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," 8 Spruce street.
☞ 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. 6....[NEW SERIES.].... *Twenty-third Year.*

NEW YORK, WEDNESDAY, AUGUST 5, 1868.

Contents:

(Illustrated articles are marked with an asterisk.)

INSTRUCTION AND AMUSEMENT COMBINED.

Within a few years the business of toy making has assumed considerable proportions in this country; and it is not strange, considering the utilitarian character of our people, that the style of toys made should be different from those made by poor Caleb in Dickens' "Cricket on the Hearth." Our toys are either artistic or mechanical—perhaps both. Certainly they are incomparably above our imported toys, especially when they simulate life. They are not repulsive exaggerations, nor caricatures, but life like Even our dolls are pleasant to look at; almost instinct with life. All our toy representations of animal life are of a similar character. This taste, this striving after the actual, even in these little things, as some would call them, is very encouraging. Our young derive their knowledge of the world from things rather than from their representatives, words, and first impressions are lasting. Toys during the period of childhood are their constant companions, and from them, as models of the real, they derive their only actual knowledge. For this reason their toys should be reasonable.

But in mechanical toys particularly the Americans excel. Walking dolls, running steamboats, fire engines, carriages, etc., with many other similar contrivances, worked by simple clock work and driven by a coiled spring are both common and cheap. Some of them beautifully illustrate mechanical movements and may be made a means of instructing children in the principles of mechanics, while at the same time amusing them. The same may be said of chemical toys which illustrate some of the most important principles of chemical science.

But we think there is room for still further attempts, and successful, in this direction. It seems strange that the simplest of machines—the steam engine—has not been presented to the public as a toy. Miniature steam engines are common enough; but they are usually more than necessarily elaborate in finish and therefore costly in price. They are built either by amateurs as specimens of their mechanical skill and regarded as curiosities, or constructed by machinists or model makers to fill orders from educational institutions to be used to illustrate problems in natural philosophy. The amount of finish put upon these miniature specimens places them beyond the reach of the mass, or the vagaries of their builders in adopting unheard-of plans for their engines deprives them of practical use as means of instruction. Beside this, many otherwise sensible people believe that the steam engine with its necessary boiler is simply another form of a gunpowder magazine, ready at the touch of a match to blow their house into "finders" and themselves into eternity. Perhaps the discussions in the SCIENTIFIC AMERICAN in regard to steam boiler explosions and the records of accidents in our daily papers conduce to this feeling of insecurity. But really a toy steam engine standing on the table or the mantel and running at lightning speed is much less dangerous than a common kerosene lamp.

Probably few machines are simpler in principle or easier in construction than the steam engine Of course a large machine, with all its appurtenances and its exactions, appears to be complicated, and it is so in one way; the larger the engine the more accurate must be the fit and working of the parts to hedge in and control the subtile element of steam. But a small engine, such as would be appropriate as a toy, may be built by the most ordinary mechanic; and it may be made plain, light, and cheap. The mechanic who shall introduce this as one of our mechanical toys may be assured of a handsome return for his outlay, while the public will be gainers in a familiarity with what is now thought by many to be a mechanical mystery and a dreadful agent of evil.

ENCKE'S COMET.

This celebrated comet is now expected to make its appearance again, and it is not improbable that it will be observed before this article is printed. As it will probably be much talked about, a few words in regard to it may not be uninteresting to our readers. Encke's comet was discovered by the astronomer Pons, at Marseilles, in 1818. Encke, however, was the first to calculate its elliptical elements, and hence his name has been given to it. One of the results of Encke's calculations was to establish its identity with the comets observed in 1786, 1795, and 1805. After its observation by Pons, Nov. 26, 1818, it remained in view until 1819, since which time it has been regularly observed at each return. Its period is approximately three and one fourth years. It can rarely be seen by the naked eye, and it then appears as a star of the fifth or sixth magnitude, exhibiting, under favorable circumstances, a faint nebulosity.

