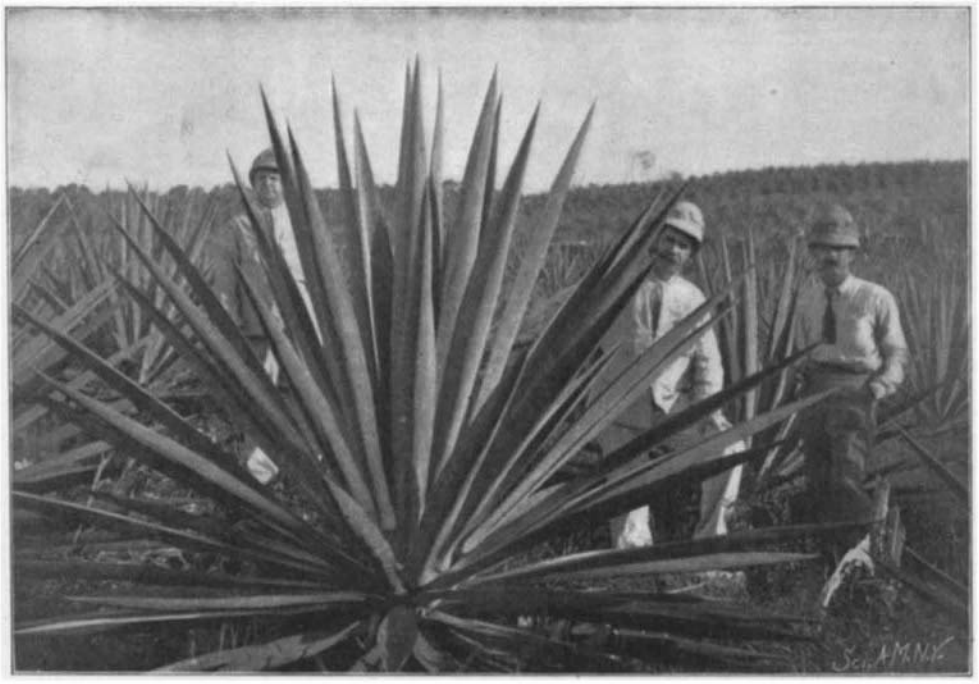
THE SISAL INDUSTRY IN THE BAHAMAS.

BY S. HARBERT HAMILTON.

While on an exploring expedition through the West Indies your correspondent made a point of carefully inquiring into the sisal business. To this end the largest plantation on the island of New Providence was visited. This is the property of Mr. F. M. Menendez, who kindly furnished most of the following facts. Considerable judgment has to be exercised in the selection of land, which is worth from $5 to $15 an acre. The young plants are set out at intervals of several feet. They are usually quite tiny—not larger than one's hand. In three or four years the leaves have attained a length of three or four feet. Now the harvest is ready. All the outside leaves are cut off close to the ground, leaving three or four around the center. The shining green blades are loaded into carts and hauled to the factory. Here an interesting process commences. The heavy green leaves are fed into a machine, driven by a 24 horse power oil engine. Two rapidly revolving wheels set with brass knives quickly tear the green pulp from the strong fiber. The pulp is washed away by about a thousand gallons of water running through the machine per hour. Each leaf contains but from 3½ to 4 per cent of fiber; as the leaf is only in the machine a few seconds it is possible to make with this equipment about three-quarters of a ton a day. From the machine the wet fiber is carried to the drying grounds, where it is allowed to bleach in the sun. When it is dry it is brought into the warehouse in masses of shimmering white fiber, 3 or 4 feet long. Here it is baled under a pressure of some thirty tons in bales of four or five hundred pounds, to be shipped to twine manufacturers in the States.

In examining the sisal fiber, a single strand of which will sustain a strain of nine pounds, it seems that surely some use could be devised for it which would insure a market price of more than 9 cents a pound. At first sight one would imagine that it might be woven like flax; a more careful study shows that the diameter of the strands varies from butt to tip of leaf. It does appear, however, that the shorter and poorer qualities which bring but 5 cents a pound could be used to give strength to shoddy, and in preparing an untearable paper.

Over 95 per cent of the sisal plant being waste, it is immediately suggested that the huge piles of green refuse lying about the works should be put to some use. This is done to some slight extent by using it as a fertilizer. An analysis of the ash of some of the material showed it to consist largely of carbonates of lime and magnesium, with 6 to 7 per cent of potassium salts—a valued constituent of fertilizers. Mr. Menendez at the present time has chemists investigating this refuse, and it is possible, as it readily ferments, that this waste product may prove a valuable source of both alcohol and acetic acid.



