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THE NEW PANAMA CANAL.

All the world is pretty well agreed that a ship canal ought to be built somewhere across the neck of land which unites North and South America. All the world is also agreed that only one canal should be built. The points upon which it is not agreed are as to where it should be built, by whom and at what cost.

The United States Senate has cut the Gordian knot at a stroke by declaring that it should be built at Nicaragua, by the United States government, and "for a cost not to exceed $115,000,000."

One of the most distinguished and representative bodies of engineers that ever gathered to discuss an engineering problem of international importance, after examining the results of a four years' survey by 150 engineers, has recently stated that the waterway should be cut through at Panama, where it finds a canal already two-fifths completed, and that the cost of its completion will be $102,000,000.

Three successive estimates, based upon preliminary surveys of the Nicaragua route, have been offered to the public. In 1895 the engineer of a private company (the Maritime Canal Company) reported that the canal could be built for $69,893,660. Then a government commission of engineers (the Ludlow Commission), at about the same time, after examining the route, said it would cost at least $133,472,893 to do the work; but stated that the many unsolved problems could only be determined after a complete survey by a competent staff of engineers. Thereupon the government dispatched an admiral, a college professor, and an engineer to make a more detailed examination. In its frantic haste to know the truth, and before the commission had had time to arrange its data and draw its final conclusions, the Senate demanded a statement of the cost. At a hearing before a committee of the Senate the college professor stated that he thought the thing could be done for "inside of $90 000,000;" the gallant admiral, "speaking as anybody on the street might speak, thought that the canal could be put through for $125,000,000;" while the engineer thought it could be built "for a maximum of about $140.000,000." The preliminary report of the Walker Commission, recently handed to the President, states that the cost will be between $123,000.000 and $140,000,000. The Senate, without waiting to learn the very facts which it had dispatched its commission to ascertain, lumped the three guesses above mentioned together, divided the result by three, and authorized the construction of $115,000,000 worth of ship canal!

Now, without dwelling upon the precipitancy, or shall we rather say the absurdity, of such legislation, we ask whether it would not be wise, before authorizing the construction of a new canal, to ascertain whether there is any probable competitor in the field. For we take it that if it were once proved to the people of the United States that another canal was within measurable distance of completion, they would never countenance for a moment the folly of constructing a second in its close proximity.

With a view to giving publicity to the facts regarding this vital and fundamental question, we devote a considerable part of this week's issue to a statement and illustration of the exact condition of the Panama Canal. Our illustrations are reproductions of photographs taken within the past few months along the route of the canal. The plan, profile, and cross sections are drawn from plans furnished by one of the American members of the International Commission of Engineers, and the facts are taken from the recent report of the commission, or were communicated to us verbally by various members of the commission, American and foreign.

In presenting the data we wish to give it our fullest indorsement as being an exact, unbiased statement of facts; and we do this, not because we have the slightest interest in the Panama scheme as against any other, but because we are satisfied that the ability, experience, and high professional character of the gentlemen of the International Commission are such as to place their findings upon any engineering question of this kind beyond the faintest suspicion of incompetence or partiality.

If expert testimony counts for anything, the unanimous report of a commission which includes the chief engineer of the Croton Dam and the chief engineers of the Manchester and of the Kiel canals, in favor of the construction of the Panama scheme, should set at rest all doubts of the feasibility of the plans as now drawn up, and lay forever the ghosts of floods, fraud and fevers, which have haunted this enterprise ever since the days of De Lesseps' catastrophe.

The Panama Canal then is feasible, and the cost and time of its construction are accurately known. Two-fifths of the actual excavation is completed, a plant that cost originally $30,000,000 is scattered along the route, engineering surveys of the most thorough character are completed, the working plans for every structure big or little are completed, and the specifications drawn up; and a company composed of representatives of the leading financial institutions of France with $13,000,000 of paid-up capital stands ready to concentrate a maximum force of labor upon the work with a view to its energetic completion.

