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The editor is always glad to receive for examination illustrated articles on subjects of timely interest. If the photographs are *sharp*, the articles *short*, and the facts *authentic*, the contributions will receive special attention. Accepted articles will be paid for at regular space rates.

MOSELY ON AMERICAN COMPETITION.

In our issue of May 23 we briefly reviewed the report of the Mosely Industrial Commission and the preface thereto by Mr. Mosely himself. It will be remembered that this commission was made up from officials of the various trades unions of Great Britain, and that it visited this country for the purpose of reporting on American industrial conditions, particularly as they affected the keen commercial competition between this country and Great Britain, which, by the way, is being felt so sharply as to act as one of the chief factors in bringing the question of protection prominently into British politics. In a recent issue of our esteemed contemporary the Engineer there is a not unfriendly discussion of Mr. Mosely's report, in which the editor complains that, in spite of the wide field that is covered, and the scope and variety of the observations recorded, the report still leaves the question very much where it found it. Mr. Mosely, says our contemporary, "is one of those who urge that something must be done, but what that something is we cannot quite determine;" and as an instance of this, it quotes the following from the report: "One of the principal reasons why the American workman is better than the Britisher is that he has received a sounder and better education, whereby he has been more thoroughly fitted for the struggle;" and asks, "In what respect does this American education differ from that which is open to all in this country? What is the United States average boy taught in the average school?" The complaint is made that on this point no definite information is supplied either by Mr. Mosely or the delegates. Some of the delegates maintain that "attendance at continuation technical schools should be compulsory. All this argument and pleading is worth nothing in comparison with the value of a simple definite statement of what the average American boy of fifteen or sixteen knows as compared with the average British boy of the same age."

Now it is evident that the Engineer is asking altogether too much. The object of the Commission was to inquire into industrial conditions and indicate the advantages or disadvantages under which the American artisan labored, pointing out the secrets of the industrial success of the United States, and securing a symposium of observations by practical men, which, in the total, should constitute an extremely valuable commentary on a much-debated subject. It seems to us that the Mosely Commission has followed out this programme to the letter. It visited this country to study conditions, ascertain facts and classify them and present them in succinct form. Among other things it learned that the American artisan was better educated than his British brother, that he was better paid, treated with more consideration, and encouraged by prospects of promotion; and having learned these facts, and presented them in an official report, the commission has done all that was asked of it.

It is for others to press the inquiry further, to study the underlying causes, and suggest just what means should be adopted to improve existing conditions in Great Britain, and where they have been found to be inferior, to bring them up to the American standard. The task of ascertaining the fundamental facts of the industrial problem was a great one in itself, and to ask the Commission to follow the hundred-and-one lines of inquiry opened by this investigation, is to ask it to go entirely outside its province and undertake a truly Herculean task. Mr. Mosely surely deserves the thanks of his countrymen for securing an impartial expression of opinion from a body of workingmen, who, without his generous purse, would never have had an opportunity to personally investigate this great international problem, and give an intelligent expression of opinion from the standpoint of labor. It remains now for other industrial bodies, or for the government itself, to follow up the work which the Mosely Commission has begun, and make that more detailed investigation of the subject which the Engineer mistakenly supposes to have been the object of the Mosely Commission itself.

THE HIGH-SPEED TURBINE AS AN AIR COMPRESSOR.

The most important of the later developments of the turbine is the discovery that the high-speed steam turbine may itself be used as an air compressor, with results that are comparable in point of efficiency and general utility with those obtained in the best types of steam turbines. The air turbine, as it may very properly be called, is constructed much in the same way as the steam turbine. On a prolongation of the shaft of the steam turbine is fixed a series of moving blades which are placed alternately with rings of stationary blades, or "guide blades," as they are called, which extend inwardly from the walls of the air turbine cylinder. The action of the air turbine is, of course, the reverse of that of the steam turbine, the first ring of the blades forcing the air forward parallel with the axis of the turbine at a low pressure, and the succeeding circles of blades increasing its pressure, until, at the exit, it issues at the maximum designed pressure in a continuous steady blast. These machines are of the Parsons type, and bear their inventor's name. It is not necessary, of course, that the air turbine should be driven by the steam turbine, as described above, and, indeed, there is now at work in a lead works on the Tyne, England, an air turbine which is driven by an electric motor and supplies 3,500 cubic feet of air per minute under a pressure of 4 inches of mercury. According to Parsons, this plant showed an increase of 30 per cent in output of the furnace due to the installment of the turbine blower, an increase which was probably due to the increased steadiness of the blast. All the advantages of economy and convenience which are present in the steam turbine are shown in the air turbine. The repair bill is as light in the one case as in the other, and the compressor is in every respect as efficient. There is now nearing completion for a mine at Johannesburg, a turbine, high-pressure, two-stage air compressor, which is designed to show an output of 4,000 cubic feet of air per minute at a pressure of 80 pounds to the square inch.

