FIREWORKS WITH DRAMATIC ACCESSORIES.

In an inclosure open to the sky, occupying some 400 by 500 feet, near the easterly end of New York's popular sea beach summer resort, there is nightly being presented to the public this summer a pyrotechnical exhibition of a novel character, which our artist has made the subject of illustration on the first page. There is not much that is entirely new in the fireworks shown, although the beauty of some of the combinations of colors is remarkable, and it is evident that the chemical energy developed in their production is always under most skillful guidance; but these, in connection with the theatrical accessories and the scope given for their display in the place where the exhibition is held, combine to make up an entertainment which has attained great popularity, and is generally conceded to be a most delightful treat.

The stage setting, if we may so style it, occupies one entire side of the inclosure, to the depth of about 75 feet, and between this and the audience is a miniature lake, made to do duty as a portion of the river Moskva, there being some boats moving on it and others drawn up at what appear to be the docks and quays of the ancient Russian capital. At either side appear to be arched stone bridges, guarded by fortress-like parapets, suggesting the heavy stone fortifications characteristic of the mediæval ages, and these extend along the water front, but far enough back to give room for the actors. They also form the walls behind which rise the miniature domes, turrets, and cupolas, in Oriental fashion, of that collection of palaces and churches known as the Kremlin, on the terraces of which are sentinels keeping watch. In the distance, almost upon the horizon, and apparently beyond the confines of a walled city of considerable size, is a blue streak, representing the winding course of the Moskva, the whole being an artistic arrangement of stage slides and painted scenes to give one a realistic idea of Moscow as it might have looked on that autumn evening, seventy-four years ago, when awaiting the approach of Napoleon's grand army; while room is allowed between the stage slides for the explosion of fireworks and use of the artificial fires that are to portray the destruction of the city and mimic its falling walls and towers at the time that the noise and glare of the pyrotechnical display is at its height.

To obtain the largest possible amount of enjoyment from an exhibition of this kind, one should, probably, as far as possible, try to forget all of the "machinery" of the business, and be oblivious of the shortcomings of the actors, to thus aid the imagination to call before the mind the real historic event; yet, as all who see it are inclined to ask how the effects are produced, we give, in the smaller views, illustrations, as seen from the rear of the stage, of the hinged and braced scenery, some parts turning on pivots, and all arranged to be quickly thrown down into such semblance of ruin as shall best carry out the idea the piece is intended to represent. One of the small pictures also shows the water serpent and water dolphin, and how they are made, a fountain of fire with a float to sustain it upon the water, and the manner of firing off the grand aerial bouquet of rockets with which the exhibition concludes. About 150 of these rockets are fired simultaneously, the burning of one rocket lighting the fuses of all the others.

The prime materials of the art of pyrotechny have long been well known, but experts, aiming at novel and striking effects, are constantly making new combinations. With gunpowder and its ingredients—niter, sulphur, and charcoal—are used a large number of other substances, such as sugar, starch, resin, camphor, lycopodium, the sulphides of arsenic and antimony, the metals iron, copper, zinc, magnesium, etc. Cast iron and steel are used in powder and small filings; they do not contribute much to the burning power of the pieces, but, when discharged into the air, by their partial oxidation cause brilliant sparks and scintillations, the longer the filings the brighter being the red and white sparks they give. Copper filings give a greenish tint to flame, and those of zinc a fine blue color; the sulphuret of antimony gives a less greenish blue, but with much smoke, while amber, colophony, and common salt give a yellow fire, although the salt must be very dry. Lampblack produces a very red color with gunpowder, and a pink color with niter in excess, serving for making golden showers. Yellow sand or glistening mica gives golden radiations. Camphor yields a very white flame and aromatic fumes; verdigris imparts a pale green; sulphate of copper and salammoniac a palm tree green, and licopodium burns with a rose color and splendid flame. Niter increases the rapidity of the fire, while sulphur retards it, and the charcoal of the powder emits those volumes of sparks which form the golden train of an ascending rocket.

