### The Canal.

The House Committee on the Interoceanic Canal lately had before it Mr. Menocal, Civil Engineer, United States Navy, who has made several surveys on the isthmus, and heard his statement as to the relative advantages and disadvantages of the Nicaragua and Panama routes. Mr. Menocal strongly favored the Nicaragua route as being 660 miles shorter than the Panama route between San Francisco and New York, and because of the greater salubrity of its climate, the better supply of building material, and its relative cheapness of construction. He expressed his conviction that the cost of the Nicaragua canal would not exceed $70,000,000, while that of a sea-level canal *via* the Panama route would probably be $400,000,000. The latter he considered as commercially impracticable. He admitted that the Nicaragua route would consume more time on account of its greater length and locks, and that the annual expense of maintaining it would be probably twice as great, but that these features were compensated by its lesser cost.

The Committee also had before it Commodore E. P. Lull and Lieut. Frederick Collins, United States Navy, who entertained the Committee, so says *Engineering News*, with very interesting arguments in favor of the Nicaragua canal route.

Lieut. Collins has been associated with nearly every isthmus survey that has been made in the past ten years. He was not, however, connected with the survey of the Panama route made in 1875 under Commander Lull.

Lieut. Collins has made a study of the wind and water currents of the Pacific coast in the vicinity of Panama, and exhibited a chart to illustrate his paper. The belt of calms, some 1,200 miles wide, reach from the coast of Panama westward. A strong current of northwest winds blow down the Pacific coast from San Francisco the greater part of the year, their width from the coast diminishing as they approach Panama. A similar wind comes up along the South American coast, reaching some 500 or 600 miles from the coast. These currents seem to rise on meeting and ride over the belt of calms. They, however, produce a disturbance of the calms belt near the coast of Panama that is well known as an area of vexatious squalls, calms, and delays. Sailing vessels leaving Panama for San Francisco take a course south, trending along the South American coast to 10° south latitude, and then southwest and west from 600 to 800 miles west of Panama before finding a wind to help them northward, and make the trip to San Francisco in 36 to 40 days. Vessels leaving the coast of Nicaragua, say at Brito, following the course projected by himself, would be north of the calms belt, and standing westward would get outside of the down coast currents of both wind and water, and be able to reach San Francisco in 23 to 26 days, on a course of 3,240 miles, while the sailing course from Panama to San Francisco is some 5,350 miles, although Panama is only some 500 miles south of Nicaragua, or Brito; so that the wind and air currents of the Pacific Ocean near the coast of Panama and its isthmus give the Nicaraguan canal route an advantage of some thirteen to fourteen days over a route *via* Panama.

#### THE NICARAGUA ROUTE.

Commander Lull exhibited a map of Nicaragua, explanatory of Mr. Menocal's report of surveys. The old Nicaragua transit company, which ascended from the Atlantic *via* the San Juan, traversed Lakes Nicaragua and Managua, and thence to the Bay of Fonseca. Lake Managua being higher than Lake Nicaragua, additional locks would be required, and the stretch of country between Managua Lake and the Bay of Fonseca being almost entirely volcanic *débris* (ashes and sand), does not hold the water that falls, and wells from 100 to 300 feet deep are made to get water. This section of canal would need to be concreted to render it tight. This route would be about 300 miles long.

The surveys made by Messrs. Childs & Fay, in 1850–1, for the American Atlantic and Pacific Ship Canal Company, were *via* the San Juan river to the Lake Nicaragua, and directly across the lake and *via* Rios Lajas and Grande to Brito. Fourteen locks were to be used on each side of the lake.

The survey made by Mr. Menocal followed the same route up to and across the lake, but left the lake some miles north of the Rio Lajas route, with better results. This route leads into the bed or valley of the Rio Grande a torrent in the rainy season, which could scarcely be controlled. It is believed that thorough examination will show the practicability of turning the head of the Rio Lajas with Lake Nicaragua by a deep cut, and render the bed of the stream available for the site of the canal, which will very materially lessen its cost for this section.

The southwestern shore of the lake is of rock, and would require rock excavation under water to provide a proper depth of channel to reach the Pacific portion of the canal. The ridge to be cut through on the Pacific side is 130 feet high, and the cutting averages 54 feet for six miles.

After passing this cut, the excavation and embankments are equalized, as in railroad work. An artificial harbor will need to be provided at Brito, by excavating a basin in the swamp flats at the mouth of the river, and protecting it from the sea by a dike. The bed of the lake at the outlet into the San Juan at Fort San Carlos, is very shallow, but is composed of the volcanic sand and ashes that is brought into the lake during the rainy flood season, which gravitate toward the outlet. [The map shows several islands near the outlet of the lake.] A channel will need to be dredged for this approach to the head of the river for a distance of nine miles. It is believed that this channel will not be difficult to maintain, as the material is very tenacious.

