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EDISON AND THE UNSEEN UNIVERSE.

Hitherto man's knowledge of the extent of the universe brightness, we see but a minute fraction even of the little world we inhabit. At night a wider reach of vision is possible, and some thousands of stellar and planetary bodies are added to the domain of positive knowledge, thus enlarging enormously man's idea of the magnitude of the of the universe opened up by the telescope; and every addi- seems to be the only bar to its general adoption. larger universe within our ken.

> That the most powerful of telescopes enables us to reach the limit of the universe no one imagines. See as much as we knowledge ends with the limit of vision.

that are unseen and unseeable! Mr. Edison's plan is to ad which has just gone into operation. Seeing that the tasimeter is affected by a wider range of Philippines, and Fernando Po. etheric undulations than the eve can take cognizance of, and burnt out suns or feebly reflecting planets-now unknown because not luminous.

-----IMPROVEMENTS NEEDED IN SALT MAKING.

salt manufacturers of Syracuse, who have so long enjoyed a twenty years. monopoly, are beginning to recognize the fact that the methods which have so long prevailed for the manufacture and expensive for these times of sharp competition in the us the command of their markets. business, and is at last not indisposed to admit that some change might be advantageous.

50 to 75 square feet of grate surface, and at the other an upright smoke stack, while arranged all along on the top of have so long suffered, in pocket as well as in credit. this flue are open circular iron pans for the evaporation of the salt water.

sufficient burning gas to fill the flue throughout its length; and manufacturers. but of course the pans at the grate end evaporate the water four or five times more rapidly than those at the other end. The water in the pans is constantly replenished until several inches of salt are deposited, which is then removed with shovels, and the evaporation renewed.

Another method of very economical firing for salt works would, in our opinion, be found in the use of pulverized has been bounded by the limits of vision. During the day, bituminous coal, by which agreat saving in cost and amount when the range of sight is narrowed by the sun's excessive of fuel, and a long, hot flame throughout the flue, could be secured; and this plan, we understand, is about to be tried by parties in Pomeroy, Ohio.

The objection to the use of pans for evaporation has been removed by substituting for them revolving cylinders, whose continual movement prevents the local deposit of the salt universe. But the increase of knowledge which darkness and thereby greatly economizes or makes of use the volume reveals is almost infinitesimal compared with the wider view of heat now lost. The expense of the plant for this system

-----THE NEW PATENT LAW OF SPAIN.

The splendid exhibit which Spain and the Spanish colomay, more—perhaps infinitely more—lies beyond. So, at nies displayed at Philadelphia was a surprise to many. For least, all experience leads us to infer; but our positive a century or more the curse of bad government had weighed so heavily upon the industries of that once powerful coun-Must this always be so? Hitherto science has given no try that the recovery of its former standing among nations hint of the possibility of exploring the vast and mysterious ' was regarded by most people as practically hopeless. The beyond, from which no visible ray of light has ever been de- numerous prizes won by Spain at the Vienna Exhibition, tected, or is ever likely to be detected, by the most far- however, had clearly indicated that the period of Spanish reaching and sensitive of optic aids. But now there comes a decadence had come to an end, and that the spirit of the promise of an extension of positive knowledge to fields of nineteenth century had at last. though tardily, gained a space so remote that light is tired out and lost before it can lodgment there. The energy and industrial earnestness traverse the intervening distance. A new agent or organ manifested in connection with the Centennial Exhibition of scientific sense for space exploration has been given to proved that Spain was becoming once more a power in the the world in the tasimeter, by which it is possible not only world-industrially if not politically. A further and if to measure the heat of the remotest of visible stars, out, Mr. anything more striking evidence that the country is in ear-Edison believes, to detect by their invisible radiations stars nest in regard to industrial progress is seen in the patent law

just the tasimeter to its utmost degree of sensitiveness, then Hitherto patents have been granted in Spain only under attach it to a large telescope, and so explore those parts of such onerous conditions as to practically exclude the majorthe heavens which appear blank when examined by tele- ity of inventors, foreign inventors especially, from any scopes of the highest penetrative power. If at any point in share in the very limited benefits offered. The new law is such blank space the tasimeter indicates an accession of tem- comparatively liberal, placing foreigners on the same footperature, and does this invariably, the legitimate inference ing as natives, and the interests of the inventor are well prowill be that the instrument is in range with a stellar body, tected. The duration of patent rights has been largely exeither non-luminous or so distant as to be beyond the reach tended, the fees have been greatly reduced, and a single patof vision assisted by the telescope; and the position of such ent now covers not only Spain, but all the Spanish colonies body can be fixed and mapped the same as if it were visible. -the Balearic Islands, the Canaries Cuba, Porto Rico, the