This comet is remarkable not only on account of its periodicity—many comets having no periods—but also on account of the fact that its period is shorter than any other known periodical comet. It also exhibits a peculiarity in its motion which has given rise to much speculation. Observation has shown that its period is constantly diminishing, at the rate of about two hours and a half for each revolution. A similar retardation has been discovered in the motion of other comets having short periods. It is argued from this fact that the orbits of these bodies are constantly shortening, and that they are gradually approaching nearer to the sun, upon the surface of which they must ultimately fall. The cause for this retardation is attributed to a medium existing in the interplanetary spaces, of such tenuity that it does not perceptibly affect the motions of the denser heavenly bodies, but which opposes resistance to the attenuated masses of comets, the amount of resistance being assumed to increase with the square of the velocity of the moving body. Herschel and many others have dissented from this hypothesis, and have attributed the retardation of its motion to the gradual loss of its tail. However, it has only twice been observed to present the appearance of a tail. In 1805 it was observed by Prof. Huth, of Frankfort, when it exhibited a tail three degrees in length. In 1848 Professor Bond, at Cambridge, also observed a tail extending toward the sun. It appeared like a faint brush of light. This discovery attracted great attention, as it is very unusual for comets to exhibit any appearance of a tail in the direction of the sun. Some weeks afterward another tail was discovered extending from the sun, also very faint and about two degrees in length, the one first discovered still remaining visible. The same peculiarity was also presented in the appearance of the comet discovered in December, 1823. The projection of the tails of comets toward the sun completely upset many ingenious hypotheses which were supposed to approximately account for both the material and the direction of these singular appendages, and after ages of observation and speculation we are still in the dark as to the real nature of cometary matter. It is probable, however, that the spectroscope will hereafter be used to great purpose in the solution of this problem. Indeed some facts have been already added to the former stock by its use, although nothing has been attained that can be considered a sufficient basis for a complete and satisfactory theory.

The orbit of Encke's comet lies wholly within that of Jupiter, and it performs nearly four revolutions to one of that planet. Its frequent proximity to the planets of our system, and its small relative weight, give rise to marked perturbations in its motions, which have furnished valuable data for the determination of the masses of those bodies. By the use of these data important corrections have been made in previous computations of the respective masses of Jupiter and Mercury.

The observation of this comet has confirmed the truth of the assertions of Hevelius and Newton, that the volumes of comets contract as they approach the sun, and enlarge as they recede from it. This is accounted for by the supposition that the heat of the sun disperses the exterior portions until they become invisible from their extreme attenuation. As the comets pass into colder regions, the reverse takes place.

We have said that the period of Encke's comet is shorter than any other known. The comet of 1264 is supposed to have the longest period of any known, it being over three hundred years, making some allowances for imperfect data and calculations. The distance traveled by one of these bodies in such a period, flitting through the heavens at rates far exceeding any other of the heavenly bodies, is beyond all human conception. What wide and obscure regions are visited by them after they have disappeared from human observation, to what unknown systems and mysteries of space they penetrate, must forever remain a subject of doubt and speculation to the human mind. We may in a future article say something in regard to other remarkable comets, and the hypotheses to which we have alluded.

SHOULD THE PATENT LAWS BE EXTENDED TO HORTICULTURE.

Under the above caption the *The Horticulturist* discusses the value of the Patent Laws and suggests an extension of their benefits so that they may do for the farmer, the florist, and the horticulturist what they have already done for the mechanic. Our cotemporary says, let there be, in connection with the Agricultural Bureau, an office of record, where the name, character, quality, description, etc., of new varieties of fruit and grain, originating in this country, shall be entered and secured to the originator. Let specimens be sent to trustworthy correspondents of the bureau in various sections of the country, so that its value for general cultivation may be determined. Let the result thus arrived at be publicly announced under authority of the bureau, and the right to vend the article be vested in the originator and his licensees for a term of years. Something of this kind would wonderfully stimulate to continued improvement in the production of choice varieties of plants and grains to the great advantage and profit of the country. While it would secure to the originator the just reward of his skill and labor, it would protect the public from the thousand impositions now put upon them by the venders of new varieties of untried and doubtful value. As this business is now conducted, we have no hesitation in asserting that many thousands of dollars are annually thrown away in the purchase and planting of fruits, for example, which, however valuable they may have proved in their original locality, are totally unprofitable and useless for cultivation in other sections under an altered condition of soil and climate.

