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THE TIME IS UP.

The next number of the SCIENTIFIC AMERICAN will close the sixth volume of the new series. As we review the past six months the mind is almost staggered with the stupendous events which have taken place. The achievements of our armies, and the victories of our naval forces have formed subjects of absorbing interest. These great events have doubtless attracted much attention that would otherwise have been devoted to science and mechanics; and yet, considering all these things, it is surprising how much has been done in advancing the useful arts.

Public excitement has energized the public mind, and never before in the same space of time, have our inventors done more to deserve the gratitude of our people. We may justly claim for them many of the successes which have thus far attended the National forces.

At this period last year the affairs of the nation looked dark and gloomy. We then warned our people that "it was no time to be idle while the statesman was puzzled. . . . The mechanic and inventor are called upon to renewed action, for without their combined power our armies and our republic would be swept from the face of the earth." This call upon our mechanics and inventors was not made in vain. A novel war boat, in the redoubtable *Monitor*, saved a large fleet from destruction at Fortress Monroe, and but for it McClellan's army would not have been menacing Richmond to-day. Two river gunboats of novel construction saved an army from annihilation at Pittsburgh Landing, and new improved guns and other implements of war have given to our forces the advantage in every engagement.

The dark clouds which hung over our country are breaking away, and never in the history of our Republic has more confidence been placed in the permanency of our government. It has exhibited a strength and vigor which augur well for our future peace and its stability. When this conflict is settled we may reasonably expect a period of great manufacturing prosperity, for the productive power of our country is exhaustless. We, therefore, with much hope in the result, take this occasion to call upon our readers to renew their subscriptions for our new volume, which will commence in two weeks from the present date. The amount of subscription is so small, while the information conveyed in the columns of the SCIENTIFIC AMERICAN is so extensive and useful, that we think every inventor, mechanic and manufacturer in our country can, and should, subscribe. It is the only complete source of information respecting new improvements in American machinery and manufactures, and no person can really be intelligent on these subjects who does not consult its pages.

We hope our old friends will introduce the subject to their acquaintances, and also send in their subscriptions at an early date. Ten persons forming a club may have the paper one year for \$1 50 each, and it is only one dollar for single subscription for half a year, which embraces one entire volume. Remember our rule to discontinue the subscription when the time runs out, for although we want all the names we can get, we do not wish to thrust the paper upon those who do not want it.

MANUFACTURE OF LARGE GUNS.

The Fort Pitt Works, at the foot of O'Hara-street, Pittsburgh, Pa., have obtained deserved celebrity for the casting of large ordnance. The premises are not very attractive in appearance, they being composed principally of a few common brick structures. Their fame, however, does not rest upon outward embellishments—nor upon their extent, but upon the character of the work executed therein. For several months past this establishment has been turning out weekly from seven to nine large guns and mortars. It was at these works where the great 15-inch Rodman gun (illustrated on page 305, vol. iv., new series SCIENTIFIC AMERICAN,) was completed, and two others of the same size have lately been cast. One of these we saw last week on the lathe, nearly finished, the other had just been lifted from the foundry floor. In the rough, one weighs nearly thirty tons; when finished, twenty-five tons. Its extreme length is fifteen feet ten inches; its greatest diameter is four feet. We never obtained a comprehensive and just idea of the size of this great piece of ordnance—the largest in the world worthy of the name of gun—until we saw the huge mass upon the lathe. These two new guns are exactly similar to the one at Fortress Monroe, with the exception of their trunnions, which are placed three inches further back. They were cast hollow and cooled according to Capt. Rodman's invention. We counted nine finished guns and mortars ready to be sent away, and an equal number undergoing the boring and planing operations in the machine shop. Several were cast and ready to be raised from their molds, and several others were undergoing the cooling operations in their molds. The classes of mortars we saw were eight, ten and thirteen inch; the navy guns nine and eleven inches; the army guns ten and fifteen inches. These guns are all pure castings, being made entirely of cast iron. Very great care is exercised in the selection and purification of the metal that is used; and great experience and much skill are necessary in conducting such operations. The castings are truly beautiful; the metal is clear and very close in the grain, resembling steel. A piece is cut from the casting of every gun and submitted to a severe test, then it is labeled, numbered and laid aside for reference. A most excellent quality of pig iron comes to this foundry from Bloomfield, Blair county, Pa.; but good iron is also made in Pittsburgh from Missouri ores. It is, however, in treating the iron when in the furnace that the practical skill of the molder comes into play. The impurities are carefully removed, and only the purest metal allowed to reach the mold.

