THE MONITOR TERROR.

The vessel illustrated in the present issue is the successor of one of the monitors of the civil war. While she is really a new ship, she was started under the law authorizing the repair of the old Terror. In 1872–73 operations were commenced, and were interrupted to such an extent that it is only at the present day that she approaches completion. As will be seen by examining the illustrations, she is a double-turreted monitor, armed with four guns in the turrets. She is 261 feet long over all; between perpendiculars she is 250 feet long. She is 52 feet 6 inches wide and 17 feet deep. Of this depth 2½ feet are freeboard, or above water. Her sides are protected by a 6 foot belt of armor, 7 inches thick. This armor, therefore, extends 3½ feet below water. The deck has a slight crowning, amounting to 8 inches, and is of 1¾ inch iron. It is not in any sense deflective.

Up to this point most of the vessel is of iron. The turrets are to be of steel. For most of their circumference they are 10½ inches thick, but for a short space on each side of the guns they are one inch thicker.

The conning and sighting tower for use in action is on top of the turrets and is 4 feet wide and 2 feet high inside. Its sides are 12 inches thick. The guns are directed by sights upon the turret, the artillerist not seeing the piece whose firing he is directing. Each turret contains two 10 inch breech-loading rifles.

Hydraulic lifting apparatus is provided, to raise the shell and powder from the hold, and to force it into the breeches of the guns. The powder is contained in two cases, to avoid too great a length, on account of the limited room.

The guns are strapped fast to the carriages, and for loading the breech of the gun, carriage and all are swung downward. This operation is also executed by hydraulic power.

The turrets are of the English type. They rest on coned rollers, and are rotated each one by two Brotherhood engines, which rotate with them. All around the turrets an annular space, 4 inches wide, is left between them and the decks. This is closed by a heavy sheet of India rubber, so as not to interfere with the movements of the turrets.

The smoke stack and ventilating shaft are both armored with 9 inch plating for 6 feet above the deck.

She is propelled by twin screws, driven by Whiting patent engines of 1,500 horse power. She is of 3,800 tons measurement, so a rather low speed will be attained.

The hull was built at Cramp's ship yards, Philadelphia. It now lies at the Brooklyn Navy Yard, awaiting completion. Work is rapidly progressing, and it will soon be ready for service.

The guns, projecting for nearly half their length from the turrets, seem to offer a weak point, but they form after all a small target. In the old monitors, using the short guns of the period, they were entirely housed within the turrets.

New York Passenger Traffic.

The New York *Sun* has recently collected some statistics of the passenger traffic in and about New York. It is found that 1,672 regular passenger trains leave the stations of New York, Brooklyn, and Jersey City every 24 hours. The Long Island road's summer service runs on its various lines 577 trains daily. The next largest business is done in the depot of the Erie in Jersey City, where 288 trains daily enter and leave, and there are 216 in and out of the Grand Central depot, and 204 in and out of the Pennsylvania depot. Between 7,000 and 8,000 cars are employed daily in this traffic, and it is said that the number of people who entered and left the city by rail during the year ending May 1, 1888, was 40,188,000. Of this number the Long Island road carried about 8,000,000, the Pennsylvania 6,367,000, and the passengers entering and leaving the Grand Central depot in the same year were 8,881,000. The daily average of passengers in and out is 110,000. It is said that the Long Island road carried 98,000 people to Coney Island on the 4th of July. The busiest moment in the evening is at 5.40 o'clock. At that instant ten trains simultaneously leave the various stations. In the fifteen minutes between 5.30 and 5.45 fifty trains in all go out. The busiest single hour is from 5 to 6 P. M. The busiest moment in the morning is 8.45 o'clock, when nine trains enter the stations simultaneously.

The Black Walnut.

Daniel B. Emerson, Beloit, Wis., has given his experience in black walnut culture. He prefers shallow planting, seven feet apart each way, if planted in a field, or sixteen feet apart if planted around fences, as wire fences can be attached to the trunks without injury. Under favorable circumstances, the trees begin to bear in about seven years. One bushel contains from 400 to 600 nuts, or fifteen pounds of kernels, which will yield seven and one-half pounds of oil. He has trees fifteen years old which are thirty feet high and a foot through at the base. They yield ten bushels of nuts each annually, worth $4. The leaves and the husks, when boiled, furnish a liquid which will kill worms and insects on lawns, without injuring the grass.—*Lumberman.*

Correspondence.

