SCIENTIFIC AND INDUSTRIAL.

At one of the locomotive manufacturing establishments in Philadelphia—the shops covering an area of 337 by 156 feet—there are in operation two immense travelling cranes worked by electricity, being the largest pair of cranes in the world, but one crane, that in the gun works at the arsenal in Washington, excelling either of these in power. Each of the cranes is of twenty-eight feet span, and fitted with two trolleys capable respectively of lifting fifty tons, thus giving to each crane a power of 100 tons; the electric power is furnished by two 100-horse power generators, driven by Westinghouse compound engines. The shops turn out an average of 500 locomotives a year, and two men, by means of these cranes, can handle the entire output, the adjustment of the cranes being such that they can be raised or lowered at will so short a distance as a half an inch, and they can lift one engine completely over another. In the boiler and electric houses there are four smaller cranes, stationary, with a capacity of 6,000 pounds each, possessing the same character as to nice adjustment and ready response to the touch of wheel or lever as the more elaborate ones. This arrangement of wheels is simple—the lowest lowers, the highest lifts, and the central fixes.

A paper on the superior value of cork coverings for steam pipes and as a protection of water service pipes from frost has recently been published by a French engineer. According to this paper, one variety of these coverings which is found to be very efficient consists of pieces of cork, shaped to fit the different sizes of pipes, with radial joints, similar to the staves of a barrel, which are placed around the pipe and for the time bound to the pipe by strings. After the pipe so covered has been used with steam for some time and the cork been sufficiently dried, the crevices are filled in and the string replaced by wire—elbows being also covered in the same manner—and after the covering is finally fixed, the pores and crevices are closed by a coat of paint or lime wash. In another arrangement, as proposed, rectangular blocks of cork, about one and a fourth inch wide, and varying in thickness from one-fourth of an inch for small pipes to five-eighths of an inch for pipes from four inches in diameter and upward, and cemented to strips of cloth by an India rubber solution, are used; the bands are lapped spirally around the pipes and elbows, and covered by another band of waterproofed canvas lapped in the same manner, so as to cover the joints of the cork bands, the whole being afterward covered by a thick coating of paint or tar.

The assertion is made by workers in ornamental wood that yellow pine, hard finished in oils, is the rival in beauty of appearance of any wood that grows, not excepting the costliest of the well-known hard species, it being susceptible of receiving and maintaining as high a degree of polish as any known wood, while, when impregnated with oil, it is well nigh indestructible. In such a condition it is found, in fact, to possess the valuable property of being impervious even to hot grease and other substance that leave an ineffaceable stain upon such a great variety of woods, including white pine, maple, &c. The yellow pine characterized by the valuable quality referred to is the long-leaf pine, or *pinus australis* in technical classification, and which grows so abundantly in parts of the South; and, as trees are found in this species having a curled grain somewhat similar to that of "curly maple," no other wood it is asserted, is capable of being fashioned into more beautiful work for cabinet purposes.

A short time ago a boiler was constructed in Manchester, Eng., with a view to testing the practice advised by some, in case of shortness of water being discovered, of turning on the feed water—a somewhat startling method of procedure according to some. In these tests the furnaces were bared of water by opening the blowoff cock and allowing the water to escape while good bright fires were burning, which could not fail to overheat the plates. When sufficiently heated to melt disks of lead, tin, and zinc, the feed was suddenly turned on through special pipes, which injected the water directly on to the heated plates, but in no case, as is often assumed, was this followed by a sudden generation of steam at an excessive pressure, but in one case actually a reduction of pressure took place. The one mishap which took place proved, it seems, to have been due to the feed not having been turned on soon enough. Again, the bogging upward of the flue tubes, which was accurately ascertained by means of rods, was in some cases found to be as much as one-half inch. The inadvisability of hurrying fires when raising steam was demonstrated as beyond question.

A machine for cutting shingles has been devised. As described, the cedar bolts are steamed five hours, then run through a trimmer, after which they go to the cutting knife, a heavy knife running 170 strokes a minute, the shingles being cut off with ease at this rate, coming from the machine almost too rapidly, in fact, to be counted. They are hot and steaming and cut smooth, and are afterward treated the same as other shingles. It is claimed that the steaming drives out all sap and prevents all liability of warpings, there is also no sawdust, hence no waste. The highest cut made in a ten hours' run is stated at ninety-six thousand.

