

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.

The American News Company, Agents, 121 Nassau street, New York. The New York News Company, 19 Spruce street. A. Asher & Co., 20 Unter den Linden, Berlin, are Agents for the German States. Trubner & Co., 60 Paternoster Row London, are also Agents to receive subscriptions. Messrs. Sampson, Low, Son & Marston, Booksellers, Crown Building 188 Fleet street, London, are the Agents to receive European subscriptions or advertisements for the SCIENTIFIC AMERICAN. Orders sent to them will be promptly attended to.

VOL. XIX., No. 14. [NEW SERIES]. . . . . Twenty-third Year.

NEW YORK, WEDNESDAY, SEPTEMBER 30, 1868.

Contents:

(Illustrated articles are marked with an asterisk.)

Table listing various articles such as 'Improvement in Hand-power Sawing Machines', 'The Hoosac Tunnel', 'The Origin of Petroleum', etc., with corresponding page numbers.

THINGS EASY AND DIFFICULT.

The easiest things to be done are not by any means the easiest things to be described, while on the contrary, those things which are most easily described are often the most difficult to accomplish. The more complicated the mechanism used to obtain a given result the more complicated and extended are the rules for its use and manipulation.

In no department of the arts is this more manifest than in the use and manufacture of musical instruments. The violin, devoid of keys, composed of three elements, a sounding board or shell, strings, and the bow which agitates the strings, is in mechanical construction the simplest of all instruments having much scope or expression.

This leads to another important fact connected with this subject, namely, that in most cases the education of the muscles to delicate manipulation is more difficult than the acquisition by the mind of the principles which govern and direct it.

If then strength of will in the overcoming of difficulties is an element of greatness, the artist who can skillfully perform is greater than the critic who can only tell how work should be done without being able himself to put in practice his own teaching. This truth is felt by all competent workmen and is the cause of their impatience with the criticisms of men who are only able to approve or disapprove their work without being able to execute it themselves.

STREET DUST LAID BY THE USE OF CHEMICALS.

A patent was taken out in England, last September, relating to the application of a compound of deliquescent salts to the prevention of dust upon roadways. This season, extensive experiments have been made to test the value of the invention, and the results seem very favorable. It is estimated

that it costs \$500,000 dollars per annum to water the streets of London, and notwithstanding this enormous outlay, the dust cannot be laid. The demand for something more effectual has given rise to the invention referred to. The composition used is from 1/2 lb. to 1 lb. of the mixed chlorides of calcium and sodium to one gallon of water. The salts are put in the cart and the water is then taken in. By the time the cart is full, the salts are dissolved. Although we have had sufficient rain in New York and Brooklyn, as well as in other parts of the country, the season in England has been remarkably dry, and consequently very unfavorable to the development of the principle upon which this invention is based, viz: the retention of moisture by the mixed chlorides. The reports, however, are remarkably favorable. It produces a most important effect upon the surfaces of macadamized roads, hardening and concreting the material in such a manner that when it is perfectly dry, no dust arises from the passage of ordinary traffic. The light dust always found upon a dry road surface, watered with plain water, is not to be seen. The surface remains firm with the absence of detritus. The roads are thus rendered more durable, while the chlorides being anti-putrescent, a sanitary advantage is gained, at the same time that economy in the use of water is secured—important considerations in all large cities.

The shopkeepers, along the streets where this composition has been used, have given their testimony in its favor. They state that, instead of having their shops filled with dust, they can scarcely see a particle, and on Sundays, while other streets are smothered in dust, they rejoice in immunity from this nuisance.

The chlorides used are cheap, and obtainable in large quantities. The chloride of calcium has not been in large demand heretofore, but can be manufactured to any extent. There seems no practical difficulty in the use of these salts, and we hope that a trial of them will be made in this country. The city of Calcutta, in India, is about to test the method. The dust is said to be intolerable there, and of a most damaging nature to clothing, etc., as the roads are made of brick, easily pulverized by the feet of horses and the wheels of vehicles.

THE EARTHQUAKE TERM.

Our mother earth is passing through one of those periods of convulsion the phenomena of which are among the most terrible of all the manifestations of physical forces. The throbbings of the earth crust, which have extended over so vast an area during the last twelve months, the meteoric shower, and the meteorological phenomena during the same period, are together an interesting subject of study. What mysterious connection exists between these occurrences, if any does exist, or rather the real nature of it, has never been satisfactorily shown; and there is yet, perhaps, room for skepticism upon the hypothesis that the cosmical matter from which the enormous number of meteors periodically rain upon the earth's surface has any direct agency in these disturbances. That the weather and other atmospherical phenomena are influenced by some cause acting in concert with the causes of earthquakes, if not by the same causes, must be admitted. It would be interesting to review in this connection the histories of some of the most remarkable earthquakes on record; we will, however, allude only to one, which destroyed the city of Caracas, in Venezuela, in 1812. The shocks of this earthquake continued at intervals for months previous to the above catastrophe, and were felt with more or less violence from the mouth of the Ohio river to that of the St. Francis, in the United States. Fissures were opened, lakes disappeared, trees were felled, and such changes produced in the general appearance of the surface that a tract 70 to 80 miles in length and 30 miles wide along the Whitewater river and its branches has ever since been called the "sunk country." The traces of the fissures and chasms produced at that time were visible for years, and were noticed by Flint, the geographer, seven years after their occurrence, and Lyell, the geologist, as late as 1846. Such were the effects of this convulsion in our own land. Throughout Mexico and Central America they were still more remarkable, increasing in intensity as they extended further south, finally terminating with the destruction of Caracas, which involved the almost instantaneous death of 12,000 people. The atmospheric phenomena during the period preceding the final great convulsion was exceedingly peculiar. Electrical discharges from an apparently cloudless sky were frequent. Vivid auroral displays were more than ordinarily common. At New Madrid, below St. Louis, the inhabitants were at one time surprised and alarmed by the appearance of the sky, which although cloudless, presented along the western horizon a most brilliant electrical display. A continued glare of most vivid lightning, accompanied by what was at the time supposed to be incessant thunder, appeared to proceed from below the horizon, and coupled with the preceding alarming events, produced great terror in the minds of the people.

