NEW EXPERIMENTS WITH GUNS AND TARGETS.

Another set of experiments with flat-headed solid bolts and flat fronted shells took place place at Shoeburyness, England, on the 14th ult., and elaborate accounts of the trials are given in the London *Times* and several other journals. In this case the trial was with a stronger target than had ever before been used, and at a greater range. Again the guns and projectiles came off victorious. The target was 10 feet high and 15 feet in breadth; the upper plates were 4½ inches thick, the lower ones 5 inches, and the backing was composed of 18 inches of teak wood, and an inner skin plate ⅝th of an inch thick. The top and sides of the target were inclosed like a box to resemble the between-decks of a ship. A 70 pounder gun was placed at a distance of 600 yards and a 120-pounder at 800 yards. The latter gun was first fired with a Whitworth shell and a charge of 27 lbs. of powder. The projectile weighed 151 lbs., and was filled with 5 lbs. of powder. It left the muzzle of the gun with a velocity of 1,500 feet per second, and it struck the center of the 5-inch plate when its speed was 1,220 feet per second. This shell passed through the target and burst inside. The hole made was a clean cut, 8 inches in diameter; but the bursting of the shell did comparatively little damage beyond that of a solid shot. The second shot fired was similar to the first, and with like results. These bolts were made of steel. A third shot was then fired with a flat-fronted cast-iron shell which weighed 130 lbs. This shot, when it struck the target broke into fragments and only made an indentation two inches deep. The last shot fired was with a solid steel shot which weighed 130 lbs.; it also went through the target.

The trial then took place with the 70-pounder at 600 yards distance. It was fired with a steel shell which weighed 81 lbs., and a charge of 13 lbs., of powder. The shell struck the 4½-inch plate, passed through the wood to the inner plate and burst. Two other similar shots were fired with like results.

These experiments have proved that solid iron plates of five inches in thickness, backed with 18 inches of wood, and a plate of ⅝ths of an inch thick (making a total of nearly six inches of iron and 18 of wood), can be pierced with ease at great distances by steel shells. And on the other hand they have demonstrated that cast-iron projectiles are almost useless in firing against such thick plates. The guns were rifled, and, with the projectiles, were furnished by Mr. Joseph Whitworth. The rifling was octagonal in the large gun and hexagonal in the smaller.

As a bit of advice to our Secretary of the Navy, who has advocated so strongly the organization of national workshops, on the plea that private establishments cannot furnish such good materials and workmanship, we would state that the British dockyard shops have always failed to make reliable plates—the best have been furnished by private establishments.

THE DRAIN OF LABOR.

From all parts of the country we hear continued complaints of the scarcity of labor, not only from the farmers, but also from the manufacturers and merchants. In some of the western States, if we may credit our exchanges, the cost of reaping the crops has been greatly increased by the delay which has occurred in getting the grain to market; as also by the higher rates it has been found necessary to pay for "help." The reason for this stringency is apparent; the reapers of the fields toil now in other scenes. Steel, no longer harmless but deadly, is wielded by their sturdy arms; the saw, the hammer, nay even the pen, lies idle and useless while the graver and more weighty matters of "life, liberty and the pursuit of happiness" claim the attention of the nation.

In our own city it has been frequently said by parties, within our own hearing, that their business was suffering for want of hands, and from this office may be seen every day full regiments of the rank and file, the bone and sinew of the various trades and handicrafts, marching away to the seat of war. It is a nice question and a vexatious one, to decide how far the absence of portions of a trade will affect the standard of wages of those who remain. We should be ignorant of passing events if we were blind to the fact that strikes in the several trades are daily taking place, with more or less success, according to the nature of their demands. We are not of that school of philosophers who think fine spun theories necessary to decide upon the relations of labor and capital. A fair day's work for a fair day's wages should be the standard, and then let individual skill and excellence determine the rate of remuneration in solitary cases. It has been our fortune to mingle with mechanics to some extent, and we have invariably found this sentiment to be the prevailing one among the most intelligent and reflecting of them. Societies of whatsoever nature fall very far short of exercising any material good upon the general welfare of those trades which they profess to serve—at least such has been their history in this country.

We have seen many a promising institution arise, based upon the assumed necessities of employers and their compulsory compliance with certain fixed rules of wages, and we have seen the same fade and fall through want of unanimity and proper organization. So soon as the leaders of these societies had secured their own particular advancement, the lesser lights in the company were left to their own devices; then bickerings and disputes very soon demolished whatever remained of the brotherhood. Far be it from us, in discussing these questions, to assume any tone that might be mistaken for levity. The right to ask for increased wages is undeniably and manifestly correct, but the right to grant any such advance rests solely with the employer and his needs. This has been our ground always, and we maintain as a principle that no man should be discharged or degraded in rank because, like Oliver Twist, he dares to ask for more.

