Some 300 men find employment in the cane fields, while forty-eight head of mules are employed. Water for the flume is obtained in abundance from streams in the Pilhonua district. So far two varieties of cane have been planted with success, being the Lahaina cane on the lowlands and the Rose Bamboo on the uplands.

The crop of 1901 will aggregate 1300 tons and each year will show a marked increase in the product of the plantation.

At the present time about one-half of the area in cane is held by outsiders and ground in the company's mill upon profit shares, or co-operative plan, the individual planters receiving five-eighths of the sugar product for cutting and delivering the cane at the flume, while the company transports it to the mill.

As showing the increase in the product of the plantation, it may be stated that three years ago the entire season's output of the mill was only 270 tons, while this year it will be 1300 tons.

The company is now having cleared by contract at an expense of $70 per acre some 500 acres of forest lands, a portion of which is now ready for plowing and planting. The method employed by the company in clearing the land is to remove the small brush and logs, strip the large trees of their branches and foliage, and cut away the surface roots around the base of the trees. No attempt is made to remove the standing trunks until immediately after the first crop of cane is flumed to the mill, when the trees are felled, cut up into stove wood and flumed to Hilo and disposed of under contract at $6 per cord.

A feature of the land now being cleared is the fact that it requires no rocking, and as the top soil is a rich, leafy mould it requires but a slight depth of plowing. Practical exemplification upon the uplands of the above plantation has demonstrated that cane planted on the higher elevations does remarkably well, and it is the intention of the company to plant up to at least 2100 feet elevation.

At Pilhonua, about three and one-half miles from Hilo, are the main headquarters of the company, where is maintained a first-class general supply store, besides large stables, blacksmith and wagon shops, and a number of residences for employes.

In order to make the various portions of the plantation accessible, a finely graded road has been constructed, which greatly facilitates the handling of supplies to the camps, as well as expediting the handling of seed, fertilizers, the taking off of cane and the handling of lumber for portable V flumes.

The average yield of sugar from the cane produced upon the lands of this company is between four and five tons to the acre, or forty tons of cane to the same area, which is a fair average for the Hilo district, and as no irrigation is required this expense is obviated, which reduces the cost of producing a ton of sugar very materially.

From the manager's residence a magnificent view of Hilo and the harbor of the same name may be seen, while at one's feet lies a vast area of waving sugar cane. The manager's residence is a modern, up-to-date structure, surrounded by broad verandas, while well-laid-out walks and flowering plants lend a charm to the entire natural surroundings.

Everything about the above plantation presents an air of thrift, from the manager's residence to the whitewashed cottages and fences of the laborers' habitation. In conclusion it may be stated that all matters connected with the successful operation of this plantation, from the cane fields to the mill, are looked after under the careful supervision of W. von Graevemeyer, who has succeeded in accomplishing much within the past year.

Application was made some time ago by this company for permission to change the original name of the corporation to that of the Hawaii Mill Company, which has been granted.

Following is the list of officers and attaches of the company:

J. F. Hackfeld, President.
H. A. Isenberg, Vice President.
George Rodick, Treasurer.
F. Klamp, Secretary.
W. Pfotenhauer, Auditor.
W. von Graevemeyer, Manager.
A. H. Jackson, Accountant.
T. O. Wilson, Engineer.
E. Biela, Sugar Boiler.

Halawa Plantation.

Situated four miles from Kohala and in the district of the same name is the above plantation, where the first cane was planted of the Lahaina variety, in 1866-67. The property comprises 1200 acres, all of which is planted, principally with Rose Bamboo, while the average annual crop is from 350 to 400 acres of plant cane and about 100 acres of rattoons. The placing of the land in condition for planting is by the ordinary plows and mules.

During the growing of the cane it is the aim of the management to strip it from two to three times a year, but owing to the lack of labor once is about the average now. This lack of stripping has enabled the borer to raise havoc upon this plantation, as likewise upon others. The borer has been in the Kohala district for years, but by concerted action the plantations managed to pretty well get rid of it, till lately it made its reappearance, the whole trouble arising in not being able to strip the cane often enough to keep it down. The method of conveying the ripened cane to the mill is by fluming and hauling in wagons. Water for the flumes is collected from the gulches and streams and placed in reservoirs, from whence it is drawn upon when cane is ready to be flumed. When hauled by wagons a load will average from 8000 to 9000 pounds.