The present season has presented great climatic peculiarities. From all parts of the world come accounts of hurricanes, floods, unusual vagaries of temperature, and prevalence of winds from unusual quarters. The Scientific Review, speaking of the extraordinary heat and drouth experienced in England, says: "The southerly winds have prevailed for an unusually long interval, and the weather has consequently been very hot and very dry. On the 22d of July it was possible to cook a beef steak on the south side of Westminster Bridge by the heat of the sun's rays alone. The apparatus employed was of a very simple kind; it consisted of an empty cigar box, the inside of which had been blackened, and the top closed with three panes of glass about one inch apart. In the course of twenty minutes the steak was done on both sides, while a few potatoes were baked around it."

With the south winds and the extreme heat in England have appeared the mosquito, which threatens to become a pest in a country hitherto exempt from that annoying insect. The peculiarities of our climate during the last twelve months have attracted much attention. Both extreme cold and heat have been experienced, and these extremes have continued for extraordinary periods, while we have had unusual storms of wind and rain. All this indicates unusual atmospheric disturbances. Overhead and underfoot the elements are warring with terrific energy. The recent eruption of Vesuvius, the earthquakes in the West Indies and the Sandwich Islands, the meteoric fall of 1866 and 1867, the alleged shifting of the Gulf Stream nearer to the eastern continent, and above all the accounts just received of the disastrous earthquake in southern Peru and Ecuador, exceeded in destructive effect by only two similar events on record, constitute a series of remarkable occurrences which may not perhaps be rashly regarded as the commencement of an epoch of permanent physical and climatic change to which the earth is destined. Some will see in these events the fulfillment of prophecy, and the indications of moral and political changes not less momentous.

The causes which produce the grand and terrible phenomena of earthquakes are doubtless various. The generation of gases by chemical reaction, and the development of enormous volumes of superheated steam, by the contact of water with the intensely heated interior of the earth, are without doubt the most common and potent. The distance below the surface at which these forces act, although undoubtedly great, is unknown. The sensations produced upon people by earthquake shocks have peculiarities which must be felt to be realized, as it is impossible to give any adequate description of them. The most graphic description we have ever heard, was given to us by a gentleman who has experienced several of these occurrences both at sea and on land. The sensation at sea he says is often described as resembling the shock produced by a ship's striking upon a reef, but there is a feeling of something different, a sort of instinct of something further away and more powerful, which accompanies the first feeling of surprise and alarm, a sort of mysterious pulsation through the water, which once experienced is not easily forgotten. On land he describes it as being like what would be the feeling of a person standing upon a flexible, buoyant substance, like an immense tarpaulin spread over the surface of a liquid mass in a state of violent agitation. The undulations succeed each other so rapidly and irregularly that it is impossible to time one's steps to meet them, persons are suddenly and violently prostrated, while the mysterious subterranean noises, the peculiar appearance of the sky and atmosphere, the universal alarm of all living things, conspire to produce the most appalling spectacle that the imagination can conceive.

The accounts received from Ecuador and Peru indicate a disaster of almost unparalleled extent, and the misery which must inevitably result will appeal to the sympathy and the charity of the entire civilized world. Whether it will prove the grand finale of the present earthquake term, or whether other disasters are to follow, no mortal can say. Time only can determine this, but we trust that the giant forces which have produced such wide spread devastation and death have expended their energies, and the earth may again "rest for a season."

INQUISITIVENESS--OUR CORRESPONDENTS.

Most people are inclined to think inquisitiveness a very disagreeable characteristic, and it must be admitted that when it expends itself upon the acquisition of a minute knowledge of other people's business, no other adjective can be found which seems more applicable, unless it be some which are prohibited in polite intercourse. But although in personal and private concerns this quality renders its possessor an unmitigated nuisance, in matters of science and philosophy it is the prime motor. The great discoveries that have ever been made have resulted from inquisitiveness. There are those who seem to believe that *acquisitiveness* is the great stimulus to progress, and we do not deny that it has had a large share in initiating and forwarding the enterprises, and improvements which characterize the present age; but before *acquisitiveness* will induce men to aid in the investigation of any subject, the inquisitiveness of those who demand from nature the revelation of her mysteries, must be rewarded by such plain and direct responses, as to give some warrant for the assumption of pecuniary risks.

Such inquisitiveness is the chief attribute of philosophical minds. It has stimulated the Newtons, Watts, Franklins, Faradays, and Ericssons of past and present ages to plunge into the most laborious and complicated investigations, for their own sake. The search after knowledge, for the pure love of it, is what has paved the way for all the great achievements which have so ameliorated the condition of mankind.

The position of this journal, upon the relative merits of of practical science and speculative philosophy, must be well understood by our readers. We have been opposed to abstract speculation beyond certain limits, and except for the purpose of opening the way to real and earnest investigation of facts. The inquisitiveness of which we speak is never satisfied with hypotheses. The positive or negative response of actual experiment is its ultimatum, and until that be reached it will not be content. No man, however gifted by nature or improved by culture, can be perfectly sure that in forming a theory he has embraced all the facts which relate to it. Prof. Tyndall has said, that "the true physical philosopher will never rest content with an inference, when an experiment to verify or contravene it is possible." We are daily in receipt of theories upon all manner of subjects—some of them crude, some of them remarkably ingenious. That the most of