The "White Ring" Black Snakes.

To the Editor of the Scientific American:

In the article on the black snake in your issue of the 6th Oct., and in the comment on it in the issue of the 27th Oct., there may possibly be a misunderstanding of terms. The first article referred to a *racer* with a white ring around its neck, and so far as I know was correct. The second gentleman is surely correct in his statement, and in his belief that there are large black snakes with white rings. I have caught three of the kind he describes, and they certainly belong to the black snake family. Their intensely black skin makes the white ring very prominent. These I captured in West Virginia, so they are not confined to any one locality. However, I doubt if this variety ever attains any considerable size. While traveling in Ohio in 1882, I caught a black snake over five feet in length, and he also had the ring around his neck, the only perceptible difference being in the color, this one approaching yellow. He was the most fearless snake ever I met. He allowed me to go on all sides of him, only moving enough to watch me closely. If this class is not generally known to naturalists, a specimen could easily be procured in Lancaster County, Ohio, for, as I was informed, they are rather common there. In regard to snakes chasing people, I am satisfied there is much exaggeration, but I know such a thing has happened. I am personally acquainted with a lady whose veracity cannot be doubted, and who is not so excitable as to see a snake where there is none, who was chased by a racer black snake for more than a hundred yards, in fact into her yard. At this point he turned and fairly darted away. Of course he could have caught her easily, but he did not. His motive, if it may be called by that name, must for the present be mere conjecture, but the fact remains, and his wanting her for food or not does not change it in the least. I have seen a colt chase a calf, and have no idea that it meant to eat the calf. It is believed by some of our best, or at least most popular, naturalists that a snake has a very low degree of intelligence. He can easily be trained to perform acts not natural to him, and it seems to me that in chasing a person his motive may be very similar to that which in higher creatures is called sport.

W. A. HARSHBARGER.

Franklin, Neb.

The Manufacture of Large Bells.

It may not be generally known, says a writer in *Stoves and Hardware*, that there are only five concerns in the United States engaged in the manufacture of church, school, and chime bells, and that the Hy. Stuckstede Bell Foundry Company, St. Louis, claims to be the largest of the five. In fact, it is not an industry that calls for many factories, as a well made bell will last almost forever, and hence but little has ever been said about them in public print. Nevertheless, the process of manufacture is one full of interest, and worthy of more than passing notice.

A visitor to a bell foundry where nothing but large bells are manufactured experiences peculiar, if not weird, sensations. Not many workmen are employed, and as they move around, with apparently noiseless motion, occasionally stepping in the full light of the open furnace door, showing their begrimed faces, and all the while the soft, resonant tones of the bells being tested, in his ears, the impression is one far removed from churches and church chimes. There is no conversation or badinage, or loudly expressed orders, for the workmen's duties keep them separated, and, as the floor is of clay, there is not even the sound of a footfall. This is the first impression received by a *Stoves and Hardware* representative on his visit to the works above mentioned. A casual glance gave no indication of the work being done. A lot of bells, of various sizes, distributed over the floor, a larger number of moulds, a pile of cast iron mountings, and a furnace with a deep pit in front of it is all that is to be seen, yet here some of the finest chimes in this country have been made.

Contrary to the popular idea, the exact musical tone of a bell depends neither upon the metal nor upon any change in it after being cast. If the bell should not be of the exact pitch, there is no alternative but to melt it over and recast it until the proper tone is secured. Hence, it is clear that the greatest care must be exercised, and the most thorough skill displayed.