Finally, in respect of the all-important question of control, it will doubtless surprise many of the public to know that by the articles of a treaty concluded in 1848 between this country and New Granada (which is now the United States of Colombia) this country, in return for special privileges, "guarantees" (to quote the treaty) ". . . the perfect neutrality of the isthmus with a view that free transit from one to the other sea may not be interrupted, . . . and the United States also guarantee, in the same manner, the rights of sovereignty and property which New Granada has and possesses over the said territory."

These rights are of the very essence of sovereignty, and, in accordance with their stipulations, this country has already had occasion to land its forces to protect the property of the Panama Railroad.

After consideration of the facts as above set forth, the question will naturally suggest itself whether, if it is desirable for the government to participate in the construction of a canal (which we very much question), it would not be advisable for it to take such steps as will give it a strong representation in the directorate of a company whose property it is by treaty pledged to protect. Should the question be answered in the affirmative, the next and most obvious move would be the appointment of an expert commission to be given all the time it needs to look carefully into both the Nicaragua and Panama schemes, and report which, all things considered, has the most features to commend it to the support of the United States.

In a future article we shall present the available data regarding the Nicaragua scheme. Our first attention has been given to Panama because we believe that any discussion that ignores or belittles the older enterprise is worse than misleading.

PROF. DEWAR'S EXPERIMENT WITH LIQUID HYDROGEN.

It is now about eight months since hydrogen has been liquefied in the laboratory, and on January 20 Prof. Dewar gave an interesting lecture on the subject at the Royal Institute. His experiments were most interesting, and a description of them has been cabled to The New York Sun. A little ball, cooled and exposed to the air, was first covered with a coating of solid air. It then began to drop liquid air. A piece of cotton wool soaked in it appeared to be magnetic, but the liquid itself Prof. Dewar is satisfied is not magnetic. This phenomenon must, therefore, be due to the cotton wool being immediately filled with solid oxygen, which is highly magnetic. He explained how vacuums of high tenuity were easily obtained by immersing a closed tube in liquid hydrogen. The air in the tube was immediately solidified, and if the tube was so arranged that the portion combining the accumulation of solid air could be sealed up, the other part would have, according to the calculations of Sir William Crookes, a pressure amounting to only one ten-millionth of an atmosphere. With vacuum vessels for use with liquefied hydrogen it is, therefore, not necessary to pump out the air. It is only needful to put liquid hydrogen in a double walled vessel and it may itself make a vacuum by solidifying the air between the two walls.

COPYRIGHT OF PHOTOGRAPHS.

An amendment has been proposed to the copyright law in the interest of photographers, which will enable them to prosecute the alleged infringement of their copyright at any time after publication. It also gives the photographer the full amount of the penalty of the violation of the law instead of dividing the amount with the government, as is now provided by law. Even the present law has been used by unscrupulous persons in the photographic business for levying blackmail, and these operations have been highly successful. The amendments proposed will enable them to carry on their designs with still more success, as they will not be obliged to divide with the government. It will be readily seen that this new amendment might result in great hardship to the publisher; thus a photograph might be brought to the newspaper, which had been remounted, cutting out the copyright notice, or it may not have been copyrighted at the time of publication. The owner of the copyright sees the violation, and after waiting two or three years sues the newspaper publisher, the photographer saying that the newspaper published a copy of his copyrighted picture. This may or may not be the case, but in the meantime it is more than likely that the newspaper editor will have lost all trace of the photograph from which the cut was made and he is practically without means of proper defense. In many cases innocent infringers have had to pay $5,000 for using a photograph the value of which was not $5. The law should be amended so as to bring damages within reason, and endeavor should be made to make them in some degree commensurate with the actual damage which the photographer has suffered. Photography is a common art, and no photographer was ever yet damaged anything like $5,000 for even a very flagrant infringement of his rights.

THE FOURTH ANNUAL CYCLE AND AUTOMOBILE EXHIBITION.

