Egypt in the Time of Moses.

We are only beginning to understand the height of civilization to which Egypt and other ancient countries around the Mediterranean had attained even before the time of Moses, says Sir John William Dawson, in the *Expositor*. Maspero and Tomkins have illustrated the extent and accuracy of the geographical knowledge of the Egyptians of this period. The latter closes a paper on this subject with the following words:

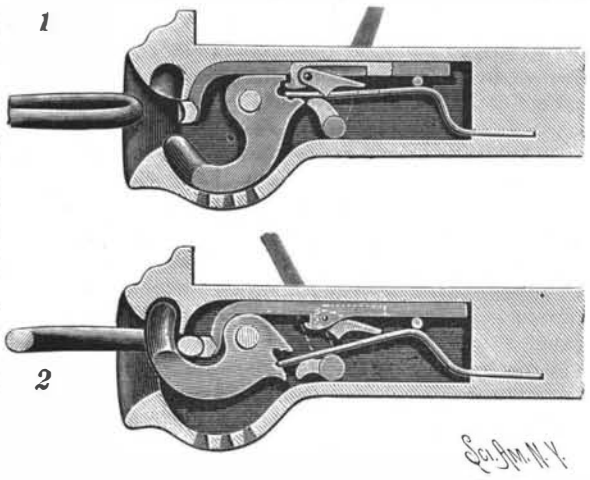
"The Egyptians, dwelling in their green, warm river-course, and on the watered levels of their Fayoum and Delta, were yet a very enterprising people, full of curiosity, literary, scientific in method, admirable delineators of nature, skilled surveyors, makers of maps, trained and methodical administrators of domestic and foreign affairs, kept alert by the movements of their great river, and by the necessities of commerce, which forced them to the Syrian forests for their building timber, and to Kush and Pun for their precious furniture woods and ivory, to say nothing of incense, aromatics, cosmetics, asphalt, exotic plants, and pet and strange animals, with a hundred other needful things."

The heads copied by Petrie, from Egyptian tombs, show that the physical features of all the people inhabiting the surrounding countries, as well as their manners, industries, and arts, were well known to the Egyptians. The papers of Lockyer have shown that long before the Mosaic age the dwellers by the Euphrates and the Nile had mapped out the heavens, ascertained the movements of the moon and planets, established the zodiacal signs, discriminated the poles of the ecliptic and the equator, ascertained the law of eclipses and the precession of the equinoxes, and, in fact, had worked out all the astronomical data which can be learned by observation, and had applied them to practical uses. Lockyer would even ask us to trace this knowledge as far back as 6,000 years B. C., or into the post-glacial or antediluvian period; but, however this may be, astronomy was a very old science in the time of Moses, and it is quite unnecessary to postulate a late date for the references to the heavens in Genesis or Job. In geodesy and allied arts, also, the Egyptians had long before this time attained to a perfection never since excelled, so that our best instruments can detect no errors in very old measurements and levelings. The arts of architecture, metallurgy, and weaving had attained to the highest development; civilization and irrigation, with their consequent agriculture and cattle breeding, were old and well understood arts; and how much of science and practical sagacity is needed for regulating the distribution of Nile water, any one may learn who will refer to the reports of Sir Colin Scott Moncrieff and his assistants. Sculpture and painting in the age of Moses had attained their acme, and were falling into conventional styles. Law and the acts of government had become fixed and settled. Theology and morals, and the doctrine of rewards and punishments had been elaborated into complex systems. Ample material existed for history, not only in monuments and temple inscriptions, but in detailed writings on papyrus. Egypt has left a wealth of records of this kind, unsurpassed by any nation, and very much of these belongs to the time before Moses; while, as Birch has truly said, the Egyptian historical texts are, "in most instances, contemporaneous with the events they record, and written and executed under public control."

There was also abundance of poetical and imaginative literature, and treatises on medicine and other useful arts. At the court of Pharaoh, correspondence was carried on with all parts of the civilized world, in many languages, and in various forms of writing, including that of Egypt itself, that of Chaldea, and probably also the alphabetical writing afterward used by the Hebrews, Phenicians, and Greeks, but which seems to have originated at a very early period among the Mineans, or Punites, of South Arabia. Educations were carried on in institutions of various grades, from ordinary schools to universities. In the latter, we are told, were professors or "mystery teachers" of astronomy, geography, mining, theology, history, and languages, as well as many of the higher technical arts.