A NEW NIAGARA POWER CANAL.

The Electrical Development Company, of Ontario, Ltd., has entered into a contract with A. C. Douglass, of Niagara Falls, N. Y., for the construction of a new power tunnel on the Canadian side at Niagara. In this contract the Electrical Development Company of Ontario, Ltd., is supposed to represent the Toronto and Niagara Power Company, which latter company has secured a franchise from the Victoria Park Commissioners permitting the development in question. The supposition is that the Electrical Development Company of Ontario, Ltd., is to the Toronto and Niagara Power Company what the Cataract Construction Company was to the Niagara Falls Power Company during its initial development.

The new tunnel will have a length of 2,100 feet, while its height will be about 25 feet and its width about 20 feet. Thus in length it will be a little less than the tunnel of the Canadian Niagara Power Company and less than a third of the length of the tunnel of the Niagara Falls Power Company, but its interior dimensions will be slightly larger than either of the tunnels referred to, and it is expected to have tailrace facilities for the development of 125,000 horse power. It will be lined from end to end with concrete or brick.

As a site for its power house the Toronto and Niagara Power Company has selected a spot above the station site of the Canadian Niagara Power Company and below the forebay of the Ontario Power Company. From the point where the company's wheelpit will be sunk the tunnel will run right under the riverbed to the gorge and lower river, the outlet or portal of the tunnel to be behind the sheet of water of the Horseshoe Fall. In order that the work may progress with all possible speed, Contractor Douglass will sink a shaft 8 by 16 feet to a depth of 180 feet at the shore line above Table Rock, and from the bottom of this shaft he will run a lateral tunnel out under the river about 700 feet to the line of the main tunnel. This lateral tunnel will be 10 by 14 feet, and with the shaft will form an important work in itself. When the lateral tunnel has been driven to the line of the main tunnel under the riverbed, headings will be driven in both directions, upstream and downstream, and in this way the main tunnel will be driven, the excavated material being raised to the surface through the lateral tunnel and connecting shaft. It is understood that the contract price on the tunnel is about $575,000. It will take more than two years to build it.

Contractor Douglass is now at work lining the tunnel of the Canadian Niagara Power Company, and as he excavated this tunnel, he has his plant all on the ground ready for work on his new contract.

SCIENTIFIC EXPEDITION TO THE BAHAMA ISLANDS.

An expedition recently left Baltimore for the purpose of making an exhaustive study of the Bahama Islands. Its members will spend about two months amid the group and the result of their labors will be compiled in a volume which will be donated to the United States government. The expedition, however, might be termed international in character, since it has the hearty co-operation of Great Britain and the governor of the Bahama Islands will place all of the facilities he possesses at its disposal. The expedition, which originated with Prof. George B. Shattuck, of the faculty of Johns Hopkins University, goes under the auspices of the Geographical Society of Baltimore, which defrays a portion of its expenses. Some of the principal lines of research will be amid the animal and plant life of the islands, which is known to exist in great variety. The geology of the group will also be examined, and a bench mark will be left with the view of ascertaining to what extent, if any, the Bahamas are sinking or rising above sea level. The industries will be made the subject of a special chapter of the reports, as well as the physical condition of the inhabitants, the extent of the commerce of the principal towns, and any other economic features which may suggest themselves.

The expedition will go to the Bahamas in a sailing vessel especially equipped for the purpose. It is provided with a steam launch for journeying between the islands to be visited, while a member of the Geographical Society has donated a glass-bottomed boat to aid in examining the extensive marine growth. One of the cabins of the vessel has been converted into a dark room for photographic work, as the camera will be used very largely in various phases of the investigation. An elaborate outfit of scientific apparatus for studying the meteorology and climatic conditions, also for microscopic examination, has been provided, and an ample store of provisions will be taken so that the investigators can be provided for while visiting uninhabited islands of the group.

The diseases which may be prevalent and general sanitary conditions will be included in the investigation. This portion of the work will be in charge of Dr. Clement A. Penrose, of Baltimore, assistant director of the expedition, who has arranged an elaborate equipment for this purpose.

