glassy coating, which will withstand the action of sewer gases, dilute acids or alkalies, and the heat of the kitchen fire. If all be true that is said of this "platinized iron," as it is called, it will find numerous applications.—*Rev. of Sci. and Ind.*

A BRILLIANT PURPLE FOR SHOW BOTTLES.—Sulphate of copper, two drachms; water, two ounces; French gelatine, one drachm; boiling water, two ounces; solution of potassa, two pints. Dissolve the copper salt in the water, and the gelatine in the boiling water. Mix the two solutions and add the liquor of potassa. Shake the mixture a few times during ten hours; after which decant and dilute with water.

ENGLISH manufacturers, it is said, have succeeded in producing a new cloth from the hair of the vicuna or South American lama. The cloth is called camelina vicuna. It is made in all the new colors, and also in ivory, but the latter hue is different from all other white goods, in consequence of the introduction of the black hairs that appear in vicuna wool.