

# 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 four months.  
Single copies of the paper are on sale at the office of publication, and all periodical stores in the United States and Canada.  
Sampson Low, Son & Co., the American Bookellers, 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. 22... [NEW SERIES.]... Nineteenth Year

NEW YORK, SATURDAY, NOVEMBER 28, 1868.

## OPENING OF A NEW CAMPAIGN.

It appears quite evident to all who observe the signs of the times that Generals Grant and Meade are about to open a new campaign, which we trust will inaugurate glorious results. Not exactly following in the wake of these military chieftains, the Publishers of the SCIENTIFIC AMERICAN propose to begin, on the first of January next, a new and brilliant campaign in the fields of popular science, and they hope to give renewed assurance that this journal is fully up to the stirring events of the day. After a flattering success of eighteen years, the SCIENTIFIC AMERICAN will commence a new volume at the time mentioned, being the "Tenth" of the "New Series." The Publishers earnestly appeal to their friends and patrons, far and wide, to reinforce their subscription list by the formation of clubs.

They feel warranted in saying that no better expenditure of money can possibly be made than for a year's subscription to this journal, which is the only one of its class now published in the United States. The Publishers promise untiring devotion to the interests of their patrons. No department of the journal will be allowed to fall behind preceding years; while it will still be their aim to excel in every respect.

Friends and Patrons, we ask with confidence a continuation of your former patronage, and also your influence in promoting a wider circulation of this journal than it has hitherto enjoyed.

Our New Prospectus appears on our back page.

## SHAPE OF LASTS, BOOTS AND SHOES.

A favorable change has lately taken place in the shape of the lasts that are employed to give form to boots and shoes. They are not only made broader at the toe than formerly, but also nearly straight on the inner side, with a right line passing through the center of the heel and the arch to the extremity of the great toe. Such lasts correspond more nearly in form to the anatomic structure of the foot. For this reform the public are indebted to Herman Meyer, Professor of Anatomy in the University of Zurich, who published a pamphlet on the Anatomy of the Foot, in relation to the Form of Boots and Shoes, to which we directed attention on page 266, Vol. VII. (new series), of the SCIENTIFIC AMERICAN. The Chinese have been ridiculed for practicing the custom of deforming the feet of their women, by subjecting them to a cramping, dwarfing operation from infancy. But nations of a more reputable civilization have for centuries been as blind to their own shortcomings respecting the feet of both sexes and all classes. Thus it has been customary to make children's and ladies' shoes of the form called straight—narrow at the toe, without regard to the form of the foot—so that they could be changed on the feet daily. It has also been customary to make men's right and left boots and shoes more narrow at the toe than the normal size of the foot. Ridiculous ideas respecting

the shape of boots and shoes have occasionally been displayed in fashionable circles, and until recently correct ideas have not been entertained by any class. Deformity of the toes of the feet is quite common, more especially among men who have been accustomed to stand and walk a great deal. The smaller toes are usually cramped up and the large toe bent out of line, causing a deformed projection of its joint. These evils are due to the wearing of ill-formed boots and shoes. If we look at the form of a child's foot we notice that the heel is narrow compared with the front part of the foot, where the toes spread out like a fan, and the large one is separated from the second by a small space, and is also in a straight line with the inner edge of the foot. The little foot of a child is very beautiful, and very different from the same foot after having been subjected to the cramping operation of common boots and shoes for fifteen or twenty years. The ancient Greeks, so celebrated for correct ideas in matters of taste, followed nature in their works of art; hence, they have left us the most perfect models in works of sculpture. The feet of their female figures have the great toe slightly parted from the second, and straight in line with the inner edge of the foot, and fashion should conform to this standard in boots and shoes, as a departure from it exhibits an abnormal taste.

Professor Meyer says:—"All feet are perfectly alike in the principles of their mechanical construction, and the only differences in our healthy feet are those arising from varying length and breadth. In the original form of the foot we never meet with those essential differences designated by shoemaker's 'straight or bent feet,' and still less with such variations in which the great toe lies over, or with the thickness of the ball at its root." He attributes corns, bunions, gout, chilblains, unseemly protuberances and growing-in nails to the unsuitable form of the shoes in established use.

Shoemakers and last-makers have been blind to the anatomy of the foot, and the cause of toe deformity so prevalent everywhere. Advertisements, such as "lasts made here according to the shape of the foot" are quite common. In such places lasts are made from plaster casts of the feet. The idea is wrong, as boots and shoes made upon such lasts only tend to perpetuate evils. Lasts should be made according to the normal, not to the distorted, form of the feet. The chief defect in the form of lasts heretofore has been in making them too narrow at the front of the foot, and sloping them from the root to the point of the great toe. Boots and shoes made upon such models, press the great toe upon the small ones, and the joint at the metatarsal bone is thrust out of line, so that it forms a protuberance on the inner side of the foot.