Although within a short distance of the mainland of the United States, the Bahamas are comparatively little known from a scientific standpoint, and it is believed the expedition will result in some very interesting disclosures being made. At present about twenty of the islands are inhabited, the principal population being at Nassau, the capital. Less than 50,000 persons, however, reside on the group and only about 11,000 of these are whites. Among the industries which will be investigated are the sponge and pearl fisheries, the production of sisal fiber, salt making, and the cultivation of pineapples and oranges. An effort will be made to verify the claim that Watling Island is the San Salvador which Columbus discovered in 1492, and the expedition will give considerable attention to this island.

ON A SINGULAR RADIATION PHENOMENON.

It has frequently been observed that photographic plates will undergo in the dark a most noticeable blackening under the influence of certain metals and organic bodies. Russell ascribes this phenomenon to a direct chemical action of the superoxide of hydrogen, causing a fairly strong veil to appear after development on the plates placed in its neighborhood. Though the same observer states this effect to be capable of traversing numerous solid and liquid bodies, no radiation proper is supposed to exist, but the formation of H_2O_2 is thought to propagate, owing to the water or camphor contained in these bodies.

This explanation, however, is contradicted by numerous facts. First, thin metal films are found to be permeable as well. Moreover, the effect is by no means lessened when the surrounding vapors are blown away by means of an air current. L. Graets, in an article published in No. 5 of the Physikalische Zeitschrift, therefore suggests that the blackening might be due to an emission of particles of an unknown nature.

The author records a similar, particularly striking phenomenon: When exposing, in absolute darkness, a photographic plate to the action of H_2O_2 by placing the sensitive face at a distance of some centimeters above the liquid and putting a metal piece of any shape, e. g., a copper cross, on the opposed face, an image of the metal is found after development, though the latter was not in the way of the rays. This faint but clearly distinguished image appears bright on a dark background. This phenomenon the author terms *retrograde reproduction*, as it is a production from

the back side of the plate. Other liquid or solid bodies may even be interposed between the plate and the metal, without the retrograde reproduction ceasing. The various liquids studied would exhibit a different specifical behavior, being more or less permeable. In the case of a chemical reaction occurring between the metal and the liquid, the metal will appear with particularly bright tints on the image. The author thus succeeds in *producing photographic images of chemical processes in a perfectly spontaneous way.*

These phenomena afford moreover a most sensible test of the thermic state of the plate, the images obtained being direct *thermo-photographs.*

As regards the bearers of these phenomena, the author only makes negative statements; they cannot be due to a direct action of H_2O_2, oxygen, or ozone vapors. Nor are negative ions likely to be operative, as no electrical effects are observed. A striking feature is the dependence upon temperature, no similar behavior being known in the case of any other radiation phenomenon. A. G.

OBSERVATION WAR KITES.

As a result of the success which Col. S. F. Cody has achieved in his experiments in aerial flight by means of kites, he is now carrying out a series of trials for the British Admiralty with his aeroplane, which was described at length a few weeks ago in the SCIENTIFIC AMERICAN SUPPLEMENT.

With this apparatus the inventor has completed some remarkable performances. At Newcastle-on-Tyne he succeeded in flying his kites to a height of only 1,000 feet below the record altitude attained at the Blue Hill Observatory. On this occasion he could easily have attained a much greater height, but for the insufficiency of paying out wire on his drum. This flight was carried out purely for meteorological purposes, the kite being equipped with a specially-devised appliance for automatically registering, at the maximum height reached, the wind velocity by means of an ingenious anemometer, the temperature of the atmosphere, and the barometric pressure, the records being obtained upon a paper drum similar to those of the barograph. By means of this ascent some valuable data was obtained relative to the conditions reigning in the upper strata of the atmosphere.

But although it has proved successful in meteorological observations, the kite has been designed for the express purpose of solving the problem of aerial flight. In this direction the inventor's attempts have surpassed all previous efforts. Major Baden-Powell, of the British army, some years ago contrived a kite which succeeded in lifting a man some 12 feet in the air, but as the apparatus was somewhat clumsy in character, and the results achieved of no practical utility, further experiments with this aeroplane were abandoned. Hitherto, the greatest altitude attained by man by means of a kite is about 100 feet, but at Woolwich a few weeks ago Col. Cody eclipsed this limit by ascending to a height of 600 feet quickly and with facility, and he would have risen still higher, but for the fact that this was deemed sufficiently conclusive to the members of the British War Office who were witnessing the experiments. The British military and naval departments are following the trials with the Cody apparatus, with a view to adopting it in the services if its practicability and reliability can be established. At the test at Woolwich, although the weather was rather inclined to be boisterous, the inventor was carried into the air with perfect steadiness, and he had no difficulty in controlling his position while in the air.

