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Special Notice.

All subscribers to the SCIENTIFIC AMERICAN who have paid the full subscription price (two dollars) for the complete volume which has heretofore terminated in September, are informed that by remitting $1 60 more, their subscriptions will be continued for one year on the New Series commencing July 1st.

CLUBS of subscribers who have paid up to September, and wish to renew their subscriptions or form new clubs at that time, can do so at the club rates, deducting 30 cents each from all the present subscribers and complying to our advertised rates on new ones; for instance, a club of 10 subscribers who have paid $15 for one year's subscription up to September, may have their subscriptions continued till the *end* of Vol. I, New Series, or one year from July 1, 1859, by remitting $12.

Science and Modern Warfare.

Science was once the handmaid of liberty, as in the days when Archimedes defended Syracuse against the Consul Marcellus for eight months, astounding the Roman soldiers with the deadly effects of his ingenious machines. Then science was local, now she is cosmopolitan; and the progress which has been made in fire-arms and the appliances of war must influence the struggle between France and Austria for the Italian nationalities.

Let us see how this is to be done, and the probable effect of improved implements of destruction as employed in modern warfare. The daily papers of our city have been indulging in pleasant fancies on the superiority of France in the matter of arms, quite ignoring the fact, either from ignorance or forgetfulness, that Austria is just as well prepared, and that she has not forgotten the motto, "In time of peace prepare for war."

It is true that the old musket has given way to the rifle, that breech-loading guns are being rapidly introduced into the armies of Europe (by which three shots to the common gun's one can be fired), that revolving carbines are furnished to some companies of light cavalry, and that many-chambered pistols have found their way into military holsters.

We are told of cannon that have deadly effect at five miles, and that a great number of light field-pieces are superseded by a few guns carrying heavy shot. The round ball has passed away before the conical one; and the names of Norton, Minie, Jacob, Colt, Sharp and Armstrong stand as shining lights amid the din of cannon and the smoke of powder.

Napoleon the Great did not understand the value of individual skill in the use of arms, the secret of his system being to pour a mass of men upon his enemy after a well-directed cannonade from the artillery had decimated their ranks and produced momentary confusion. He depended on the collective bravery of a mass of soldiery, not upon the intrinsic skill of the soldier.

A soldier in the British army was told by his officer, in 1838, that, in firing at a man 600 yards distant, he was to fire 130 feet above him; so imperfect were the arms of Europe at that period. Now, with the improved arms supplied to the army, the soldier can make far better practice at 500 yards, or even 1,000, than he could with the old musket (which achieved the peninsular victories) at 100 or 200 yards. With Gen. Jacob's short barrelled four-grooved rifle, introduced, we believe, in the East Indian service, a tolerably good shot can hit an object the size of a man, once out of three times, at a distance of 1,000 yards, the effective range being 2,000 yards. The Enfield rifle is of about equivalent value.

The French admit firing 25,000,000 cartridges in the Crimea, and they certainly did not hit 25,000 men, or one in a thousand, nor did they kill half that number by musketry fire. All this time Austria and the armies of Germany have been perfecting their munitions of war, and profiting by the failures of other nations.

But, thanks to the art of printing, each improvement, and the experiments testing its efficacy and value, quickly find their way all over the world, and the armies have progressed together and are as capable as they ever were of meeting on equal terms. And to sum up, the only changes in modern warfare, by improved means of slaughter, may be briefly stated as follows:—

Firstly, The result of a battle will depend upon the skill and practice of the soldier more than formerly, and a sure aim will effect more than the showers of bullets hitherto thrown away.

Secondly, Personal bravery will be in a measure lost, cavalry rendered of less utility, and on riflemen and artillery will depend the issue.

Thirdly, Battles will be shorter in duration and more deadly in effect.

Fourthly, That nation which has within it most skill and science, which most has cultivated the liberal arts and trained its men to that coolness which only knowledge can give, will be surest of victory; or in other words, brute force dies out and brain force at last prevails in its very lowest sphere of action.