The reform which has commenced in the making of boots and shoes is more in accordance with the anatomical structure of the foot, and we hope will be productive of lasting benefits. Nature, not the whims of fashion, should be consulted in the manufacture of boots and shoes.

## RECKLESS USE OF FIRE-ARMS.

Among the common vices of the day there are none more reprehensible than the reckless use of fire-arms, which seems to pervade all classes of the community. We have just read in an exchange of a bullet that came whizzing from some unknown quarter into the shop of a mechanic engaged in business in one of our northern towns; and quite recently we remember having seen another account wherein the experience of one individual in cleaning a gun was set forth. It appears that he adopted a very certain method for discovering whether the weapon was loaded or not: simply putting his mouth to the muzzle, his foot on the hammer, pushing it back, and then attempting to blow through the nipple. Before this latter performance was achieved, the individual lost his life by the slipping of the hammer (as hundreds before him have) and the discharge of the load, which, it appears, remained in the barrel. Such means as these for the end desired strike us as rather foolish; for although the knowledge is obtained, the person experimenting does not have a chance to profit by it. From all parts of the States we may read daily of accidents by the careless use of fire-arms. Only recently two ladies quarrelled in

sport, and one, declaring that she was a rebel, the other, in mock indignation, seized a musket and snapped it at her; it was loaded, of course, as weapons seized by chance, or those near at hand, always seem to be; and the ball, although it did not strike anybody, passed sufficiently near the head of the fair "rebel" to give her a realizing sense of her danger.

Fire-arms are dangerous playthings, and there is much sense in Mrs. Partington's advice to the ubiquitous "Ike;" "Put it away; it might go off if it hasn't either lock, stock, or barrel." There are a number of promising young men who are, in their own opinion, remarkably skillful in handling loaded guns. The remonstrances of male friends and the objections of timid female relatives are laughed off or put aside. Guns "never go off" with them; of course not; if by any chance shock or jar enough force was contributed to fire the fulminate, the powder would obligingly refuse to ignite in deference to their dexterity. Another favorite argument with these gentry is, "they know the gun ain't loaded." How do they know it? Why, some half year ago, they fired the last charge at a crow, and of course there can't be a load in it now. Perhaps in the meantime some thoughtless person takes the musket, and placing a charge in it, puts it in the corner handy for some other reckless individual to shoot a little child with "in sport."

Men ought to know that powder and ball cannot be dodged, and that as a rule it is unsafe to point a crooked stick in the shape of a gun at any one. A life once lost by such means as those discussed, ought to be sufficient warning to the whole community for a century; and yet it seems to be of little avail, for every day the long list of persons killed by the careless use of fire-arms is lengthened. Men go shooting, and pull their guns through briar and brake with the hammer at full cock, and call it an "accident" when their friend in front of them is blown to pieces by their carelessness; others take guns out in boats, lay them across the seats, from whence they fall to the bottom of the craft, and in a great many cases explode. This is also called a "remarkable occurrence." It is time that such folly, and worse than folly, should cease. If the only evil that resulted from the reckless use of fire-arms was the death of the fool-hardy individual in fault, it would be no matter; but the case is generally the other way, and innocent persons are maimed for life, if not killed outright, by men playing with loaded pistols, and snapping muskets, presumed empty, at other people's heads. If public opinion is not enough to restrain persons from a careless use of fire-arms, some legislation ought to be had upon the subject; for as the matter now stands, by far too many persons are yearly killed in this way.

## OXYGEN, OZONE AND ANTOZONE.

Oxygen is the most abundant substance in nature, and it plays the most important part in the chemical changes which take place in the organic and inorganic kingdoms. It is the active agent or combustion and fermentation. It attacks and decomposes the hardest steel; it maintains the fire upon the hearth, the light in the lamp, and the warmth of the human body. Every one should have some definite knowledge of its nature and properties, as it forms the very breath of man's nostrils. Oxygen is one of the six permanent gases; it was discovered by Dr. Priestley in 1774, and called dephlogisticated air. It is insipid, colorless, inodorous, and permanently elastic under all known pressures and temperatures. The lightest gas is hydrogen, compared with which oxygen is sixteen times heavier; its specific gravity being 16—hydrogen 1, and 100 cubic inches of it weigh 34.24 grains. The air of our atmosphere contains four constituents; namely, oxygen 21 parts, nitrogen 79 parts, some carbonic acid and ammonia; the two latter are variable, the two former constant. The nitrogen is passive, remaining in an unchanged condition in the air; but the oxygen, the active agent, is ever being consumed and renewed. Water absorbs a portion of it, the rate being three cubic inches of oxygen to 100 cubic inches of water. It is thus fitted for the respiration of fishes; the blood of these creatures in circulating through the gills being aerated by the free oxygen dissolved in the water. It is drawn from the atmosphere into the