The War Office, after its experiences with the balloon during the South African campaign, is inclined to the opinion that it is not an ideal means of aerial reconnoitering of the enemy's country and movements. Being held captive, the balloon is in constant movement, rendering survey by the occupants of the car through field glasses extremely difficult and unreliable. On the other hand, the kite is remarkably still—almost stationary—when flying, so that observations can be carried out with success.

Having established the utility of his kite for military purposes Col. Cody next proceeded to demonstrate its serviceability to the naval authorities. To a fleet at sea some means of reconnoitering from an aerial position is even more important than on land to an army. Attempts with balloons held captive to a vessel have proved that the defects exhibited in military operations are accentuated, especially when we consider that a vessel moves far more rapidly through the water than an army corps can travel over land. With a kite, however, as Cody has shown, when the vessel steams against the wind, the increased atmospheric resistance offered to the planes of the kite only serves to keep it steadier, while if the vessel remains at anchor, the man in charge of the kite has greater possibility of shifting his position while aloft without any assistance from the ship below. With a balloon this is absolutely impossible, since this vessel is quite at the mercy of the wind, and naturally has a tendency to travel in that direction in which the wind chances to be blowing at the time. With his kites, however, Col. Cody has been able, while in the air, and with the ship riding at anchor, to shift his aerial position from a point at an obtuse angle to the deck successively to a position perpendicular, and finally to a point at an acute angle, to the vessel below. The inventor has succeeded in bringing the kite over to an obtuse angle of 140 degrees against the wind by the manipulation of the apparatus from his seat upon the lifting kite.

TOMATO CULTURE IN THE SOUTH.

BY GUY E. MITCHELL.

The place where tomato culture can be said to have attained its highest degree of perfection is Crystal Springs, Miss., and the methods employed by the growers of that section can be advantageously followed by every gardener, if not commercial grower. The unusual feature of the system consists in pruning the plants, and the plan has been followed by the writer in his home garden since 1895, when he learned of it in the Florida winter tomato section.

Coincident with the appearance of the third leaf of a young tomato plant will come a sucker or branch; and as the plant grows, additional suckers will appear in the axil of each leaf until a vigorous plant will have twenty or more branches, the larger ones having branches of their own, and the whole plant spreading over an area of ten or twelve square feet. Such a plant of course requires an immense amount of soil nutrition and moisture to support its foliage. The Crystal Springs planters set their tomatoes somewhat nearer than do ordinary growers—as close as three by three and one-half feet—and when the first sucker is two inches long it is pinched out, as are likewise all suckers appearing thereafter. Before the plant begins to fall, light pine stakes are driven in the ground and the plants tied to them with ordinary white cotton strings. The tomato is then trained up this stake, requiring three or four tyings, until it reaches the top, four feet from the ground. Then the bud is pinched out. This gives a plant with about twelve or fourteen great leaves, four times the size of the ordinary tomato leaf, and five or six clusters of magnificent, perfect fruit. The patch now looks like a diminutive orchard loaded with fruit. Bushels of ripe tomatoes are in plain sight as the eye wanders over the field. Under this method there is no danger of tomatoes rotting or mildewing; they ripen seven or eight days earlier than if the plants are left to their own devices or stalked in the ordinary way, and it is practicable to get through the rows at any time and keep down objectionable weeds, and perhaps the most important, the plants having a comparatively small leaf surface for transpiration do not require nearly so much moisture to mature their fruit.

If a somewhat bushier plant is desired, the vine can be trained to two instead of to a single stem.

A KITE COMPETITION.

An interesting competition is to be carried out under the ægis of the Aeronautical Society of Great Britain, to ascertain the maximum height to which it is possible to fly kites. The trials will take place on the Sussex Downs. The contest is of an international character, so as to obtain considerable data relative to the utility of kites for meteorological operations, and the best type of kites with which to attain high altitudes. There is no stipulation regarding the size of the kites, but only single kites must be employed, and a height of 3,000 feet is fixed as the minimum. The duration of flight must be one hour. Each kite will carry a weight of two pounds to represent scientific instruments. Several enthusiastic kite fliers have decided to participate in the contest. Various materials in the manufacture of the kites will be employed. Most of them will be made of canvas, but one will be flown constructed of aluminium. This is a decided novelty, but it is anticipated that it will work satisfactorily. The string is steel wire wound upon a big reel, and weighing 15 pounds to the mile, so that at an elevation of 15,840 feet the kite will have to support a weight of 45 pounds. There will also be an exhibition flight by Mr. Patrick Alexander of almost every kind of kite used by man, inclusive of the Japanese and Chinese. In the event of there being insufficient wind to lift the kites from a stationary position, it is proposed to employ motor cars to give them a flying start, in precisely the same manner in which a boy runs, dragging his kite behind him in order to obtain sufficient atmospheric resistance to cause the kite to rise.