A SISAL PLANTATION.

MECHANISM FOR PREDICTING THE TIDES

BY DAY ALLEN WILLEY.

The machine for predicting the tides for a given period, used by the United States Coast and Geodetic Survey, is the invention of the late William Ferrel, who was connected with the service. It will make predictions two and three years in advance, as desired, and one machine is so arranged that it will make the necessary mechanical calculations for all of the American seaports, as well as for some of the more important foreign harbors. In constructing it, the inventor utilized data or components of tide observations which had been gathered for a period of years, and arranged the parts to correspond with various lunar changes and other phenomena which affect the tides. Briefly described, the device is a mechanical computer which solves the geometrical problems arising in this division of government labor.

The tide predictor performs its work with such accuracy that comparison of its records with observations taken at tide occurrence show its greatest deviation to be less than three-tenths of a foot and the variation in time seldom more than five minutes. As a substitute for human labor it is estimated that the machine does the work of fully forty mathematicians.

In the construction of the machine, two brass plates, 16 inches wide and 22 inches in height to support the wheel work, are placed in a vertical position about 2.5 inches apart, the edges of which are seen in Fig. 2, which is a side view of the machine. Nineteen of the principal components or estimates are provided, each component being represented by an individual axle connected with a crank and pulley. All of these axles are connected with what might be termed the operating axle, which is located in the lower part of the predictor, and is moved by the crank seen projecting from the left hand side of the case. The small chain fastened to the pulley on the right hand side of the case (Figs. 1 and 2) passes over all of the pulleys of the several tide components connecting with the sliding frame seen in Fig. 1 on the right side of the case. A second chain also passes over the pulleys representing the tide components, and with the one already noted is used to adjust or set the machine for prediction for a certain port. In making the adjustment it is necessary to use the triangle in geometrical calculation. This is completed by the action of he chains upon the sliding framework seen in Fig. 1 at the left of the two vertical indicators or scales. The slit in the bar of this framework determines the sides of the triangle.

All of the machinery is moved with the left hand by means of the crank represented on the left side of the machine. This crank turns the horizontal axle passing from side to side, most visible in the lower part of the front view. By means of a connection between this axle and two upright shafts, one of which is seen in Fig. 2, the one on the left is made to turn twice in a lunar day, and the one on the right, once in lunar day. By means of a connection of three wheels and an endless screw between the shaft and each of the axles of the semi-diurnal tide-components, which are all arranged on that side, each of these axles is made to turn in its proper relative period with regard to that shaft.

The index on the dial, Fig. 1, pointing to the left a little below the figure 9, is the lunar index. The other index pointing to 11 is the solar index, which indicates the solar time. When this points to 12, and the small index directly below the center points downward, it is midnight; but if the small index points upward it is noon. Although the lunar index moves according to lunar mean time, yet it does not point out this time on the dial, but indicates the phases of the mean lunar tide, and the high water of this tide occurs when the index points to 12. It consequently points out the lunar time which has elapsed since the last high water of the mean lunar semi-diurnal tide.

The longer index, in the upper left-hand corner, Fig. 1, moves around the circle in three hundred and sixty-five days, and keeps a record of the day of the year. Between the other end of the axle which controls this index and the axle of the small toothed wheel between the two scales on the left of the face of the machine, there is a connection by means of a small crank and a rod which turns the latter axle a little, by which the annual inequality of mean level of the sea is taken into account. During one part of the year the left scale is thrown down a little and the other up, the effect of which is to increase the readings of both high and low waters. During the other part of the year the effect is the reverse. The smaller index is used in setting the axle and crank in accordance with the epoch of maximum of this annual irregularity. The index of this and the indices of the other three dials in the other corners are controlled by means of connections between their axles and the horizontal shaft below, turned directly with the left hand by means of the crank attached to it. The thermometer is no essential part of the machine, but is placed there because it is a convenient place to keep a thermometer to give the temperature of the room, also, because it gives symmetry to the face of the machine.