Strikes, though apparently beneficial, are in no wise so; they are at best but a specious remedy for an assumed disease that lies far beyond their reach. There can be no general system of fixed wages in any community, for every man, in most cases, will earn just such sums as his skill entitles him to; that there are exceptions to this rule we readily acknowledge, but as to the main part of our statement the facts remain incontrovertible. Another feature of these revolts against natural laws, is the reaction that takes place immediately after the *furore* and excitement of their inauguration; those who have been instrumental in starting them, and who were the first to receive the advance, are quietly set aside and their places supplied with other men at the earliest moment. Only by mutual co operation can a proper state of feeling exist between the employer and the employed. Conflicting interests produce jarring and derangement where only concord should exist; and we can say, feelingly and truthfully, that any trade which loses sight of the fundamental principles upon which the value of labor is based, not only inflicts a temporary injury upon its members but a future and permanent one, which results in depreciating its *morale* to such an extent that it sinks very low in the public estimation. Very generally, however, the requests of the workmen have been met, as all employers have seen that the advance demanded was by the nature of things not improper.

We invite our readers to notice the large amount of original matter contained in this number. Our editorial staff is strong, and we never labored harder to make our columns acceptable and profitable to our generous patrons. We are determined as the difficulties increase in respect to the enormous rise in paper, to work all the harder to make the SCIENTIFIC AMERICAN more acceptable and valuable to its readers. All we want is your steady patronage, and we will do our part to the best of our ability.

A GOOD DAY'S WORK.—We determined to act out our advice given in another article to "bring on the paper stock;" consequently we spent one day in scouring every nook and corner of our office for the precious material. The result astonished us. We had an accumulation of 3,500 lbs. of useless material, which we readily sold at nine cents per pound, which netted a handsome remuneration for our day's work.

RAISING SUNKEN SHIPS-OF-WAR.—The ship-of-the-line, *United States*, sunk in Norfolk navy yard when that place was evacuated by our forces, has been raised; and men are now at work on the *Cumberland*, which was sunk by the *Merrimac*.

RECENT FOREIGN INVENTIONS.

New Cement.—A patent has been taken out by H. D. Scott, of Chatham, England, for the manufacture of a new composition called "Scott's cement," the specification of which we condense from *Newton's London Journal of Arts*. Quick-lime in the state of powder is submitted to the action of sulphurous acid gas. The slacked lime is passed through a revolving screen which sifts it, then it is carried down a shaft lined with fire-brick, which shaft is heated by a fire outside. The heated lime, in a thin shower, is here met by a stream of heated sulphurous acid gas and is impregnated with it. The gas is prepared by placing sulphur in an iron vessel, having a fire underneath it; and as the sulphur burns, the gas is given off in large quantities. One pound of sulphur to 80 pounds of lime is required. Iron pyrites may be used in place of pure sulphur. The sulphurous gas is also conducted to mingle with the flames of a furnace before it mixes with the lime, so as to combine with a considerable quantity of oxygen. The lime thus impregnated with the sulphurous acid gas is now cooled and is fit for use as a cement. In nature this cement is similar to roasted plaster-of-paris, and may be used for like purposes.

Artificial Molder's Sand.—Melted pig metal from blast furnaces is usually run into molds of natural sand. A patent has been obtained by John Gjers, of Middleborough, England, for the production of an artificial material which he states is superior to the natural sand. It consists of the slag of blast furnaces, which when in a molten state, is run into a vessel containing water, wherein, by sudden cooling, it becomes divided into minute particles. These are then passed between heavy rollers and crushed, and in this condition used for molding. When employed for making "pig beds" instead of natural sand, the pigs come out of the molds much cleaner. On the outside of iron pigs run into ordinary sand beds, there is always a coating of silica. This requires the employment of lime or oyster shells in the cupola furnace, as a flux when the pigs are smelted for castings. The employment of this artificial sand obviates the use of lime in the cupola furnace. This material reduced to a fine state, when mixed with molding sand in foundries, renders it superior in the production of smooth castings,

Hardening and Tempering Steel Wire.—R. Hadfield and J. Shipman, of Sheffield, have secured a patent for hardening and tempering steel wire to be used for crinoline and other purposes. The furnace for heating the wire is constructed with fire-clay slabs, having channels through which the wire is drawn upon a reel. In close proximity to the end of the furnace is placed a trough containing a composition, consisting of about one pound of tallow and one pound of resin to every gallon of oil. This is the hardening composition, and a stream of cold water flows constantly through the water trough to keep the hardening composition cool. The wire is drawn through the resin and oil composition, and passes through chips of leather to remove the surplus oil. The wire being thus hardened is carried along continuously under a roller, thence through a tempering bath of molten lead, then through a considerable space exposed to the atmosphere to cool it before it is finally wound upon the reel. The speed of the reels for drawing the wire is proportioned to the time requisite for heating, hardening, tempering and cooling, according to the thickness of the wire operated upon.

Paper from Hay and Beet Root.—A patent has been obtained by J. H. Johnson. of London, for making paper from sea wrack (zostera marina), the residuum of the beet-root and common hay. These substances, in about equal proportions, are first immersed in a lime bath for about 24 hours, and are thereby reduced to a coarse pulp. They are then boiled in a boiler for about 12 hours in a solution of caustic soda, under a pressure of 60 pounds on the square inch, and when taken out are washed in water, then treated with carbazotic acid, and afterward bleached with chloride of lime and sulphuric acid, in the same manner that rag pulp is bleached. The subsequent processes are also similar to those which common pulp undergoes.

TEA to the value of $7,500,000 is annually imported into Russia. A person taking tea once a day will consume about 7½ lbs. in a year.