More prominence has been given to horseless vehicles, or automobiles as they are called, in this exhibition than in previous years, and naturally they form one of the chief attractions to visitors.

The exhibition was held in the Madison Square Garden, in this city, from January 21 to January 28, 1899, the main floor being divided in sections for the various exhibits of many different manufacturers of bicycles and accessories.

We shall refer briefly to the exhibits of automobiles. Near the main entrance slightly to the left stood an electric runabout styled the "Orient," and manufactured in Waltham, Mass. Its bright red running gear contrasted well with the black body. The framework for holding the body and motor is built of weldless steel tubing, and the front axle support is swiveled to allow for unevenness of roads, there being attached also steering rods which operate the two front wheels in combination with a center lever located in front of the driving seat. The raising of the lever, we will say, turns the wheels to the left, the lowering of it steers to the right. A foot lever connected underneath rearward, by diverging wire ropes to brake bands located near the hubs of the rear wheels, operates the brake. A three-kilowatt motor attached to the frame underneath gears into a special spur differential gear, thereby equally distributing the power on the wheels whether going straight or around a curve. The controller lever for switching on the electric current is on the outside of the carriage, left side. The chloride accumulator battery is located in the rear compartment and has an efficiency of 1,800 ampere hours or a discharge which will propel the vehicle for twenty-five miles on a level road.

Near by this exhibit, on the left, were three electric vehicles by the Riker Electric Company, one of which was a new covered phaeton, light in construction and tasteful in design. In this vehicle a special steering gear is provided working the hubs of the front wheels, and connected to a vertical steering rod which rises to the level of the seat and is there hinged to lie horizontally, with a handle on the end for steering with the left hand. Projecting upward between the cushions in the center is the controller lever operated by the right hand for switching on the battery. The motor at the rear gears into a large gear wheel, keyed to the rear axle, and the latter is ingeniously constructed to compensate for different rates of speed of the two rear wheels. The Willard storage battery is employed on account of its compactness and efficiency. Another vehicle was a covered delivery wagon of unique design. The vehicle is very attractive and easily operated.

The third exhibit of electric vehicles was that of the Pope Manufacturing Company, of Hartford, Conn., at the further end of the hall. These vehicles appear to be more solid and substantial than those of other makes. Three styles were shown, a top-covered two-seated doctor's vehicle, a four-seated trap, and a covered delivery wagon of solid proportions, all equipped with the usual controller lever and brake device. The motor is well incased at the rear, motion being conveyed therefrom to the wheels in an effective manner.

It was said these vehicles would make a distance of thirty-five miles on one charging of the battery on a hard level road. Each carriage is equipped with the chloride storage battery.

Near by, in the same section, was on exhibition by this company a novel motor merchandise vehicle, propelled by a gasoline motor. The carrying boxes are supported on each side of the main central frame, there being one steering wheel in front and two driving wheels at the rear. The gasoline motor is located at the right hand side, about ten inches above the ground, and gears into a driving shaft running across the rear of the machine. The motor cylinder jacket is provided with flanges for cooling by air currents.

Attached to the main shaft is a chain connected with a separate foot-driven sprocket wheel. A seat is provided conveniently for the operator, who, to start the machine, works the foot pedals. The forward motion

of the vehicle pumps the gasoline and air mixture into the motor. The electric igniter then explodes the mixture in the cylinder and the machine travels by its own power, the operator at the same time, by means of a lever, disconnects the foot crank and steers the forward wheel by the usual cycle handle bar. It travels at ten miles an hour and under, and is said to be an excellent hill climber.