AN IMPROVED CAR COUPLING.

This coupling has a spring-pressed hook to engage the link, and a slide for locking the hook in open position, the slide being adapted to be engaged by the entering link. The construction is very simple, the cars fitted with this improvement being automatically coupled as they come together, while the uncoupling



DUNLAP'S CAR COUPLING.

may be conveniently effected without the need of trainmen going between the cars. The invention has been patented by Mr. William Dunlap, of San Diego, Cal. Fig. 1 is a sectional view showing the hook in open position, and in Fig. 2 the link is engaged by the closed hook. The hook has trunnions journaled in the sides of the drawhead, and its rear end has a lip pressed on by the end of a spring, which may be lifted by a cam on a transverse shaft connected with a rod, at whose outer end is a handle at the side of the car. On the same end of the hook is also a second lip, above the first one, adapted to be engaged by a hook on the under side of a slide, whereby the coupling hook may be locked in open position. The forward end of the slide is bent down, and has a head or cross-piece extending into the mouth of the drawhead, above the free end of the coupling hook, so that an entering link will strike the head of the slide and move it rearward, disengaging the coupling hook, and permitting the spring to swing the hook upward to engage the link. On the slide is pivoted a dog whose free end rests on top of the spring, and on the under side of the dog is a lug passing through a slot in the spring, the lug being adapted to be engaged by the cam actuated by the handle lever, whereby the slide may be moved forward to lock the coupling hook in open position. A notch in the rear end of the hook is also adapted to be engaged by the end of the spring to lock the hook in closed position, the spring being disengaged from this notch by swinging the cam upward by means of the handle lever. Further particulars of this improvement may be obtained of Mr. E. M. Reinhardt, C Street, between 26th and 27th Streets, San Diego, Cal.

Prizes for Hay and Clover Making Machines.

In connection with the Darlington meeting of the Royal Agricultural Society of England for 1895 the following prizes are offered by the Royal Agricultural Society of England for: Class I.—For the best hay making machines, first prize, $100; second prize, $50. Class II.—For the best clover making machines, first prize, $100; second prize, $50. All prizes are open to general competition. The trials will take place during the hay harvest of 1895, on land selected by the society in the neighborhood of Darlington. The necessary arrangement for the grass and clover crops required for the trials will be made by the society. Notice of the place and date of the trials will be posted to every competitor as soon as they are fixed. Every competitor must himself provide for the delivery of his machines on the trial ground, and for the removal of the same after the trials. Horses will be provided by the society to work the machines during the trials, but competitors who desire it may provide their own horses. Every machine must be delivered at the depot on the trial fields in proper working order not less than two days previous to the commencement of the trials. The competitor will find one attendant to drive and work each machine. Any assistance given by the competitor himself or other workman will be noted by the judges. The order in which the several machines will be tested will be determined by the stewards, who will decide by lot. Machines are not to be worked under conditions as to weather and crop when such machines would not be used in the actual work of a farm. The attention of the judges and engineer will be particularly directed to the following matters: Price; weight; simplicity, strength, and construction; efficient protection of the gearing, and freedom of the machine from choking; excellence of work in turning and lightening up of the crop without damaging it; draught in work. Should the judges find any of the machines to be of practically equal merit, they are empowered to bracket them as equal, and so divide the prize money. Entries for the prizes in any of these classes must be made on or before Monday, April 1, 1895, and must be accompanied by a deposit of $5 for each entry.