Several of the most prominent manufacturers of iron in Sheffield, Eng., have been endeavoring to ascertain definitely whether, after all, oil hardening and annealing, or some such process, is really necessary for steel plates, the result of the trials thus far made showing that, in respect to compound armor, the necessity is obvious. A nine-inch plate of steel was for this purpose manufactured and cut into two plates, each four feet square, one piece being left untreated and the other oil hardened and annealed. These were fired at by a six-inch gun with Firth steel projectiles weighing 100 pounds, the striking energy of the blow upon the untreated plate being 2,389-foot tons, and the energy of the blow upon that which had been treated was 2,378-foot tons. In the latter case the projectile made an indentation of ten and one-half inches, so that light was just visible through the centre of the bulge at the back of the plate; the projectile rebounded, breaking into three pieces, and the plate, though cracked through, was whole, nor was any material splintered out either at the back or front. In the case of the non-treated plate, the shot passed through, and the splintering of the steel around the hole in front of the plate spread over a space of fifteen inches across. The splintering around the hole at the back of the plate covered a space of thirty-three inches across, and the plate went into six pieces.

French ingenuity has contrived a remedy for the inefficiency of ordinary combination locks for houses and apartments, these contrivances being usually of so little avail against professionals who, wasting no time in efforts to raise the tumblers and move the bolt, simply insert the end of a short iron lever, or "jimmy," between the door and its rabbet, forcing the whole affair inward, tearing out both locks and bolts on the wya. According to the new device for meeting this difficulty a combination is resorted to of the iron shore with the ordinary lock in such a manner that locking the door sets a shore in place which will resist an enormous strain, but on the return of the proprietor the unlocking of the door in the usual way shifts the upper end of the shore from the door to the frame, where it presents no obstacle to the opening of the door. The mechanism of the lock itself need not be very elaborate, although the picking of the lock would move both the bolt and the shore, for if there are tumblers enough to prevent picking with a bit of wire, and if the jimmy is insufficient for the purpose, the point of security is attained.

In silvering iron a recent process introduced in Austrian workshops consists in plunging the iron article into hot dilute hydrochloric acid, whence it is removed to a solution of mercury nitrate and connected with the zinc pole of a Bunsen element, gas carbon or platinum serving as the other pole. It is rapidly covered with a layer of quicksilver, when it is removed, washed, and transferred to a silver bath and silvered. By heating to 300° cent., the mercury is driven off, and the silver firmly fixed on the iron. To save silver the wire may be first covered with a layer of tin, one part of cream of tartar being dissolved in eight parts of boiling water, and one or more tin anodes joined with the carbon pole of a Bunsen element. The zinc pole communicates with a well-cleaned piece of copper, and the battery made to act until enough tin has deposited on the copper, when this is taken out and the ironware put in its place. The wire thus treated is much cheaper than any other silvered metals.

From a number of careful tests lately made to ascertain the precise strength of anchor bolts set in Portland cement in the ordinary way, the fact appeared that the joint was really stronger than a stone. In this demonstration, two-inch iron rods were set into the stones some eleven and one-half inches, and then subjected to the test. The first rod had a screw thread to improve the grip of the cement, and the cement began to yield at a load of 32,000 pounds, the breaking of the stone taking place at 50,000 pounds. With a plain, smooth rod, it was found that the cement began to yield at a load of 34,000 pounds, but the rock broke at 67,000 pounds. Thus, though the strength of the cement joint was not developed, it was inferred that, in a suitable setting, the cement joint on a smooth rod might be made to break the rod.

A short time ago, the French Government caused to be instituted a series of tests of gun steel at a low temperature, that is from 75° to 100° below zero Fahr., part of the bars being hardened and part unhardened, and the breaking load was increased by the cooling—3 per cent, in the instance of the unhardened bars and 6 per cent, in the case of the hardened ones. It seems that in a shock such as a gun would be subjected to the unhardened bars—cooled—broke on an average with 5.9 blows, against 14.9 blows under ordinary conditions. With the hardened bars the difference was less, 12,57 blows being required for the cold bars, against 14.4 at the normal temperature. The various bars employed in these tests, both hardened and unhardened had their elastic limit raised eleven per cent, by the cold, and their elongation was diminished twelve to fourteen per cent.

Very satisfactory results are now being obtained by some of the English paper manufacturers in bleaching paper by electricity, the process rendering the paper perfectly white, without in the least injuring its strength. This process in question depends on the use of a solution of magnesium chloride, which is decomposed by the action of a strong electric current into chlorine and oxygen on the one hand, and into magnesium and hydrogen on the other. Plates of platinum are used as electrodes.