Heretofore separate patents had to be taken out for each is withal far more acutely sensitive, the probabilities are of these possessions, each costing several times more than is that it will open up hitherto inaccessible regions of space, now charged for all. Certificates of additions, covering any and possibly extend the range of our real knowledge as far improvement or modification of patents, are granted any time beyond the limit attained by the telescope as that is beyond within the first year; and subsequently the inventor is givthe narrow reach of unaided vision. Possibly too it may en the preference for new patents on improvements. Patbring within human ken a vast multitude of nearer bodies- ents may be inherited, sold, or donated, the same as other property. The time allowed for the official working of patents is extended from one year to two. Infringements are punishable by tines, confiscation of machinery and products for the benefit of the patentee, and, if repeated, by im-Judging from articles in some of our recent exchanges the prisonment. The life of a patent has been extended to

Inventors and manufacturers will readily appreciate the value and importance of the field laid open to them by this of this commodity require considerable modification in order law-certainly that part of it embraced in the Spanish West to encourage continued or further investment of capital; Indies. The commercial relations of our country with Cuba that the conservatism which has for so many years held fast and Porto Rico are steadily increasing in scope and value, to the old system, is beginning to find that it is too crude and the nearness of those islands to us must ultimately give

The protection which patented inventions now enjoy there cannot but prove of signal advantage to our manufacturers The salt block of to day consists of a horizontal brick flue in many ways, not the least of which may be the shutting 90 to 110 feet long, or thereabouts, having at one end from out from Spanish-American markets of British and German counterfeits of American products, by which Americans

As our readers are doubtless all aware, the publishers of this paper are also solicitors of American and foreign patents. When in operation a large amount of soft coal (two or Their advertisement, with special reference to Spanish patthree tons) is kept burning on the grate in order to produce ents, in another column, will be of interest to inventors

.... LOCAL ENCOURAGEMENT OF MANUFACTURES.

A member of the Baltimore City Council proposes to that body the appointment of a permanent commission of prom-The excessive consumption of fuel and the unequal tem- inent citizens, whose special duty shall be to promote the esperature in the flue are the most immediately apparent ob- tablishment of manufactures in that city. Among the jections to this method, but one of no less importance lies in means proposed for securing that end is the proffer of sites the fact that the deposit in the pans of several inches of salt for manufacturing establishments at low rates, the exempconstitutes such a non-conductor of heat that a large por- tion from municipal taxation of the buildings and machinery used, and the granting of special water rates. The two first objections may be overcome by improved Speaking of this proposition the Baltimore Sun pertinently methods of firing; one of which would be to build a cylin- remarks that except in rare instances and under peculiar drical fireplace (which should be fed from the top), lined with circumstances it is always by a combination of manufaca coil of pipe for superheating steam, then to make within tures and commerce that cities grow populous and wealthy. it a fire of anthracite culm, and force up through the burn- Every new manufacturing establishment brings an accession ing coals a jet of the hot steam, which, first passing through of citizens-who require additional houses, and whose wants the coil, should carry with it into the mass of fuel sufficient must be supplied by additional artisans and shopkeepers. air to maintain active combustion. The steam, taking air | The wealthiest States are the manufacturing States, and they with it, becomes decomposed by passing through the hot are the ones which sustain a numerous population. Rhode coals, and creates a very high temperature and a long and Island, for example, depending almost entirely upon manufull hydrogen gas flame, which, extending throughout the factures, has a larger population for its area than any other length of a "block," would secure a far more equable heat in the Union. So with cities. Philadelphia, which until recently has had no foreign commerce worth speaking of,

> The gathering of eight or ten thousand inhabitants about the mills and manufactories in the suburb of Baltimore known

- Status, you the Leterphone to Leeple currents —Jablochkoff's Dynamo-Electric Machines. 1 figure.
 NATURAL HISTORY, GEOLOGY, ETC.—Recent Progress of Entomology in North America. North American butterflies —A strange Insect. The Basket Carrier, or House Builder Caterpilar. By Wiltham H. GIBSON, New York. A species of moth of which the female has never been discovered. How are the eggs fertilized?
 The Earthquakes of 1877. The eruption of Cotopari. The Europian of the Jayanese Island Volcano Ooshima. Eruption in Southern California. Earthquakes in Spain, Switzerland, and elsewhere. Statistics of Earthquakes; comparative frequency in summer and white:
 A Variation in the Moon's Motion caused by the Earth's Spheroidal Figure. By D. F. BLACKSTONE, with figure. An Estimate of Geological Time.