Another new gasoline-propelled vehicle, on the south side of the room, was the Tinkham tricycle, for one person. It is provided with a small, double cycle motor, having the usual mixing chamber. The water for cooling the cylinder is in a tank the width of the machine located over the motor between the two rear wheels, forming a cover for it. A hand lever on the left throws in or out a clutch which connects the driving shaft to a pedal crank conveniently operated by the feet like a bicycle. To start the machine, the driving shaft, when clutched to the pedal crank clutch, is rotated by the movement of the feet, the clutch is then disconnected by the hand lever and the feet raised and supported on two rests. The speed is regulated by pressure on a small lever attached to the steering handle bar, which cuts off the supply of air to the mixture. The electric sparking is produced by a small storage battery which is kept charged by a small dynamo geared to the shaft. A muffler is provided at the rear to soften the sound of the exhaust. It has a speed of 15 miles an hour.

A third and most attractive looking gasoline motor carriage designed to carry two persons was called the "Hertel," made in Greenfield, Mass. The striking feature was its lightness and compactness and method of applying the power to the wheels. Beneath the seat is carried the supply of gasoline, water tank, and storage sparking battery, kept charged by a small dynamo geared to the main driving shaft. There are two cylinders placed horizontally, which operate the main shaft. One lever in the center near the seat brings to bear a countershaft in contact with the main shaft, and the driving pulleys on each end of the countershaft on the outside impinge by friction on special concentric rails secured to the inside of the rear wheels. Pushing the lever forward brings the pulleys in contact with the wheels and sets the vehicle in motion; drawing the lever backward puts on the brake and at the same time removes the driving gear from the wheels. The engine is also started by a back and forth movement of the same lever. By another lever the two front wheels are steered. The weight of the vehicle is 500 pounds. Its manipulation is said to be so simple that a lady can operate it without difficulty.

The wheels of all these vehicles are fitted with heavy pneumatic tires of large dimensions.

In the line of cycles, perhaps the most prominent improvement is the introduction of various chainless gears. The Pope Manufacturing Company have perfected their bevel gear driving mechanism during the past year in such a way as to make a smoother running wheel and prevent undue friction.

The Grand Rapids Cycle Company exhibit also a plain bevel gear bicycle called the "Clipper," well built and light weight.

In the Sager gear is shown a combination of a peculiar shaped bevel spur with a roller gear on the axle of the driving wheel, designed to reduce the usual friction of a bevel gear.

Still another form is the Bullis gear, in which miniature rollers on projecting spurs take the place of the usual spurs of a bevel gear and mesh into each other at an angle like a bevel gear.

A novelty in the chainless line was tandem chainless bicycles, located at the east end of the hall.

The usual sprocket pedal wheel had gear teeth on its periphery which geared into a run-around ring of large diameter, traveling on ball-bearings over a stationary ring supported on the frame of the bicycle, and geared on the opposite side into a second toothed pedal wheel. This in turn geared on a second large run-around ring and that into a gear wheel on the end of the axle of the rear wheel. The power is thus transmitted through the medium of these gears and run-arounds directly to the rear wheel.

In the line of accessories and minor improvements there were on exhibition four or five different styles of acetylene lamps, unique devices for quickly adjusting the height of the seat on the seat post, notably that of the "Tribune" bicycle, novel contrivances for ringing a bell from bicycle wheel, and a curious adjustment of the bicycle pedals which could be immediately detached from the sprocket wheel by a slight back pressure, desirable in coasting. Numerous exhibits of adjustable handle bars were to be seen. On the "Cleveland" bicycle we noticed a new simple bi-speed gear arrangement operated by a rod running up to the seat, which permitted the rider, when in motion, to quickly change the gear from low to high speed or vice versa. There seemed to be a desire on the part of manufacturers to supply the public with the chain or chainless machines as it might select. In the Orient cycle exhibit we noticed a six-seated racing bicycle which had a main sprocket wheel twelve inches in diameter.

In another issue we shall give illustrations of some of the novelties in the exhibition. As a whole it was particularly interesting, especially in the progress shown in automobiles.

THE VERDICT IN THE TANK COLLAPSE CASE.