Machines for opening and cleaning cotton have recently been improved by an automatic feeding apparatus, applied to the feed apron, and by means of which one man can tend two machines when being fed with raw or bail cotton easier than he could heretofore tend one. A large amount of seeds and leaf is extracted by this device.

Experiments lately made in Hartford, Conn., show that light can be seen throug a clean cut opening of not more than one forthousandth of an inch. This fact was determined by taking two thoroughly clean straight edges, placing a piece of paper between the surfaces at one end the opposite end being allowed to come together. The straight edges being placed between the eye and a strong light in a dark room, a wedge of light was perceived from the ends between which the paper was placed and the opposite, which were brought together. The thickness of the paper being known, the distance a part at the two edges of the small end of the wedge of light was easily calculated, and the result was shown as above.

Watkins' Eiffel Tower.

Sir Edward Watkin's project of an "Eiffel" Tower for London has assumed substantial form. An estate of 280 acres has been purchased, a company formed without application to the public, a plan has been approved, a station erected on the contiguous railway, the foundations of "The Tower" have been commenced, and on Saturday a large party of representatives of the press were conveyed from Baker-st. to Wembley Park in twelve minutes to see what was going on. The ground acquired is undulating and woody. The estate is nearly divided between the building property and the ornamental park, with its "Tower" and Winter Garden. A fine lake of over five acres is being formed by the aid of the Upper Brent River, which will be pleasant for boating in summer and the scene of curling, rinking and skating in winter. The tower will stand on the highest eminence in the park, from which, at present, pretty views are to be seen extending some miles beyond the immediate surroundings. The design of Mr. Stewart, one of the competitors for the prize awards, has been adopted as the basis of the plan, and Sir Benjamin Baker has been associated with him in the construction. The tower will be mainly supported on four large concrete blocks, in dimensions 26 feet long by 20 feet bread, and 25 feet deep. The excavation for one of these blocks is nearly completed, the geological formation of the hill being stiff clay. The elevation of the site is about 140 feet higher than the site of the Paris tower, and the ironwork of the Wembley tower will be 1,000 feet. As this will stand on a sort of pedestal portion of 150 feet, the total height will be 1,150 feet, or 350 feet above the Paris example. The roads and ornamental grounds are being prettily laid out by Mr. Miller, and there is undoubtedly an attractive settlement being formed which if it can be always reached with the promptitude of Saturday's journey, should prove a popular place of resort as well as residence.

The Practical Side.

Many farmers have a great deal to say about advice being *practical*. Call their attention to something in an agricultural journal which, may be, you think is of real value, and often they will turn up their noses at it and say "It isn't practical." In consequence of so much use being made of this word one would naturally think that the general average of farmers are among the most practical men in the world. On the contrary, we believe, measured by good business standards, that no calling furnishes more unpractical men than farming.

Practical means doing things in the best manner and according to the best profit. To be "practical" calls for the putting in *practice* of sound theories and the use of the most intelligent methods. Is the practice of our Western farmers in wasting the fertility of the soil or in the breeding of their farm animals really and squarely practical?

Take the dairy farmers of any section of the country. Can we believe that the majority of them are governed by sound practical ideas concerning cows when the average yield of milk per cow is only 3,000 pounds a year? If a man is really practical will he not set to work in dead earnest to milk and feed a practical cow? Can men be called practical who have kept a herd of twenty or forty cows for years and yet have never taken pains to know by a simple test which cows were not paying their keep? Would a practical manufacturer allow himself to remain in very expensive ignorance for years concerning some machine, and never show energy sufficient to test it to see if it is not running him in debt? Think of a dairy farmer who pretends to do business for profit; who sneers at the agricultural papers because they are not practical, going along year after year with half the cows in his herd absolutely not paying for the food they eat at market prices. Men who talk so much about other men being practical should first establish clear, well defined standards of what is practical.

The fact is, what is practical with one man may not be with another.

M. Henri Lecomte, the director of the Meteorological School of Aerostation at Paris, proposes to endeavour to cross Africa by balloon, starting from Mozambique. The balloon is to be furnished with a special apparatus for making hydrogen gas during the night time, is to carry provisions for 100 days, and have a capacity of 10,000 cubic metres. Many experienced aeronauts have expressed their opinion that the attempt is a rash one and the aim is quite impracticable. But nearly all advances in means of travelling have from the days of Stephenson been so spoken of.