And lastly, Wars will be more bloody and more like murder than ever, and we hope that men may soon become convinced that it is a destructive folly, and settle their quarrels, personal and national, without recourse to slaughter and bloodshed.

While, however, it is an established fact that skill in the use of arms will greatly influence the fate of battle, the nearer that fire-arms approach perfection of aim, the greatest power of propulsion and the most simple combinations of mechanism, the more will such weapons be sought by the governments of contending nations. From our inventive genius as a people, and our neutrality as a nation, we are in a peculiarly fitting position to supply them with these, and thus, though not participating in the bloodshed, we can take a share of the spoils.

Street Railroads.

To the city of New York, we believe, belongs the credit of originating the now widely-extended and still-extending system of street-railroad travel, which is strictly an American institution. About twenty years ago the Harlem Railroad Company conceived the utilitarian project of making the best use of the track which they had laid, by starting a line of small cars upon it to run from the upper part of the city, for a distance of two miles, to the City Hall, and carry passengers at the same rates as the stages. This, the first of city railroads, was eminently successful as a paying concern; still it was a long time after this before the fact of its utility made a sensible impression upon the public mind. It was not until 1852 that other lines were started, in which year the Sixth and Eighth avenue lines were laid. Much prejudice, however, had to be removed before this was accomplished. There are now six lines of street railroads in this city, which, with their double tracks, are, unitedly, about forty-five miles in length. They are great corporations in every sense of the term, for they carried during the past year no less than 27,057,000 passengers, and earned $1,352,000. These roads employ about 2,000 horses and mules to draw the cars, quite a large force of conductors, drivers, agents, &c., and are doing a very prosperous business.

For many years we advocated the multiplication of city railroads before their advantages were publicly appreciated, but truth always triumphs at last, and within the past four years street railroads have wonderfully expanded in the cities of Brooklyn, Boston and Philadelphia; and at last our Cockney friends are now earnestly proposing to adopt the system in good old London itself.

Much has been learned by the experience of New York in the construction of street railroads, and a work recently published on this subject by Alexander Easton, C. E., No. 42 Wall street, Philadelphia, contains a great amount of practical information on this subject. The grooved rail, which is the *chef d'œuvre* for street tracks, was a most important improvement. Its top being laid flush with the pavement, and the groove permitting the flange of the wheel to run in it, allows other vehicles to cross the tracks freely. The old T and tram rails never could have answered for streets; therefore we consider this invention of very great importance, because it has rendered the system a practical success. Another great improvement, to enable the cars to turn at the corners of streets, was replacing the grooved rail with a tram rail at the sharp curves, so as to raise the flange of the off wheels, and give them a greater travel according to the contracted curve. Both these advantages have been provided to hand for those cities which are now adopting street railroads with something like a rational excitement. This appears to be the case with our "Quaker City" friends of Philadelphia, who are going ahead with a commendable spirit in constructing a more perfect system of street railroads than any other city in the country. During the past year they have finished and put in operation eight lines, seventy-nine miles in length, of single track, all of which are doing a prosperous business; and ten other companies are chartered and building their lines, so that, in the language of the *North American Gazette*, "there is scarcely a portion of the more compact portion of the city that is not penetrated by one or more of these lines; in fact, as has been poetically expressed, the city is gridironed with them."

The [illegible] railroads have wonderfully assisted the means of communication between the distant portions of New York, still, owing to the form of Manhattan Island, all the travel between the upper and lower districts is confined to a very few long streets, which will always make these streets crowded at certain periods of the day, let the means of carrying passengers be multiplied to any extent; and hence, also, our city, although the first to adopt street railroads, cannot extend the system in the same proportion as Philadelphia, or even Brooklyn, which has a very extended breadth in proportion to its length. Wherever city railroads can be extended and multiplied they should be adopted, as the best means of relieving overcrowded streets from omnibuses, because one horse can draw five passengers on a rail for every person that can be drawn "over the stony street" in a stage.