VI.

tion of the thermal value of the fuel used is lost.

than is now done.

than is now done. MEDICINE AND HYGHENE — Medical Uses of Carbolic Acid. A clinical lecture delivered at the Norfolk and Norwich Hospital, Eng-land By PETER EARS, M. D. Carbolic Acid in Carbonets.— The Al-kaline Treatment of Burns and Scalds — Dunger from Hypodernic In-Bedian of Morphia.— Diseases of the Ear from Bathing.— The Al-Discusse treated by Volcanic Vapors.— The New Dental Departure. By L¹ Microfirth. M. D. Fast history and present state of dentistry, with plain hints useful for all. Gold, tinfoil, gutta percha, and white This method of firing was in successful practice and has grown populous and wealthy within a little more than brought to our notice eighteen years ago at certain experi- thirty years through the numerous manufactures that have mental works in Philadelphia, but since then we had heard been established within her limits.

as Woodberry is looked upon in that city as an earnest of what might be done on a larger scale for the city's growth and prosperity by increasing the number of its manufacturing establishments. If, as the Sun remarks, the hearty cooperation of every citizen will be given to whatever effort may be made to increase the manufactures of Baltimore, there can be no doubt that intending manufacturers will take the advantages offered into careful consideration

INDEPENDENT WORKERS.

As the larger industries from the pressure of the times become crappled or paralyzed, it is surprising to note how quickly our American inventors devise machines and appliances for doing in a small way what was before done on a large scale, in factories controlled by capital and employing heavy machinery and a great number of men.

When capitalists fear to invest and the whole manufacture ing world is in a state of suspense, the self reliance of the mechanic or artisan is brought to the test. Then each must begin an industry for himself, choosing the particular branch of manufacture with which he is best acquainted.

In these days, for almost every branch of industry, tools and machinery that can be operated single handed are obtainable. With such tools and machinery, and with a rea sonable amount of energy, skill, and good judgment, it would rarely happen that a man could not at least earn a livelihood, with the probability of doing much better, and with the satisfaction of being his own master

A thousand energetic men with a thousand light machines would, in many branches of manufacture, prove formidable competitors for a large establishment, employing the same number of men, and especially in the present state of affairs is it evident that the small manufacturers have the advantage over the larger, who now struggle against interest on investments, and are obliged to conduct their business on an unprofitable scale; if at all.

Now, when mechanics and artisans are looking for the dawn of better times, and hoping for the revival of industries, is the time for every workm in to become capitalist, president, vice president, secretary, and superintendent. Instead of "waiting for something to turn up" let every workman apply himself to business. We would then have a multiplicity of industries which would increase in importance as the times grow better, and furnish employment while the times are unpropitious.

A CURIOUS INSECT.

Practical entomologists will find a very interesting and suggestive study of a singular phase of insect life in Mr. William H. Gibson's paper on the "House Builder Caterpillar," printed in the current issue of the SCIENTIFIC AMERICAN SUPPLEMENT. Mr. Gibson says that for a dozen successive years he has studied this insect, collecting hundreds of caterpillars and cocoons and watching their transformations. Meantime he has searched in vain for any satisfactory account of the singular features of the reproduc- moon.

tion of the insect and the fertilization of the Harris says that the female never eggs. leaves her cocoon. Packard says the same. Gibson says there is no female!

Mr. Wood says of a West India species that the female has no external vestige of wings, and looks more like a grub than a moth, the head, thorax, and abdomen being hardly distinguishable from each other, and adds: "Love and courtship with this insect are carried on quite in an oriental fashion pushed to extremes; for whereas the oriental in many cases never sees the face of his vailed bride until after the nuptial ceremony is completed, the house builder moth never sees his mate either before or after marriage, and so is obliged to love blindly or not at all.'

Mr. Packard's account is characterized as "more specific but nevertheless unsatisfactory." He describes the female as wingless, cylindrical, and in general form closely resembling its larva. The fertilization of the female he believes to take place while it is within the case, which it never leaves, and in which the eggs are deposited. This conclusion Mr. Gibson thinks to be based entirely on inference not at all on observation

PHOTOGRAPHIC AND OTHER VIEWS OF THE ECLIPSE.

We are indebted to several amateur and professional astronomers for interesting reports of their observations, but have room for only the following:

Fig. 1. a copy of a photograph taken at Indianapolis, Ind.,



by Mr. F. M. Lacey, we owe to the courtesy of Mr. L. T. photograph are very fine.

Fig. 2 represents a series of diagrams sent by J. B. Jones, M. D., representing the several phases of the eclipse indicated, as observed through an ordinary field glass at Caddo C. H., Indian Territory. The time is that of Sedalia, Mo. From 4:15 to 4:35, the sun was partially obscured by the



tality, then regularly diminishing to the end of the eclipse. In his diagrams, however, he has completed the circle of the moon for each phase of the eclipse from the portion visible, and, misjudging the impinging curve, has drawn the curious series of expanding and diminishing moons shown in the cut.

