The Scientific American.

MUNN & COMPANY, Editors and Proprietors.

PUBLISHED WEEKLY

At No. 37 Park Row (Park Building), New York.

O. D. MUNN, S. H. WALES, A. E. BEACH.

TERMS—Three Dollars per annum—One Dollar in advance, for our months.
Single copies of the paper are on sale at the office of publication, and at all periodical stores in the United States and Canada.
Sampson Low, Son & Co., the American Booksellers, No. 47 Ludgate Hill, London, England, are the British Agents to receive subscriptions for the SCIENTIFIC AMERICAN.
☞ See Prospectus on last page. No traveling agents employed.

VOL. IX, NO. 13...[NEW SERIES.].....*Nineteenth Year.*

NEW YORK, SATURDAY, SEPTEMBER 26, 1863,

IRON FOR MOLDING.

In founderies where the castings are made of pig-iron, the qualities of which are well known, the task of managing the cupola or melting furnace, and running the metal, is comparatively easy. But in founderies where cheap castings are produced and a variety of work manufactured, the management of the melting furnace is more difficult, and much practical skill is necessary to mix and heat the iron. In such founderies large quantities of cheap fusible scrap-iron, in the form of old pots, grate bars, retorts, &c., &c., are necessarily used. The qualities of such iron differ greatly. Some scraps are hard, others soft, and most of them contain much oxide and impurities. Old gas retorts are almost as difficult to fuse as wrought iron, and they generally require to be mixed with some iron that melts easily and flows freely. Some kinds of scrap-iron require a flux to unite with the oxide and impurities. Oyster shells are usually employed for this purpose. They are chiefly composed of lime, and by uniting with the impurities they form a black slag, which floats upon the surface of the molten metal, and has to be removed by an iron rod, which is stirred into the ladle, the slag adhering to it like glass to the iron rod of a glass-blower. A very intense heat is also required to fuse certain kinds of scrap-iron, and much care must be exercised in selecting coal of the proper quality for this purpose. The graphine or hard carbon which forms in the interior of iron gas retorts, is the best known substance from which to obtain an enduring heat of high intensity in a cupola. For melting some fractions kinds of scrap-iron, some molders would give double the price for a tun of graphine that they would for the same weight of anthracite. This substance has now ceased to be used, because it has ceased to be made, owing to the general substitution of clay for iron retorts. A suitable substitute for it would be a great benefit to many foundery establishments. Old scrap-iron is more commonly employed in some founderies in the vicinity of cities, because it can be obtained in large quantities in such situations. We received a communication lately from the proprietor of a foundery in a country village, who stated he had been unable to use scrap burnt iron, such as furnace bars, &c. Old furnace bars of locomotives are much prized by some of the molders in the city, as they are generally made of good iron, and are not so much burnt as other grate bars. Burnt iron, as it is called, is difficult to melt; it requires a flux of oyster shells or lime, and an intense heat in the cupola. For fine castings, scrap-iron cannot be used with safety, unless the scraps are of uniform quality and their character well known. An experienced molder is competent to form a very accurate opinion of the nature of iron, from an examination of its grain, but the most skilful admit that there are so many different kinds of iron, they are frequently puzzled, and make mistakes as to their fusibility and capacity of flowing into molds.

THE CIGAR STEAMER—STEAM RAMS.

Upon the subject of the best defences for the nation, the Philadelphia *Ledger* says:—

"An inventor in the SCIENTIFIC AMERICAN, proposes a cordon of revolving iron-clad towers for harbor defense, placed so near each other that as soon as a vessel gets out of the range of the guns of one it will be in that of another. This plan, or floating batteries arranged in the same way, seems to be a better security for harbors than stone forts. But a better security than all would be swift-steaming, powerful rams, constructed on the plan of the Winan's steamer, cigar-shaped, the best for strength and speed. A whole fleet of attacking vessels could be destroyed by one such ship. It is singular that the Government has never given sufficient attention to the peculiar construction of this vessel; but we suppose it is only another instance of how hard it is to introduce a principle which revolutionizes established systems, and requires a change in fixed habits and old ideas."

So far as we have been able to ascertain, the Winan's cigar-shaped steamer, which was illustrated and described on page 65, Vol. XIV (old series) of the SCIENTIFIC AMERICAN, was a failure, as predicted in an article on page 109, same volume. The form of the cigar is not the best for a common steamer, and is very objectionable for a steam ram. In this connection we cannot forbear stating that the great projecting iron wedges, called horns, which have been secured to the bows of several armor-clad vessels, to act as rams, appear to be objectionable. In striking with a slanting blow they will either be bent or broken, or if one strikes square and enters the side of an armor vessel, it will stick fast and fill up the breach. Steam rams should be constructed with straight vertical stems of great strength, for the purpose chiefly of crushing in the sides of an enemy. They should have a speed which can only be secured by great steam power. Steam rams of moderate size can be turned with greater facility than very large vessels, either to strike or avoid being struck by a huge opponent.

COAL-MINING MACHINES WANTED—INVENTORS TAKE NOTICE.