As street railroads have not yet found their way into any of the cities of the Old World, we would recommend their adoption, first of all, to the good people of London, for relieving their overcrowded thoroughfares. We assure them that they are an American institution well worthy of introduction as a means of accomplishing a revolution in their means of city travel, and as well adapted for the aristocratic monarchist as the most vehement republican.

Agricultural Fair Premiums.

The Morrow County, Ohio, and the Wyoming County, N. Y., Agricultural Societies have each offered as premiums a large number of yearly subscriptions to the SCIENTIFIC AMERICAN for various articles to be offered for exhibition at their next fairs. We are happy to notice this recognition of the value of our journal, and would state that other societies have before pursued this system with satisfaction to the exhibitors.

Mammoth Patent Lawsuit.

For several years past there has been a lawsuit in progress in the United States Court for the northern district of this State, which, for foggy procrastination, appears to be a disgrace, not only to the country, but to the age in which we live. The present state of this lawsuit is ably set forth in an article of considerable length in the Saratoga *County Press*, which states that the records of the case already fill three printed volumes of 500 pages each, and perhaps as many more will be required before the lawyers allow the birds to escape from the meshes of the legal net.

The case relates to what is called "the hook-headed spike," for making which Henry Burden, of Troy, N. Y., secured a patent on a machine in 1840. It seems that in 1845 some informal agreement was made between the owners of the patent and Winslow, Corning & Co., when the latter got some of the machines made and commenced manufacturing the spikes. In 1848 the patentees sued for an infringement, but the District Court decided that the defendants were working under a license. An appeal from this decision was taken to the Supreme Court of the United States, where the decision was reversed, and a decree made in June, 1853, that the use of the machine by the defendants was an infringement of the patent, for which they must give an account for damages, profits, &c., to the plaintiffs. The case was then referred to Marcus T. Reynolds, Esq., master of the Court, to take testimony, examine persons under oath, books and papers, and to ascertain the damages, profits, &c. Mr. Reynolds declined the appointment, and the Hon. R. H. Walworth was selected in his place, who, in March, 1854, commenced taking testimony. The amount claimed by the plaintiffs is $746,164 as profits on 45,046,000 lbs. of spikes, and $4,600 for other expenses. This is a large sum of money, but our cotemporary caustically remarks: "The costs of masters, lawyers, witnesses, &c., are enormous; we cannot begin to estimate them. When the case is closed up—if ever it does get to a final decision—we think we should prefer to take the costs rather than the verdict."

From the day on which the testimony commenced to be taken until now—five years—the case, like a huge snake, has been coiling itself into complicated folds, threatening to crush out the whole profits and damages claimed. A smart merchant would have finished the business in as many months as it has been years in progress, but then this would not have sufficed to maintain the dignity involved in executing the degree of such a dignified body as that of the United States Supreme Court.

A commission, it is stated, has been sent to England to take testimony of the iron masters there—a most unnecessary act—and dealers in spikes, and workmen in nearly all parts of the country, have been called upon for testimony. Questions have been asked of witnesses which have required several days to answer, and some of these which we have read appear to be rather an effort at prolixity than precision to assist in concluding the protracted issue. It is now about eleven years since the suit was first commenced, and it still affords golden nest eggs for hatching a well-feathered brood to those who are engaged in conducting it.

Murexide Colors.

We described the beautiful purple colors obtained from preparations of uric acid, on page 181 of Vol. XIII. of the SCIENTIFIC AMERICAN. The Glasgow *Practical Mechanic's Journal* describes an improved method of dying these colors on fine woolen goods. The wool after being cleaned is boiled for an hour in an *acidulated* bath of tartaric, citric, or oxalic acid, or the muriate of tin with acid slightly in excess. After this the wool is steeped in cold murexide for about two hours when it assumes a beautiful amaranth color. To the solution a small quantity of dissolved corrosive sublimate is now added, when the wool assumes a most brilliant crimson shade.