The moral of it all is the uncertainty of individual observation, however sincere, particularly when the observer is not an expert. Had the phenomenon been one of local or unique occurrence, visible to no other observer, such a misreading of facts might have given rise to endless theorizing to account for the real or apparent increase and diminution of the moon's orb before and after totality. Indeed, in earlier times the hottest of controversies have arisen from just such mistakes.

THE ECLIPSE,-A NOTE FROM PROFESSOR MITCHELL.

[The following pleasant note from the head of the Vassar College Eclipse Expedition touches some points not noticed in the press reports.-ED. Sci. Am.]

DENVER, July 29, 1878.

The weather has been all that any one could desire, and the eclipse has been successfully observed.

The brilliancy of the corona far exceeded that of the eclipse of 1869 as observed at Burlington, Iowa, but the rosy prominences were less marked. We obtained a sketch of the corona in oil during the 2m. 40s. of totality.

Mercury, Regulus, and Mars were scen, Venus was very brilliant, Procyon and several other stars were visible. Situated as we were on a lofty plain outside of the city of Denver, the landscape (including, as it does, a long sweep of the Rocky Mountains) was wonderfully beautiful. The sweep of the black shadow was seen as it approached us from the Rocky Mountains, and its retreating darkness was seen to cross the plain to the southeast.

I have been assisted in the day's work by four of the graduates of Vassar, and every facility has been afforded us by the citizens of Denver. MARIA MITCHELL.

THE STUDY OF REAL LIFE IN SCHOOLS.

Referring to the growing custom of using newspapers in the place of reading books in schools, a teacher in the Milwaukee High School, Professor L. Burstall, writes us that for some years he has used the SCIENTIFIC AMERICAN in that way with the most beneficial results. His belief is that a great part of the work of schools, especially of the higher grades of schools, should be to direct the work of students to "real Stanley of that city. It shows the eclipse as it appeared results," to knowledge "that may give them a lift in future there at 4h. 51m. P. M. The cloud effects as shown in the years," and fit them to understand that they "ought to be greater, more practical, more decisive than their fathers." For this reason he thinks that too much time is given in the schools to the history of the past, to human conflicts and dynastic struggles, battles, mad strifes, and the victories of hypocrisy and brute force; and too little time to the history of real progress of the present age, the history of the steam engine, the telegraph, and other inventions, the influence of

which would be to impel the students to emulate in their lives the men who have lived and labored for the real benefit of humanity.

As the best exponent that he knows of the realism which is the mainspring of our country's success is the SCIENTIFIC AMERICAN, he insists that it ought not only to be on file in all school libraries, but that it should be used as a common reader, for translation and for composition, as a leader for class work and home occupation.

We are not sure but our friend is altogether right Certainly one great fault with current school teaching is that it gives too little attention to, and is too little in sympathy with, the real working and determining forces of the age. As our correspondent puts it, "too much time is given to the knowledge of the past, very little to the present and the future." As a natural consequence, most students leave school not much better fitted for the life of to-day than they would be had they been schooled a hundred years ago and laid away to sleep for a century. The reading of a paper like the SCIENTIFIC AMERICAN in school or at home must do much to correct and atone for this neglect of the scientific conditions and aspects of modern life in the routine work of the schools. While much of the information given is beyond the years of school children, enough of every-day life is covered from week to week, pictorially or otherwise, to make the paper instructive even to the youngest.

According to Mr. Gibson's observations the female larva is transformed, not into a moth, but into a bundle of eggs and a little fuzz, which, under the microscope, reveals forms of wing scales similar to those on ordinary moths. If fecundation takes place at all it occurs either during the caterpillar state, which is improbable, or the fecundative is passed down several generations after the manner of the Aphides. Mr. Gibson illus-

hedge and shade trees.

MAN

and one ounce of oxygen gas,

One Effect of the Chinese Famine. The great famine in China has created a sudden and large demand for the cereals of

trates by numerous drawings the various stages in the de- In these diagrams the observer has evidently given pre- the Pacific slope, and the farmers of that region prosper acvelopment of this strange insect, as observed by him. cisely what he thought he saw; but it is equally evident that cordingly. All the steamers from San Francisco now go The caterpillar inhabits the arbor-vitæ, larch, hemlock, and he did not see what he represents. We reproduce his draw- out fully loaded with flour. Unfortunately many California the like, sometimes doing much harm to these favorite ings as an illustration of the liability of unpracticed ob- farmers were deterred from seeding largely by the drought servers to misinterpret the testimony of their senses. Of of last year, and the wheat crop of the State is light; but course the observer did not see the full orb of the moon at the crop of Oregon is fair in quantity and quality. Already NINE ounces-a little more than half a pint-of water any time, save at the moment of totality. He saw at each the people of this coast are beginning to feel the revival of may be decomposed into eight ounces of hydrogen gas other instant a lenticular spot of black creeping over the trade, and the season promises to be a decidedly favorable face of the sun, increasing in size up to the moment of to- one.

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