The Rio San Juan has several rapids above the mouth of the San Carlos, which are to be passed by means of short stretches of independent canal, and the remainder of the river is to be improved by the slack water system. [The San Carlos enters at about half way from the lake to the sea.] That portion of the river below the mouth of the San Carlos is entirely destroyed for purposes of navigation by being partially filled up by the detritus brought down by the San Carlos and Serapaqui, which drain large areas to the southeast in Costa Rica. The San Carlos has been so flooded as to carry back water 40 (?) miles up the San Juan [quite up to the rapid near the outlet of the lake]. The first dam above the mouth of the San Carlos will arrest this backwater. On account of the silted condition of the bed of the San Juan below the mouth of San Carlos, an independent canal is necessary from the San Carlos to the sea. In some places the spurs to be pierced are very high—in one place about 180 feet high—but Mr. Menocal, who is consulting engineer to the government improvement of the San Juan, has been allowed to visit the locality since the surveys were made, and is confident that a much more favorable and cheaper line can be now laid, saving, probably, some seven miles. It is the intention to divert the Rio San Juan into its old bed (the Colorado), and thus relieve the harbor at its present mouth from the shoaling that is going on from the detritus brought down during the rainy season. This will insure a good harbor at San Juan.

Lake Nicaragua rises and falls because of the rainy season about six feet, the time of oscillation occupying some six months. The area of the lake is about 2,700 square miles, and the area drained into it is some 8,000 square miles.

In studying the region of the isthmus, time is an essential element to get at its meteorological and climatic conditions, and Messrs. De Lesseps and Dirks have not been long enough on the isthmus to form any just idea of the difficulties which will arise in the construction of a sea-level canal. The mouth of the Colorado river shoals very fast. Cattle were grazing where I once landed from twenty feet of water, and a canoe would now ground where, as navigation officer, I once sailed a vessel. There are three locks above the San Carlos and seven below. The passage of a ship or other vessel through a lock will occupy about thirty minutes.

### AGRICULTURAL INVENTIONS.

Henry R. Burdge, of Cape Girardeau, Mo., has patented an improved sulky cultivator, so constructed as to loosen and mellow the soil and cut off the roots of grass and weeds without turning the soil over. It may be readily adjusted to work deeper or shallower in the ground, and will work at a uniform depth in uneven ground.

Mr. Gustaf Holcomb, of Stillwater, Minn., has patented an improved thrashing machine. This invention relates specifically to improvements in the grain and straw carrying mechanism of thrashing machines. It cannot be clearly described without engravings.

Mr. Thomas B. Ashford, of Clinton, N. C., has patented an improved grazing post for stock, which will prevent twisting of the halter, and which can be easily secured and adjusted. It consists in a balanced lever, to which the halter is attached, pivoted to the top of a post, provided with a screw at the lower end for screwing it into the earth, and braced by a number of hook bars, which are driven into the earth to give it greater rigidity.

Mr. Adam C. Hendricks, of Duffield Station, W. Va., has patented an improvement in fertilizer attachments for seed drills. It is adapted to operate independently, but will in general be made an attachment of a seed drill. The improvement pertains to a rotating flanged wheel for discharging the fertilizer, and an adjustable gate co-operating therewith, for regulating the quantity of fertilizer discharged.

An improved device for planting corn in perfect check row, so that the rows shall be straight each way, and at the same time distributing a limited amount of fertilizer to each hill as it is planted, has been patented by Mr. Henry F. Graetzel, of St. Joseph, Md.

Mr. Thomas Delaney, of Waterloo, N. Y., has patented an improved plant protector. The object of the invention is to provide an efficient device for preventing heavy rains from washing the soil from about the roots of plants, while it gives the water free access to the plants, and also permits the air to circulate about them.

### Faber's Talking Machine.

A great many years ago a talking machine, the invention of one Herr Faber, was exhibited in New York, and an engraving of it was published in the columns of this paper, as, no doubt, some of our oldest readers remember. We are reminded of that famous machine by an account in our English contemporaries of an improved talking machine exhibited by the successors of the original Faber before the Physical Society, and privately, for closer examination of its novel mechanism, to several well known scientific gentlemen.

This machine is said to be the product of the continuous labor and study of two members of the same family. It was begun in 1815 by Joseph Faber, and so far elaborated in 1841 that it was exhibited in that year to the King of Bavaria.

On the death of the original inventor, he bequeathed the machine to his nephew, the present owner, also named Joseph Faber, who had been associated with him in its construction, and who, report says, has greatly increased its power of articulation.