A new class of large navy guns are about to be cast and finished in this foundry. Hitherto eleven inch guns have been the largest size used in the navy, but a contract has been made for several fifteen inch-Dahlgrens, designed to suit the turrets of such vessels as the *Monitor*; and we had the pleasure of examining the huge patterns from which they are to be cast. The total length of each will be thirteen feet five inches; depth of bore a hundred and thirty inches; diameter of bore fifteen inches; greatest diameter forty-eight inches; diameter at the muzzle in the rough thirty-eight inches. This muzzle, however, is to be turned off to twenty-six and a half inches, and from thence taper up to nothing at the base line (a line struck through at the base of the cylindrical bore). The thickness of metal outside of the bore at the base line will be sixteen and a half inches; from this line to the outside of the circle it will be twenty-four inches. A small tapering gas chamber will be formed behind the bore at the base line, a hole one-fifth of an inch will be drilled one inch back from the center, then carried straight to the top forming the vent. These guns when finished will not only be the largest, but the best and most beautiful navy guns in the world. They are not to be cast solid as has been usual with navy guns heretofore, but they will be cast hollow and cooled upon Capt. Rodman's principle. It would be impossible to obtain a good sound, solid casting of such a size, hence the necessity for casting hollow. Under Major W. Wade, experiments were made with an eight-inch Columbiad cast solid at Fort Pitt works, and another cast hollow, and cooled inside with water; also with two ten-inch Columbiads, one made solid and the

other cast hollow, each pair having been cast from the same metal and furnace. The result showed the hollow cast guns to be much the strongest. The charges of powder used in the trials ranged from ten to fifteen pounds for the eight-inch guns, and from eighteen to twenty-four pounds for the ten inch guns, with shot and sabots. The solid cast eight-inch gun burst at the seventy-third fire; the hollow cast gun of the same size was fired one thousand five hundred times without bursting. The solid ten-inch gun burst at the twentieth fire; the hollow cast gun stood two hundred and forty-nine fires before it burst. The mold for a hollow cast-iron gun has a core formed on a cast-iron tube closed at the lower end, and after the metal is run into the mold, the interior is cooled by a stream of cold water admitted into the core by a tube that reaches nearly to the bottom. The cool water descends through this tube to the bottom of the hollow core, then it ascends through the annular space between the two tubes, and is discharged from the core at a point a short distance above the casting, and it flows off in a heated state. It requires the water to flow in a continual stream for several days before a large gun is sufficiently cooled. This system appears to be the most perfect ever devised for casting and cooling large guns. Each of the *Monitor* class of vessels armed with them will be able to hurl shot weighing four hundred and twenty-five pounds, which is nearly three times the weight of the round shot fired from the largest Armstrong gun yet made for the British navy.

BUSINESS IN GENERAL.

Our manufacturers and merchants, very generally, have done a good spring business. The extent of it has exceeded their expectations, and as a consequence, a more buoyant spirit prevails among all classes. The condition of the lumber market is a good index of the condition of the country, because it affords evidence of the number of buildings that are being erected, and when the building art is prosperous it is a sure sign of growth and progress. As Chicago is now the largest lumber market on our continent, it is gratifying to learn that the lumber business of that city has greatly revived. The sales for this summer promise to be good. We learn from the *Boston Commercial Bulletin*, that most of the manufactories in Massachusetts are running nearly full time, that Lawrence and Lowell are busy, and that in several places new factories have been put up and several old ones enlarged. Orders are now beginning to come in from some of the Southern cities, which have been made submissive to legal authority. Six tons of tacks were lately sent to New Orleans from Taunton, Mass., and a large order for plated ware has been received at Hartford, Conn., from the same place, this being the first since March 1861, when the secession frenzy seized the people of Louisiana. The quantity of goods now being manufactured is not equal to that of former prosperous times but for all this it is very large, considering the circumstances of the country. The quantity of cotton on hand is very small, and the cotton market is stagnant because prices rule high, being 31 and 31½ cents per lb. for middlings. It is expected that Charleston, S. C., and other Southern cotton ports will soon fall into possession of the Union forces, and that a large supply of cotton will be obtained at early date.

THE LONDON EXHIBITION MANAGEMENT.

We judge from the remarks of our foreign contemporaries, that the London Exhibition this year, will be a financial failure, however successful it may be as a display of manufactures, mechanism and art. Its management is denounced as being short sighted and mean. The absence of Prince Albert—who was the ruling genius of the Exhibition of 1851, is now felt. The season tickets are too high in price and the Commissioners have made a rule charging each exhibitor the fee of a season ticket. Foreign and British correspondents of the press are also charged for season tickets, and letters are now appearing in the French and German papers ridiculing the building and the stiff and thick-headed Commissioners who do not seem to have sufficient gumption to conduct the Exhibition upon liberal principles. Mr. Train in a late speech upon the subject in London, stated in substance that the show appeared to be conducted espe-