Coroner Zucca and a jury concluded, on January 24, an inquest in the case of the eight men who were killed by the collapse on December 13 of the large tank of the Consolidated Cas Company at First Avenue and 23d Street, which we have already illustrated. After taking expert testimony the jury returned a verdict that the deceased came to their deaths by asphyxia and by drowning, and that the construction and materials of the tank were in accordance with the plans and specifications, and that the workmanship was of good character. The jury recommended that in view of the fact that neither the design nor the construction of such gas-holder tanks is under the supervision of any city department, all such work in future should be subjected to proper municipal supervision and control.

THE HEAVENS IN FEBRUARY.

BY GARRETT P. SERVISS.

In this month the great winter constellations which center about Orion gradually shift their places to the western half of the sky, while less brilliant star companies, led by Leo and Virgo, occupy the east. At 10 o'clock P. M., in the middle of February, the Milky Way arches the sky in a nearly north and south line. The Great Dipper is high in the northeast and Cassiopeia low in the northwest.

Early in the evening Orion is on the meridian, and advantage should be taken of his favorable position for study of the beautiful star Betelgeuse, in the imaginary giant's right shoulder. This star is remarkable both for its color, a rich topaz, and for its irregular variability. Ordinarily Betelgeuse is about twice as bright as Aldebaran, the leading star of Taurus, but, according to an estimate recently made at the Cape of Good Hope Observatory, it is, this winter, but slightly superior to Aldebaran. It may lose yet more of its light, and attentive observation may result in the discovery of some law governing its variability. That a sun of such presumably enormous magnitude as Betelgeuse possesses should lose, for a time, one-half its radiant power is a phenomenon calculated to arrest attention and excite wonder. Together with observations on its brightness as compared with Adelbaran and with its white neighbor Rigel in Orion's foot, the color of Betelgeuse should also be carefully watched. There is here an opportunity for amateur astronomers possessed of normal color vision to add something of value to the stock of astronomical knowledge. The colored stars present a fascinating but difficult problem, and a careful record of their hues, arranged on a simple chromatic scale, would be highly interesting and might prove highly important.

A hint of what can be done is conveyed by the fact that Betelgeuse and Aldebaran, although both are sometimes called red stars, have by no means the same color tone, while Antares, another red star, presents a still different tint.

THE PLANETS.

Mercury is a morning star, moving in the course of the month from Sagittarius across Capricornus into Aquarius. But it is too near the sun for observation.

Venus is also a morning star, and conspicuous for two or three hours before sunrise. She reaches her greatest western elongation on February 10. She is in the constellation Sagittarius.

Mars remains the most striking stellar object in the evening sky. He crosses the meridian about 10 o'clock in the middle of the month. He is in the constellation Gemini, south of the twin stars Castor and Pollux, and greatly outdoes them in brightness. His brilliancy diminishes, however, all through February, as the distance between him and the earth is widening at the rate of several hundred thousand miles in a day.

Jupiter, in Libra, is an evening star, rising before midnight, and in the course of a few weeks will take the place of Mars as the planetary cynosure. Recent studies of his cloud belts indicate that the giant planet continues to be the scene of stupendous surface changes, which probably affect only the vapors that envelop his globe, but which give rise to a wonderful and beautiful spectacle in the telescope.

Saturn is a morning star, rising several hours before daybreak, in the constellation Ophiuchus, near the place where the new star of 1604 appeared. Recent observations of Saturn by Monsieur Antoniadi show that the ball of the planet does not lie exactly in the center of the rings, but appears shifted slightly toward the west. The explanation of this singular appearance is obscure. Antoniadi's drawings of the planet, made within a few months past, also show very plainly the series of light and dark belts parallel with the equator, and the tendency of the outer ring, near the extremities of the larger axis, to break up into cloud-like masses. This appearance may arise from tidal waves, or waves of condensation and rarefaction running through the masses of minute satellites that compose the ring.

Uranus is a morning star in Ophiuchus, five degrees almost directly north of Antares.

Neptune is an evening star in Taurus.

THE MOON.