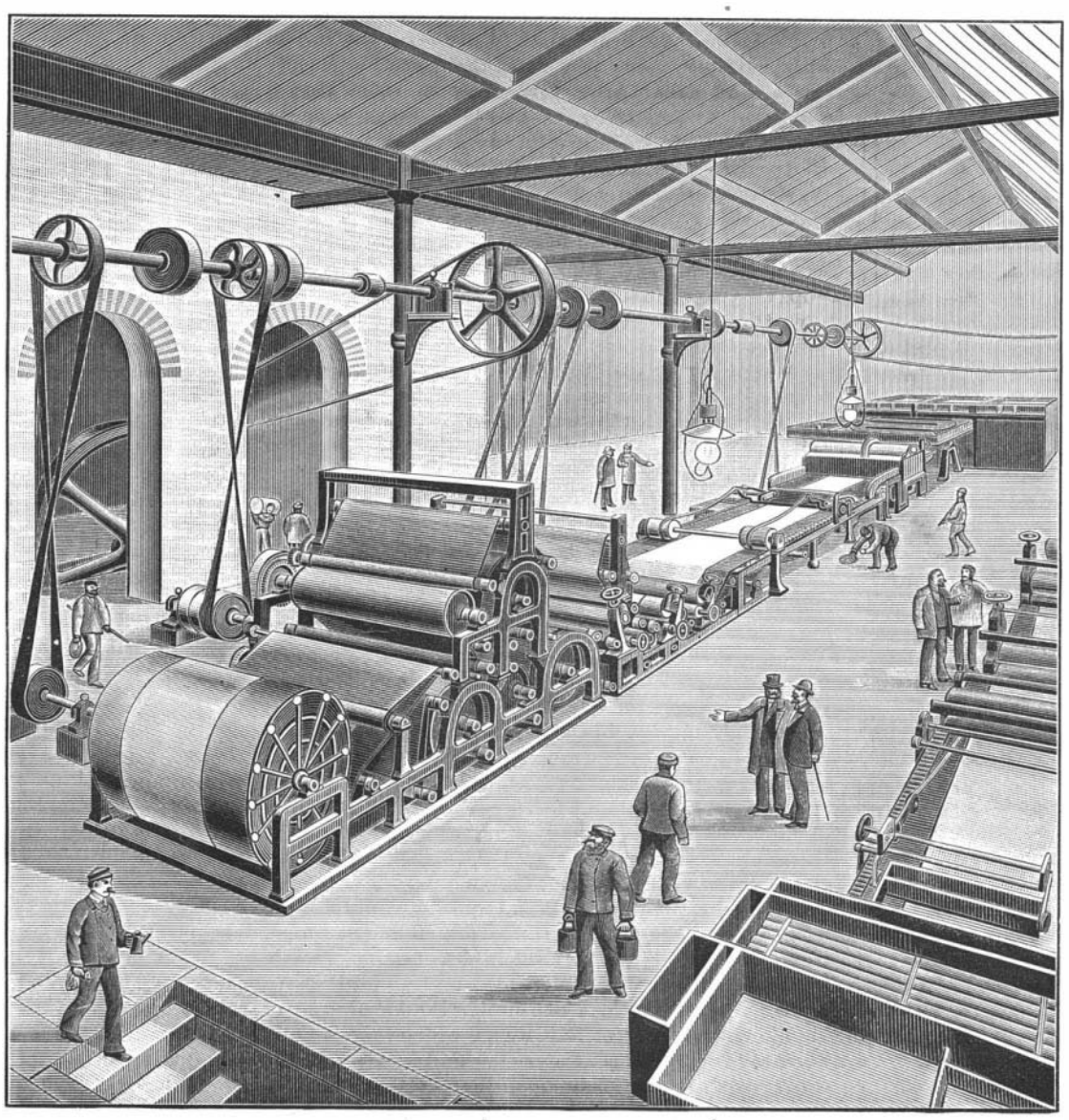
CIGARETTE PAPER.

Cigarette paper is a superior article, presenting numerous qualities. Good cigarette paper should be very thin, very uniform as to pulp, and very strong and resistant. It ought not to become disintegrated when it is slightly wet; in burning it should leave but a small quantity of ashes, and not give out a disagreeable odor; and, finally, in burning, it should not disengage substances injurious to the health.

Superior cigarette paper is manufactured exclusively from linen rags. It weighs 9½, 10 and 15 grammes per square meter. In burning it emits no odor.

Ordinary cigarette paper is manufactured from substitutes. Its pulp often contains a certain amount of wood pulp, especially the paper designed for export. Such paper is heavier and weighs from 12 to 20 grammes to the square meter. In burning, it may emit a slight odor, because the wood pulp contains resin, the combustion of which disengages gases offensive to the smell. In reality, the odor is perceptible only in paper containing large proportions of wood pulp. Apart from that, the quantity of resin contained in the paper is so small that the combustion always proceeds nearly without odor.