We know of many instances where other deserving horticulturists and agriculturists, who have devoted their best years to the public good, have had only their labor for their pains; other persons, to whom they have sent specimens of their plants, in various sections, to test their value, having stepped in to rob them of their reward. Every year the nurserymen of the country are mulcted in large sums of money for the purchase of new and professedly valuable plants, which too often prove of little or no value. These being sent out at extortionate prices, for general cultivation, and failing to answer the expectations excited by the glowing descriptions published of their merits, tend to discourage cultivators and bring the profession of Horticulture into disrepute. Were some such system adopted as we have suggested, however, the honest experimenter would be protected in the product of his labor, and the prices of new plants would be set at a more reasonable figure, so as to be within the reach of all, because the originator would, instead of, as now, being compelled to realize his profits out of his first season's sales, be secured in their enjoyment for a term of years.

We know it may be urged that such a provision as this has never yet been incorporated into the Patent Laws of any nation; but of its necessity, its justice, there can be no question. As the United States, by its greater liberality to inventors, has stimulated the arts and sciences, and added to the industrial wealth and resources of the people more than any other government in the world, let it go one step farther and by judicious legislation, stimulate the husbandman to take rank among the highest order of productive agents, and elevate and dignify that profession which, however much lauded by poets and extolled by politicians as an ennobling one, has heretofore been of the earth, quite too earthy.

THOUGHT AND EXPRESSION.

The eyes have been called "the windows of the soul." They are not only windows, but they and all the other organs of sense are doors by which impressions and ideas obtain ingress to the mind. The organs of speech, the hands, the muscles of expression, and the eyes, are the doors through which thought passes out of one mind to enter another. The perfection of these mind-valves has, probably, as much to do with what is commonly called mental vigor as quality of brain or its size. We think in language, and the more limited our language, the more limited must be our thinking power.

It is not essential to thought, however, that we should think in language of our own. We may think, in the language of another, thoughts which our limited means of expression are inadequate to utter. This is the case with mutes who possess the sense of hearing. They know and think in a language which they cannot speak. The same is true of animals to a very limited extent. If the mind of man were only accessible through such channels as that possessed by the dog, and if his means of expression were equally limited, it may well be doubted, whether the texture of his brain would enable him to exhibit higher mental manifestations than that animal.

It is possible that in the search for the causes of man's mental superiority to animals, too much stress has been laid upon the differences in the constitution of the brain, and too little attention has been paid to the effect upon mental development produced by his vastly superior physical organization.

We once heard an eminent professor, in a lecture upon the brain, make the statement, that the proportion of gray vesicular nerve matter which is found upon the surface of the white substance which forms the largest portion of the mass of the brain, was an index of the intelligence of animals, and that as the depth of the convolutions upon the brain increased its surface, such animals as possessed deeply convoluted brains would be found to possess a higher degree of sagacity than those having brains of more even surface. As an instance, he mentioned the horse, and declared that on account of his deeply convoluted brain, he possessed greater intelligence than any other animal.

We think the majority of our readers will hardly believe that the horse is more intelligent than the dog, or the elephant. We feel certain, however, that a dog will express such ideas as his limited powers permit with greater facility than the horse. As to how far physical organization influences mental manifestations, it is difficult to say, but that it it has more effect than is usually attributed to it seems probable.

MEASUREMENT OF HIGH TEMPERATURES.

We have lately received several communications requesting information in regard to the best means of measuring high temperatures in kilns and furnaces. We reply to these queries, that Daniell's Pyrometer is undoubtedly the best instrument for the purpose. The well-known Wedgewood's Py-