In the exhibition we illustrate are combined some of the best effects of the art of pyrotechny, as shown in the brilliancy and sustained power of the various lights and colors given out by the rockets, wheels, stars, Roman candles, gold and silver rain, serpents, colored fires, etc., and the one or two set pieces generally given at the conclusion. The selection of materials for the effects desired is always governed by the laws of chemistry, as illustrated in every description of combustion, well known laws of mechanics being invoked to turn the forces of chemical combination to the end sought—a work in which no small amount of practical experience and manual dexterity is required to secure the best results.

Of course, it is the forcing of the confined gases, caused by rapid combustion in various formed tubes and other shaped devices, out upon the air that gives the propulsive force of the different pieces, while the definitely measured proportions of the almost numberless ingredients furnish every conceivable hue and the varying degrees of brilliancy; but an enumeration of the many combinations now made by skillful pyrotechnists, and the detail of the means by which they are produced, would go far beyond the scope of the exhibition, the fireworks manufacture forming a special business of considerable importance.*

The "action" of the drama is but brief, and is somewhat set out by various adventitious interludes, a gymnastic exhibition, marching and countermarching of soldiers, music, etc.; but the approach of the French army upon the scene is easily imagined from the increasing noise of bombs, flights of rockets, and readily assumed appearance of consternation of the actors. This is apparently subdued for a brief period as the solemn strains of the Russian national hymn strike the ear, and afterward while a procession of white-robed priests appear at a miniature shrine of a Greek church and render a chorus of some classical music of somber character, which has a most striking effect across the water of the little lake, but which it is safe to say was never heard within the walls of a Greek church in Moscow at the time the audience is supposed to revisit it. Then follows increased alarm at the gates. The guns of the French cannoneers as they draw steadily near, liberally assisted by discharges of giant crackers, thunder with ear-splitting effect against the wooden walls, bombs fly hurtling through the air over the doomed city, the bearskin caps of the French grenadiers appear at the entrances at either side, and steadily as fate itself their columns press upon the retreating and now thoroughly terrorized Russians, who rapidly disappear within the nooks and byways of the city. The prisoners in the jails are liberated from their confinement, and with torches appear to light the fires, amid which are now seen and heard the roar of the flames and the tumbling walls and general destruction of the city, the air being full of burning serpents, and the water alive with incandescent figures to suit every imagination, while the aerial bouquet of rockets is setting evanescent stars of every hue in the heavens above, with the disappearance of which, as a conclusion, we come back to comparative darkness and "the sober realities of every day."

* For details of manufacture and various formulæ for many kinds of colored lights used in stars, rockets, Roman candles, wheels, etc., see SCIENTIFIC AMERICAN SUPPLEMENT, Nos. 49, 139, 209, 217.

Long Distance Telephoning.

The American Telephone and Telegraph Company of New York has recently been organized for the purpose of establishing direct telephonic communication between the large cities of the country. The first line has been constructed between New York and Philadelphia, the length of the route adopted being about 100 miles. Four years ago a similar attempt was made to connect New York and Boston, but the iron wire strung between the two cities did not prove successful. The present company has employed hard-drawn copper wires, and now has seventy-four of them running the whole distance. The line is entirely aerial, except where waters of some width are crossed, in which case submarine cables are employed. Between the two cities there are six series of cables, the longest stretches being under the Hudson and Delaware rivers. The cables terminate at the foot of Vesey Street, in New York, and near the foot of Walnut Street, in Philadelphia. The line will probably be open for business within a few weeks, and it is expected that it will prove a great convenience.

Galen on the Treatment of Obesity.

"The best method of getting thinner consists in gradually withdrawing from the body that whereof there is superfluity, and in strengthening at the same time those parts which had been expanded. Bodily exercise will undoubtedly prove very advantageous, as we see stout horses getting lean by heavy work. Thus, likewise, those will never grow fat who are obliged continually to toil with hard labor. This, however, requires great precaution, it being certain that fat people frequently run danger of death when attempting violent bodily exercise." And Galen says: "Regular alvine motions, energetic bodily exercise, a moderate life, a diet which, although satiating, yields but limited nourishment; which explains why Hippocrates advises stout people wishing to grow thin to dine on vegetables cooked with fat, in order that they may become satiated by a small quantity of food."