In its broad lines, the manufacture of cigarette paper does not differ from that of ordinary fine paper. A single point is special, and that is the finishing, which has to take a long time and be well done. The pulp must be finished slowly, progressively, and with as short fibers as



BUROT'S CONTINUOUS CIGARETTE PAPER MACHINE.

possible. The duration of the process, which is executed in improved vats, varies between 15 and 30 hours, and it is upon it that depends the weight to the square meter.

It requires a special manipulation and perfect machines to obtain a sheet of paper presenting great strength with a pulp composed of so short and so divided fibers.

By way of example, we give a figure of a continuous machine for cigarette paper constructed by Mr. Burot, of Angouleme.

This machine comprises the following apparatus: 1. Three mixing machines, with scoop wheels, in which the discharge is regulated by a gate. The two wheels are provided with copper scoops and serve, one of them for the pulp and the other for the water. 2. A distributing chest, with an agitator serving to mix the water and pulp well before passing to the sand collector. 3. A revolving and rocking sand collector, easy to clean. 4. Two pulp strainers whose shake-motion is noiseless. 5. A table with a cloth 11 meters in length, and with a carriage combined with the apron, so that the size can be changed during the travel of the paper, thus permitting of reducing cuttings. 6. Two suction apparatus, operating through atmospheric pressure, for extracting water from the sheet of paper. 7. A pulp roller, or "dandy," for pressing out the water from the paper. 8. A wet or couching press, whose rollers are of cast iron, and whose adjusting screws are provided with rubber cushions, so as to render the pressure elastic. 9. A suction apparatus for the felts of the couching rollers, and designed to remove the air from between the paper and the felts, in order to prevent blisters. 10. A squeeze roll. 11. A battery of five 1·2 meter driers. 12. A second battery. 13. Two superposed reels permitting of winding two sizes of paper at once.

The operation of this machine is very simple to any one who has visited a paper mill or who saw the paper machines of the Exposition of 1889.

We shall now give some practical information as to the various qualities of cigarette paper that will prove of a certain utility to consumers.

The shade of the paper is not of much importance. Ordinarily, cigarette paper possesses the natural color of the pulp of carefully bleached rags, blued or not with ultramarine. Some manufacturers, however, give it a chamois color. This color is in very much demand in Russia.

The thickness is of some importance. We have already said that good paper weighs 10 grammes to the square meter. The pulp should be fine and regular, and the thickness should be very uniform throughout the entire surface. The consumer greatly appreciates such qualities.

The strength is of still more importance. It is upon this that often depends the commercial value of a paper. For use, resistance in a transverse direction is required.

The tenacity of cigarette paper diminishes, as a general thing, when its weight increases. This is easily explained, because only rags are employed in the fine papers, while into thick papers a certain proportion of wood pulp enters.

The ashes left by the combustion of cigarette paper merit attention. The less ashes a paper leaves, the easier its combustion; but the differences are slight. Cigarette paper leaves from 0·5 to 1 per cent of ashes. It is, therefore, formed of pure fibers, since filtering paper, prepared chemically, and with the greatest care, leaves from 0·10 to 0·22 per cent of ashes.

The ease of combustion of the paper is judged of from the ashes that it leaves after burning. In order to increase such combustion, certain manufacturers impregnate their paper with a very small quantity of saltpeter or chlorate of potash. In no case should cigarette paper after burning leave any residua of carbon. Such a paper ought to be rejected.

Finally, let us be permitted to put an end to a legend: The injurious effect of the paper upon the health. Were there any danger, it might proceed from two causes: (1) From the products of the combustion of the paper itself; (2) from the presence of poisonous materials in the paper. Of the products of combustion, there could be no question, since, in the conditions in which the combustion takes place, there is produced only water or carbonic acid. The presence of poisonous substances is a myth, for supposing that traces of them are found in the ashes, as certain analysts have advanced, that would constitute but an infinitesimal proportion of the same material in the paper; so smokers can be assured in advance that cigarette paper is absolutely innocuous to the health.