February opens with a waning moon, the satellite reaching last quarter on the 3d. New moon occurs on the 10th, first quarter on the 17th and full moon on the 25th.

There will be a minimum of the variable star Algol ten minutes before 9 o'clock on the night of February 8. There are no conspicuous meteor showers in February.

PHILIPPINE ARCHITECTURE.

According to Prof. Dean C. Worcester, the houses rest on four or more heavy timbers which are firmly set in the ground. The floor is raised some five or ten feet from the ground. The frame is of bamboo tied together with rattan and nails are not used. The sides and roof are usually of palm, and the former may be made by splitting green bamboo, binding the halves flat and then sewing them together. If palms are scarce, the roof may be thatched with long grass. The floor is usually made of bamboo strips with the convex side up. They are tied firmly in place in such a way that wide cracks are left between them. The houses are entered by ladders; in some cases there is only one room, and the cooking is done over an open fire built on a heap of earth in one corner, and as the opening for the exit of the smoke is inadequate, the room is sometimes rendered almost uninhabitable. In the better classes of dwellings the house is divided into several rooms, and there is a place partitioned off for cooking. There are windows which are provided with swinging shades. Prof. Worcester states that native dwellings which are properly arranged have much to recommend them. The ventilation is perfect and the air is kept much cooler than in a tightly closed building. The construction is so light that if they are thrown down by an earthquake or blown down by a typhoon no one is injured, as the material is too light to do any damage. The richer natives sometimes build houses of boards with galvanized iron roofs and limestone foundations, but they are very much more expensive and are pronounced decidedly less comfortable than the more humble dwellings which we have described.

WINE STORED UNDERGROUND.

An experiment in handling red wine was tried last year at the Italian-Swiss colony's vineyard, situated at Asti, in the State of California. The grapes handled by the colony were far in excess of the cooperage facilities it possessed, and some means had to be devised to care for the surplus. Among the different plans suggested was that of building a concrete cistern, and this idea was finally adopted. An excavation was first made in a rocky hillside in the rear of the establishment. Next walls of concrete 2 feet in thickness were put in, and the floor and top were added to in an equally substantial manner, the latter being supported by fifteen steel girders. Then the entire surface was covered with a lining of pure cement, and finally this was glazed to the impermeability of glass. The whole cistern was buried beneath 3 feet of earth, the object of all these precautions being to preserve the wine at a uniform temperature. This cement tank is 104 feet long, 34 feet wide, and 24 feet high, and is capable of holding 500,000 gallons. The wine was kept in this reservoir for four months or more, and the experiment is said to have been entirely successful. It was then drawn off by gravitation into wooden tanks, in which it will be allowed to mature previous to being placed in barrels for shipment. There are said to be several advantages derived from treating the wine in this manner. One is that it can be maintained at a cool, even temperature; another is the equal blending of such a large quantity of wine at one time, and a third is the great saving in insurance, which is expected to repay the cost of the construction of the tank in five years.

OUR IMPORT TRADE FOR 1898.

The import record of the calendar year 1898 is as remarkable as that relating to its exports, but for opposite reasons. The total imports of the year are less than those of any calendar year in more than a decade, while the exports of the year are the largest on record. The imports fall more than $100,000,000 below those of 1897 and nearly $50,000,000 below those of the years of great depression, 1896 and 1894, on which occasions the imports were phenomenally light. That the importations in the early part of the year 1898 should have been light was not surprising, because of the heavy imports in certain lines prior to the enactment of the tariff law of 1897; but that they should continue light during the entire year in the face of the large home demand, which prosperous business conditions would naturally create, has proved surprising to those following closely the commercial developments of the year. The importation of a full year's supply of wool, sugar, and other articles of that class just prior to the enactment of the Dingley law naturally had a marked effect in reducing the imports in the closing months of the calendar year 1897; but that the imports of the closing months of 1898 should remain as low as those of 1897 is a matter of very considerable surprise.