The German government has received a telegram from Lorenzo Marquez, Portuguese East Africa, stating that the captain of the Norwegian bark "Garcia" has delivered to the German consul there a letter from the "Gauss," dated from the Indian Ocean May 5, as follows: "We wintered well off newly-discovered land in 66 degrees 2 minutes south latitude and 89 degrees 48 minutes west longitude. We are now *en route* to Durban. All well." A message from Prof. Drygalski, at Durban, says the ship behaved splendidly. He adds that he is forwarding reports.

SCIENCE NOTES.

Dr. Koldeway announces that the excavation of the Ishtar gate at ancient Babylon is now completed. The gate is of imposing size. Six hundred cases of tiles, reliefs, and other objects, which once decorated the palace of Nebuchadnezzar have been shipped to Germany.

The peach crop this year, owing to the heavy frost which caught the blossoms just as they were swelling and opening, will be very light in the eastern part of the United States, but it will be not less than it was before the landing of Columbus, for the peach is an Asiatic product; the Yang-tse-kiang country being the home of this fruit. The Chinese have always been familiar with the peach from earliest records. In the Celestial kingdom the peach blossom is used in ceremonials, something after the manner of the orange blossom among ourselves. The Department of Agriculture has had an agent in that section of China studying the early history and evolution of this fruit.

Considerable interest has been aroused in this country by the publication of the French method of producing alcohol from calcium carbide. The idea is by no means new. There are two simple processes by which this can be done. One of these was described by Col. J. Colton Lynes in the SCIENTIFIC AMERICAN for June 9, 1897. Col. Lynes has practised the method of producing alcohol from calcium carbide from acetylene for nine years, and has made many demonstrations of it. He first used it in 1894, perfecting and developing the method of Berthelot, which was put forth many years ago. Col. Lynes informs us that he was the first man in the United States to employ this method. According to calculations which he has made, pure alcohol can be produced by this process at the cost of ten cents a gallon.

The following Committee of Organization for the United States, for the Eleventh International Congress of Hygiene and Demography, to be held in Brussels, September 2 to 8, 1903, has been appointed, at the request of the Belgian government, by the State Department. Dr. E. A. de Schweinitz, the Columbian University, Washington, D. C.; Dr. A. B. Richardson, the Columbian University, Washington, D. C.; Dr. John Marshall, University of Pennsylvania, Philadelphia, Pa.; Dr. Harrington, Professor of Hygiene, Harvard University, Boston, Mass. The committee desires to secure the co-operation of all of those in this country who are engaged in hygienic work, both in attendance at the meeting in Brussels and in sending papers to the Congress. The Congress will be divided into two sections: First, Hygiene; second, Demography. The subjects which will be considered are the relation of bacteria and parasites to hygiene, the hygiene of foods, the treatment and prevention of commun cable dieases, etc. The important subject in its vari ous phases of the communicability of tuberculosis will be discussed by prominent men. Those who wish to attend or send are to notify E. A. de Schweinitz, Washington, D. C.

The effect of water impregnated with various chemicals, not only on the public health but on steam boilers, and in the various arts and manufactures will be systematically investigated by the Geological Survey. Heretofore strict adherence to the most approved scientific methods has made the work expensive and has prevented its assuming the general character likely to be productive of the most utilitarian and widespread results. The Geological Survey will endeavor to secure simply results sufficiently accurate for all practical purposes without the additional work and expense essential to the more delicate analyses. The experience of the Survey thus far is that a large number of determinations of approximate accuracy are, in the aggregate, far more useful than a few determinations made according to refined methods. The Survey has endeavored to interest the attention of various chemists in the country in this matter. A widespread discussion has been carried on concerning the most useful means by which rapid and approximately accurate results can be reached. The opinions of these chemists are being collected, and from them there is in process of construction a scheme by which large areas can be chemically surveyed. Many railroads in the United States maintain chemical laboratories, and the results of the analyses of water found along various rights of way furnish a clear conception of the character of the available waters along these narrow lines. The work involved in a chemical survey, however, as it has been carried on in the past, is necessarily expensive and exceedingly slow, and there has been great need of rapid and practical field methods whereby a large number of analyses can be made at small cost.