We shall not speak of special cigarette papers, such as those prepared with tar, amber, essential oils, etc. These are prepared like ordinary paper, but are covered, nearly at the end of the manufacture, with such substances, either by a special bath or by means of rollers.—*La Nature.*

THE loss of champagne, by bursting bottles, sometimes amounts to as much as 25 per cent.

Correspondence.

The Static Effect in Incandescent Lamps.

To the Editor of the Scientific American:

In No. 5937, A. E. S. refers to "northern lights in miniature," produced by holding an incandescent lamp over a belt in motion, and states that after replacing the lamp in its socket it immediately burned out. I have repeatedly produced the same effect by developing static electricity by walking over a carpeted floor and touching the lamp with my hand. Met almost invariably with the same result of losing a lamp by the experiment. What is there about this static electric display in a vacuum that destroys carbon filaments?

Faribault, Minn. A. C. R.

A Primary Battery for Incandescent Lamps.

To the Editor of the Scientific American:

Having often read in the "Notes and Queries" of the SCIENTIFIC AMERICAN questions of amateurs asking how to light a small incandescent lamp for a few hours a day, the answer generally referring to bichromate and storage cells, the construction and management of the latter requiring some skill, I propose to the amateur electrician the following primary battery (a modification of the Fuller battery), mounted and sold by the firm of Dalle Molle & Co., Rome. The electrodes are zinc and carbon, the former excited by a concentrated solution of sal ammoniac, the latter (inclosed in a porous cell) depolarized by the following simple solution: 100 grammes of sulphuric acid are poured into the porous cell, which is then filled with a solution of bichromate of potash, 80 grammes to the liter. To restore the action of the battery, sulphuric acid and bichromate of potash may be added. The zincs must be amalgamated. It is also advisable to paraffine the upper part of the porous cell. I tried several batteries, but this is certainly the best for small lamps. F. HAUSHAHN.

Propaganda, Rome, Italy.

A Cure of Snake Bite.

To the Editor of the Scientific American:

Last fall, in company with Mr. H. Carlos, of Cape Gracias, Nicaragua, I was coming down the River Pis-pis in the Sumo country, from the Constancia gold mine. Stopping one evening at a Sumo Indian village, we found that the chief had been bitten on the foot by a *tomagas*, the most venomous snake in this country. The man was in the most pitiable condition. Thin, watery blood was issuing from his mouth, nose, ears, and even from the tattoo marks on his arms and breast. His urine was also discolored by blood.

The people were all clamorous for us to give him some *Merican seekia* (American medicine), knowing that we always carried a medicine chest with us. It happened that we had been discussing that same day the various remedies for snake bites, and Mr. Carlos had said that he heard that to cauterize the wound with carbolic acid and give the same internally was a sure cure. After explaining to them that it had been so long since he had been bitten it might not be possible to cure him, we decided to try the above cure. The question was how much to give him. We decided upon three drops dissolved in glycerine, in half wineglass of water. We gave him two doses at an interval of half hour that evening. Two hours after the second dose we gave him an emetic that greatly relieved him and he soon went to sleep.

The next morning we gave him another dose of the acid and left him.

I was on my way to the World's Fair and have just returned. Mr. Carlos has got back from another trip to the mine, and tells that our patient is fully recovered, and that he had successfully treated another one the same way. GEO. B. PENSE, Supt.

La Constancia Gold Mine, Pis-pis, Nicaragua, C. A.

The Mines of Bauxite in Ireland.