After the machine has been "set" to make predictions for a certain port, the operator first turns the crank with the left hand until the lunar index comes in conjunction with one end of the needle pointing between 12 and 1 on the center dial in Fig. 1. If this is the upper end, the solar index then

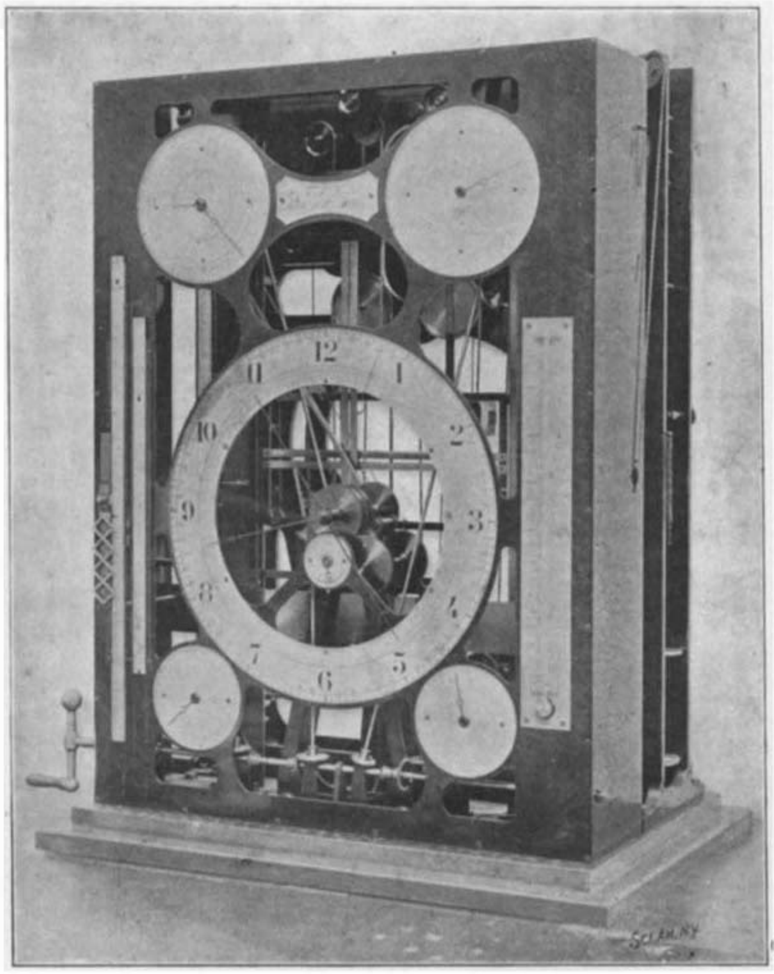


Fig. 1.—TIDE-PREDICTING MACHINE; FRONT VIEW.

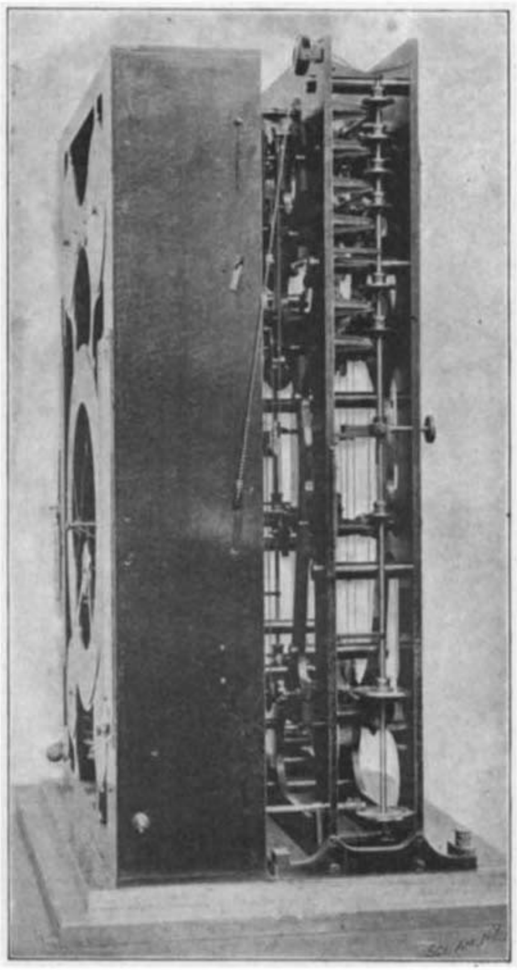


Fig. 2.—SIDE VIEW.