Correspondence.

The Polarity of Tadpoles.

To the Editor of the Scientific American:

In your issue of July 3, I notice a short paragraph on "The Polarity of Tadpoles," which states that when a current was passed into the dish containing them (the poles of the battery being immersed in the water), all of them without exception took up "one position, that in which the head was turned to the anode and the tail to the cathode."

I see nothing really surprising in this, and certainly nothing that would prove "polarity" in the tadpole. The "shock" from the cathode is always a great deal stronger than from the anode; also, the head of the tadpole (as in all animals) is the more sensitive portion of the body, electrically; hence the cathode presented to the head, if the current be strong, becomes quite powerful, whereas, if presented to the feet or tail, the current is much less severely felt.

The arrangement of the tadpoles with their tails to the cathode is the position they should assume in order to reduce to a minimum the unpleasant sensation of the passage of the electrical current through their bodies.

Confine a man in such a way that the current from a battery must pass through his body from head to foot, and he would very soon arrange himself with his feet to the cathode and his head to the anode, and yet this would be far from proving "polarity" in the human body. There may be "polarity" existing in the tadpole, but a different experiment than that made by Prof. Herman is necessary to prove it to me.

C. HENRI LEONARD, M.D.

Detroit, Mich., July, 1886.

Cleaning Woolen Fabric.

The *Leipziger Muster-Zeitung fur Faerberei*, which is likely to be good authority on such subjects, expresses its views on cleaning woolens as follows:

Opinions on the best methods of cleaning woolens are so infinitely different, and so various and contradictory are the statements of practical papers on this point, that it appears to me, says the editor, a remunerative and interesting task to examine the matter thoroughly. I tried the various degrees of heat, from the hottest to the coolest temperature, and I employed all the favorite cleaning materials one after the other—soap, borax, ammonia, benzine, and mixtures of these articles. The results were so decided, and so plainly marked, that the following conclusions must be regarded as definitely established:

1. The liquid used for washing must be as hot as possible.

2. For the removal of greasy dirt, sweat, etc., borax is of so little value that its application would be mere waste. Soap lye alone is better, but the preference must be given to soap lye along with ammonia. This mixture works wonders by quickly dissolving dirt from particular parts of underclothing which are hard to cleanse. It raises and revives even bright colors, and is altogether excellent.

3. On the other hand, for cleaning white woolen goods, there is nothing which even approaches borax. Soap lye and borax, applied boiling hot, gives white woolens a looseness and a dazzling whiteness which they often do not possess when new.

4. If shrinking is to be entirely avoided, the drying must be accelerated by repeatedly pressing the woolens between soft cloths. In no case should woolens be let dry in the sun, as in this case they become dry and hard. They are best dried in a moderate current of air, and in cold weather in a warm place, not too near the stove.

For colored goods there should be prepared a lye of seven quarts of soft water and two ounces of the best softsoap, the quantities being, of course, modified according to judgment and the dirtiness of the articles. The soap is dissolved over the fire, and the lye, properly stirred up, is divided into two vessels, to one of which is added a teaspoonful of ammonia for each quart of lye. The woolens must be entered at a heat which the hand cannot bear, and the fabric must, consequently, be turned and pressed with smooth, wooden stirrers. They are then pressed out as far as possible, and transferred to the second lye, containing no ammonia, and which by this time has become so cool that the articles can be pressed by hand, but no twisting or wringing must take place. They are then pressed between three or four soft dry towels, till the latter no longer become wet.

For white woolens there is added, instead of ammonia, a teaspoonful of powdered borax to each quart of soap lye, and the operation is otherwise conducted exactly as above described. If the second lye is too soapy, it may be diluted with a little hot water.

After two or three lots of woolens have thus been washed, the lye must be heated again—the first lot being put aside to settle, the second being made first—with the addition of ammonia or borax, as the case may be, and fresh lye made for the second.