The mineral bauxite was practically unknown before the year 1870. In 1872 Messrs. George G. Blackwell and Alexander Sutherland arranged a lease with the Marquis of Downshire for a very large royalty, consisting of 2,000 to 3,000 acres, and in a year or two afterward produced a splendid quality of bauxite, testing about 54 per cent alumina in the dry state and from 1½ to 1¾ per cent iron. The demand for this mineral was then very limited, but as chemistry progressed there came numerous demands for its use in the manufacture of alum, sulphate of alumina, and alum cake, and for this purpose the property was developed and levels were driven, which produced large quantities of bauxite. At this time there was a large demand for beet root sugar, in the manufacture of which the manufacturers discovered that a considerable quantity of waste remained, which was practically useless until Newlands conceived the idea of running liquid sulphate of alumina on to the beet root waste, which immediately liberated the 20 per cent of sugar and transposed the sulphate of alumina, consequent upon the potash contained in the waste, into crystal alum. This became a very profitable operation, as it produced from the practically waste substance a large quantity of sugar, and converted the sulphate of alumina into crystal alum, which was resalable at considerably higher figures than had been paid for it as sulphate of alumina, while the sugar was produced practically free of cost. Subsequently the Bauxite Company, limited, was formed. This company have, in consequence of the increased demand for the ore, put down a new shaft at considerable expense, and enlarged the tramway and depot to such an extent that they are prepared to deliver 2,000 tons of bauxite per week. The shaft is now completed, entirely new machinery has been erected, and improved and increased tram lines have been laid down. The ore, of the usual finest quality, has been struck at a depth of 146 feet, and the company is now prepared to supply this mineral, testing about 54 to 57 per cent alumina in the dry state and from 1·5 to 2 per cent iron oxide. This new find of bauxite has increased the value of the property to an extent that cannot at present be estimated, inasmuch as there is an enormous demand for the ore for the purposes before stated, and particularly for the purpose of producing aluminum metal, which can be done at a very low cost from this mineral, as well as the manufacture of a firebrick of a very refractory nature. The mines are situated at Strain, near Ballyclare, County Antrim, in the north of Ireland. The celebrated Giant's Causeway is in this county. The principal shipping port is Larne. Some of the White Star liners have called there and been supplied with tonnage for their trial trips, and on one occasion some 900 tons were loaded in the small space of nine hours. Thus the Bauxite Company, limited, are able to supply this mineral of unequaled quality, and in quantities that cannot be produced anywhere else.

What Buildings Cost per Cubic Foot.

The *American Architect* of February 17 contains an article which will interest fire underwriters and adjusters. The writer says:

"With materials and labor at the same price, two buildings of the same character, although of different sizes, will be found to cost approximately the same per cubic foot; hence the cost of a proposed building may be closely estimated by multiplying its cubic contents by the known cost per cubic foot of a similar structure built in the same locality." The cost of similar buildings in other localities can be estimated according to the difference in cost of labor and material.

The cost per cubic foot of well known buildings in various cities was as follows:

Rookery building, Chicago, eleven stories, iron and steel interior, ten passenger elevators, 32 cents per cubic foot.

Monadnock building, Chicago, sixteen stories, rich marble work, 42½ cents.

Masonic Temple, Chicago, twenty stories, fourteen passenger elevators, rich marble work, 58 cents.

New England Mutual Life Insurance Company's building, Boston, granite, fireproof, 60 cents.

Herald building, New York, 200×140, two stories and attic and damp proof basement, 46 cents.

Six to ten story office buildings in New York, 30 to 60 cents.

Wainwright building, St. Louis, ten stories, 25 cents.

Union Trust building, St. Louis, fourteen stories, 28 cents.

Equitable Life Insurance Company's building, Denver, nine stories, first story marble wainscoted nine feet high, 42 cents.

Ernest & Cranmer building, Denver, eight stories, pressed brick fronts, 17 cents.

Crocker building, San Francisco, ten stories, steel skeletoned, 63 cents.

Brown-Palace Hotel, Denver, nine stories, finished in iron and onyx, 30 cents.

Athletic club buildings, about 24 cents.

Libraries, from 36 to 44 cents.

Dwellings, Boston, frame, eight to ten rooms, 11 cents.

Dwellings, Denver, first class, stone, steam heat, 27 cents.

Brick cottages, East, ten rooms, about 15 cents.

Brick cottages, East, one and one-half story, 10 cents.

The Worthington Pump in India.

Some recent tests have been made of the new large Worthington pumping engines supplied to the Love Grove sewage pumping station at Bombay to the order of the municipality. The engines and pumps are capable of dealing with from 60,000,000 to 78,000,000 gallons of sewage per day, and for the purpose of the trial care had to be taken to ascertain accurately the slip on the pumps. Mr. James, the drainage engineer at Bombay, says: "In the trials that have been taken the sewage discharged has been measured not only by the pumps, but by observation in the outfall sewers, and the discharges as taken by floats and by inclination due to surface of sewage come out rather more than the discharge taken from the pumps, less five per cent, and show the slip of the pumps with good valves to about three per cent.