The extraordinary price which is demanded for coal directly affects the interests of every person. That the rates at which it is held are not warranted by the ordinary standards of value is quite apparent, and there can be no reason for the extortion other than the monopoly enjoyed by the miners, or the avarice of those who control the market. Whatever the nature of the obstacle to cheap fuel, or the obtaining coal at prices correspondent to those demanded for the other necessaries of life, there is no question but that the door for another invention is here open, and that he who produces a successful coal-mining machine will reap a splendid reward for his talent. We have before us at this writing a letter from a firm in Pittsburg, Pa., which says:—

"You will be doing our city and its neighborhood a very special favor, if you will call the attention of inventors to the necessity now existing, and daily becoming more imperative, for some kind of an engine for digging coal. It is an inviting field, and fortune most surely awaits a successful effort. The coal-diggers are now charging 4 cents per bushel, and are threatening to turn out for 5 and even for 6. At 2 cents, a skilful digger could make $4 per day.

"Prevail upon some of the ten thousand ingenious and benevolent men with whom you are hourly brought into contact, to come to our relief, if you can."

Coal-mining machines are, or have been, used in England with success, and so great is the interest with which this subject is regarded here, by those concerned in coal mines, that one gentleman who came to this office quite recently inquiring for a machine of the kind in question, was obliged to leave unsatisfied, and he is now in England endeavoring to obtain suitable apparatus. This country should rely upon itself for mechanical assistance in all arts and manufactures, and we feel confident that when the fertile brains of our inventors set to work upon the task, there will be no lack of coal-mining machinery. The practical nature of the requirements of such machines are well-known to many ingenious men, and if those who are directly interested will send forward the chief points desirable, whether heavy or light, to strike rapidly or slow, portable or permanent, to be driven by steam or by air compressed by steam, whether with drills or picks, &c., we will lay them before the inventors of the country without delay. When the machines are in operation we should have cheap fuel, because it can be purchased independent of strikes, scarcity of labor, drafts, and kindred complaints held *in terrorem* over the heads of the public, to make them believe coal is worth in this city from $7 50 to $8 50 per tun in summer, and a corresponding advance as the distance from the mines increases.

GREAT ELECTRIC ILLUMINATION.

The last number of the *American Journal of Science and Art* contains a communication from Professor W. B. Rogers, giving an account of his observations on the vast power of the electric light exhibited by Mr. Ritchie on the 6th of August (Thanksgiving) in Boston. The battery used on the occasion contained 250 of Bunsen elements, each an acting zinc surface of about 85 inches, grouped in battalions of fifty. It was arranged in the dome of the State House, with a photometric apparatus. As a standard of comparison with the electric light, a flame of kerosene was cast upon a photometric screen, equal to 200 sperm candles. By a series of observations the carbon points illuminated by the electric current were found to have a force varying from 52 to 61 times greater than the kerosene lamp with its reflector, thus making its illuminating power equivalent to from 10,000 to 12,200 standard sperm candles, pouring their light from the same distance upon the surface of the screen. This was the effect of the electric light sending its rays equally in all directions upon the luminous center, and was vastly short of the collected rays which stretched like the tail of a comet from the surface of the great reflector. Professor Rogers says:—"Judging from some recent experiments on the power of such a reflector to augment the intensity of the light emanating from its focus, there can be no doubt that along the axes of the cone, when brought to its narrowest limits, the illuminating force of the carbon light as displayed on the State House, could be rivalled only by that of several millions of candles shining unitedly along the same line." The only previous experiment of precisely the same kind was made by Bunsen with 48 elements, and the photometric equivalent of his carbon light was but 572 candles or 12 candles to the cell.

INCOMPREHENSIBLE FOLLY.

There is no folly more to be reprehended than the practice of trifling with machinery. We have seen grown men standing near gearing in rapid motion, place their fingers on the teeth and pull them off again just as they were about to be drawn in. We have also seen boys take hold of belts that were thrown off the lower pulleys still running loosely on the upper ones, and ride up to the ceiling, or as near it as they could. We have been witness to other acts of so-called smartness, such as putting a hand under a trip hammer and snatching it away again before it was harmed, which called forth no feeling but one of amazement that individuals should so recklessly imperil their lives and limbs. Don't try to play with machinery; either in motion or when at rest. Forty hair-breadth escapes may result at the forty-first trial in maiming, mutilation or sudden death. Keep the fingers, hands, arms, legs and hair away from rough shafting, and take care that clothing does not get drawn into rapidly-running belts and pulleys. Quite recently a young girl was instantly killed at the India Rubber Works in Newark, N. J. She had been at work during the evening, and after putting on her bonnet to go home, jestingly remarked that she would have a ride upon a shaft which projected about a foot through the floor, if it broke every bone in her body. The shaft was midway between two upright posts about three feet apart, and was turning round quite slowly. She sat upon it, but her hoops becoming entangled she was dashed against the posts, and before she could be rescued, was killed, nearly every bone in her body having been broken.

Men have lost their lives, ere now, while working at turning lathes, by the loose ends of their cravats licking around a roughly-turned shaft; thereby strangling them before aid could be rendered. In many factories huge belts run through openings in the floors, without the slightest protection to prevent a person's feet from being drawn in; and in the large machine shops in this city, there are back gears of huge lathes, revolving at about arm-hight, in the very place of all others where a careless step

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