The first operation, and the one upon which success depends, is the forming of the moulds. They are made according to plans which are first prepared to demonstrate the weight, thickness, and dimensions necessary to produce the required tone. The moulding is done entirely by hand, without the use of patterns. For the inside, the shape is made up of loam, which is merely sand mixed with enough clay to make it cohesive. With nothing but a trowel, a paddle, and his hands, the operator moulds the loam into the desired shape, working from the bottom toward the apex. The work is necessarily slow, as great care must be exercised, as any variation from the plans would inevitably ruin the effect, and frequent measurements are taken to see that there are no deviations. The surface is now covered with black lead. This is mixed into a thick paint, or mortar, and applied with a brush. Each coat must be allowed to dry, and successive coats applied until it reaches a thickness of about three-quarters of an inch, or until the desired shape is accurately secured. The outside half of the mould is built up of loam in the same way, only in this case no coating of plumbago is used. The exterior mould fits over the inside mould, the space between the two determining the thickness of the bell. The moulds being finished, they are placed in position in a pit in front of the furnace. At the apex, or at the point where the bell would be hung, an opening is made in the outside mould of about two inches in diameter. A trough then carries the molten metal directly into the mould.

The furnace is very similar to those generally used in melting large quantities of brass. The melting pot is built between two fire-boxes, so constructed that the heat strikes the sides and bottom with almost equal force, effecting quick results. The metal used is simply ingot copper and tin, in the proportion of four parts of the former to one of the latter. The copper is first melted, and then the tin is put into the molten mass, soon becoming a part of it. The kettle has a capacity of about a ton. For a bell weighing three hundred pounds, the mould is completely filled in seven or eight minutes. For bells weighing six hundred pounds, it requires about fifteen minutes, and so on.

The bell having cooled sufficiently, the moulds are broken, and it is taken out and turned over to the polisher. The inside, having been moulded against the smooth surface of black lead, needs no polishing, but the outside requires attention in that respect. The operation is very simple. The bell is hoisted to the center of a double revolving table. The part the bell rests upon revolves one way, the surrounding part in an opposite direction. This latter part is so constructed that it will hold a large quantity of coke. Thus, in revolving, the coke scours the outside of the bell, the result being a smooth, bright surface.

Before polishing, however, the tone of the bell is tested, and it is again tested after polishing, as carefully as the string of a piano or the reed of an organ. If satisfactory, nothing remains to do but the mounting.

An idea of the great accuracy that must be displayed in the plans and preparation of the moulds can be seen in that from ten to twenty-five pounds of metal, either too much or too little, in bells weighing from six hundred to two thousand pounds, or a variation of from one-twentieth to one-twelfth of an inch in thickness, will affect the tone. The successful manufacture of chimes and peals, therefore, can only be done by those whose knowledge of the business is as accurate as instinct, and this is possessed only by those who have followed the business for a lifetime.

What the Indians Have Cost Us.

The amount expended in Indian wars from 1776 to June 30, 1886, can at best be estimated. The several Indian wars after 1776, including the war of 1812 in the West and Northwest, the Creek, Black Hawk, and Seminole wars, up to 1860, were bloody and costly.

Except when engaged in war with Great Britain and Mexico, or during the rebellion (1860–1865), the United States army was almost entirely used for the Indian service, and stationed largely in the Indian country or along the frontier. It will be fair to estimate, taking out the years of foreign wars with England (1812–1815), $66,614,912.34, and with Mexico (1846–1848), $73,941,735.12, and the rebellion (1861–1865) and reconstruction (1865–1870), $3,374,359,360.02, that more than three-fourths of the total expense of the army is chargeable, directly or indirectly, to the Indians. (During our foreign wars, and the rebellion as well, many of the Indian tribes were at war with us, and others were a constant danger, a large force being necessary to hold them in subjection. Still, expense on this account is dropped from the estimate.)

The total army expense from March 4, 1789, to June 30, 1886, was $4,559,419,924. Deducting $3,514,911,007.48 for foreign wars and the rebellion, the remainder is $1,044,508,916.52.

Two-thirds of this sum, it is estimated, was expended for war and other services incidental to the Indians, viz., $696,339,277.68, fortifications, posts, etc., being deducted.

Total Cost of the Indians to the United States.

Indian department proper, from July 7, 1776, to June 30, 1886	$232,900,006.34
Expended by War department for Indian wars and incidental thereto from July 4, 1776, to June 30, 1886	696,339,277.68
Total	$929,239,284.02

Or almost a thousand million dollars.—*Smithsonian Report*, 1885, *Part II.*

AN India rubber horse shoe, consisting of a rubber bottom fitting over or around frog and hoof, with a projecting rim, is a recent invention for which important advantages are claimed.