### The Coming Comet.

In a letter to the Boston *Advertiser*, Professor Benjamin Peirce, of Cambridge, says that he is fully persuaded that the comet recently discovered by our eminent American astronomer (Dr. Gould in South America) is a return of the wonderful comet of 1843, which has been considered as in many respects "the most interesting of any on record" (Cooper's Cometic Orbits). The first record of this comet is in 1770 before Christ, with an average period of about seven years. The subsequent visible and recorded returns are, 370 before Christ, 252 and 183 before Christ, and after Christ 336, 422, 533, 582, 708, 729, 882, 1077, 1106, 1208, 1313, 1362, 1382, 1402, 1454, 1491, 1511, 1528, 1668, 1689, 1702, 1843, and 1880."

The appearance of this comet in 1843 is thus described by Professor Peirce:

"About noon on the 28th of February, 1843, groups of people in many of the towns of New England, especially in Portland, Maine, collected at the corners of the streets, gazing up toward the sun. Protecting their eyes in the shadows of the houses, they saw a brilliant object close to the sun. Such a marvelous spectacle had never before been seen. A thoughtful sea captain, Mr. Clarke, brought out his sextant, and repeatedly measured the distance of the strange object from the limb of the sun. These unique observations are on record, and, submitted to rigid criticism, attest the accuracy of the observer. In about a week from this time a wonderfully brilliant tail of a comet was seen skirting the horizon soon after sunset, and reaching more than one-third of the way round the sky. It was now a tail without a head, as it was at first head without tail; but they were members of the same comet. The best determination of its path was accomplished by the distinguished astronomer, Sears O. Walker. At its perihelion it passed nearer the sun than any known comet, with the single exception of that of 1680, computed by Sir Isaac Newton, and in the discussion of which in the Principia he broached the first approximation to the true theory of the cometary tail. These two comets approached so close to the sun that it would seem quite possible that they touched its surface, or, at least, swept in nearer than the solar corona. It would not have been an absurd hypothesis, that they were ejected from the sun at the time of penetration, had it not been for the fact that the comet of 1680 was seen on its way down to the sun, and for the remarkable phenomenon which we are about to describe concerning the comet of 1843. It may be claimed, as a not impossible hypothesis, that each of these comets was at some former time the product of a solar eruption, in accordance with Buffon's theory of the origin of comets. It would only involve a force which would double the greatest velocity given to the solar field of hydrogen. But a juster interpretation of the phenomenon, and one which avoids the necessity of an extravagant volcanic action, is to be found in the relation between the comets and the meteors. It is simply the splash of the falling meteors. In about an hour and a half the comet of 1843, like that of 1680, went round the sun from one side to the other. What would have become of the tail, which was reaching out about 100,000,000 of miles from the sun to the earth's orbit? There have been those who have actually adopted the incredible, I may say the impossible, hypothesis that the tail rotated through this immense circuit, developing a centrifugal force which all the united powers of the universe could not have sustained. No! The comet practically left its tail behind it, and began to grow a new tail as it receded from the sun. There were thus two tails nearly side by side. The new tail was distinguished because it commenced at the head of the comet, whereas the old deserted tail began without any head at some distance from the nucleus, and extended further from the sun than the new tail. That such should be the phenomena of this comet was suggested by a geometer, without knowing that it had been actually observed. It was as veritable and honest a prediction as if it had been made previous to the observation. A double tail was observed on the first four nights after the comet's appearance at noonday. The visible separation of the two tails only lasted for a few days, because the earth passed almost at once into the plane of the comet's orbit, so that one tail eclipsed the other."

### Conversion of Cane Sugar into Grape Sugar in Cooking.

At a sanitary convention in Grand Rapids, Michigan, recently, the President of the State Board of Health called attention to a bad practice among cooks, by which cane sugar is converted into grape sugar in cooking, thereby losing more than half of its sweetening power. Some women, he said, will put the sugar in with a mass of acid fruit to be cooked, and keep cooking and keep adding sugar while it keeps on growing sourer, until at last they will use two and a half times as much sugar as they ought to secure the desired result. The cane sugar has been changed to grape sugar. Now, if the sugar had been added after the fruit was cooked, much less would have been required, and the result would have been far more satisfactory.

### One Week's Exportation of Live and Fresh Meat.

During the first week of March the steamers sailing from New York to English ports carried 1,221 head of cattle, 650 sheep, and 300 hogs, alive; also 2,408 quarters of beef, 850 carcasses of sheep, and 605 tons of fresh meat, several steamers reporting the dead meat carried only by weight. This is the largest shipment in one week for several months.