Cane is planted at elevations ranging from thirty to 1800 feet, which is only rattooned once, but this year, due to the lack of labor, the plantation is rattooning for the second time on the upper lands.

In the fertilization of the soil the management has adopted a cheap and said to be a very effective fertilizer, which consists of mixing the residual mud cake from the mud presses in the mill with bone fertilizer and ashes from the furnaces, and plowing the mixture into the soil before planting. Where this has been applied to the soil the size and general appearance of the cane is at once noticeable and marked. The average yield of sugar to the acre on all cane put through the mill is from three to three and one-half tons of plant cane, and from one and one-half to two and one-half tons from first rattoons. For the grinding season of 1902 it would be very difficult to form any estimate as the cane is very backward this year, due primarily to the dry weather.

From twelve to fifteen miles of road have been constructed, which permits of easy access to the various fields, while from 160 to 170 men find daily employment. From the flume the cane is dropped directly upon the endless carrier and thence to the Smith cane cutter, and thence on through to a 3 and 2-roller mills respectively, which are operated by separate engines. The mill is supplied with automatic juice cleaners, one 4 and one 3-ton vacuum pans, four centrifugals, double effects, open clarification and settling tanks, etc.

Three grades of sugar are made at the mill and are designated as A, B and C. The trash from the 5-roller mill is fed direct to furnace by a trash carrier. The mill has a capacity equal to thirty tons of raw sugar in twenty-four hours, and is one of the only 3 and 2-roller mills on the island. Everything is apparently kept up in pretty good condition, the plantation employing T. S. Kay as manager and attorney in fact, and J. W. Atkins, head luna, while Dr. J. Wight is the owner. Henry Waterhouse & Co. of Honolulu are the general agents.

Kohala Sugar Co.

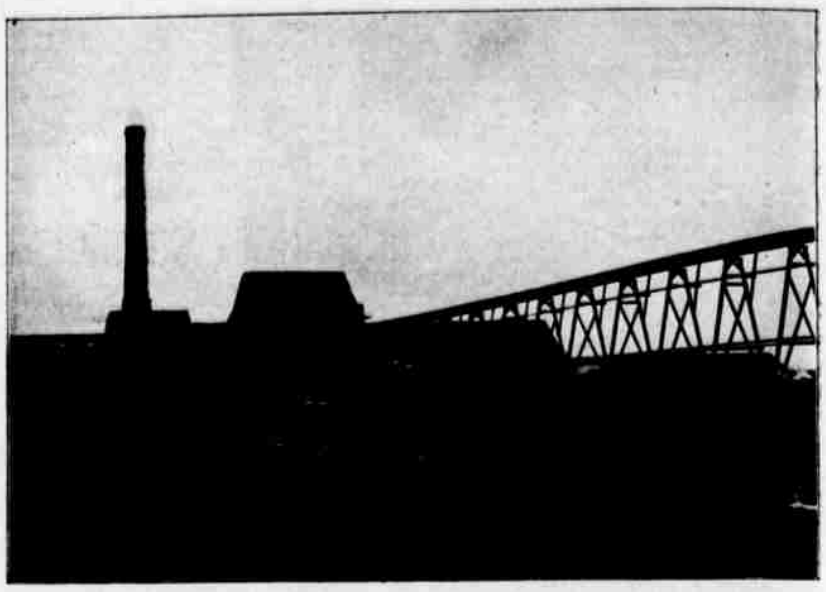
Situated some one hundred miles from Hilo by the government road and in the Kohala district of Hawaii, are the Kohala Sugar Company's lands, where the first sugar cane of the native Hawaiian variety was planted in 1862. At the present time the company owns in fee simple 3566 acres, in addition to which area it controls 1,500 acres of forest land, and has under cultivation 800 acres of plant and 500 acres of rattoon cane. The principal variety grown is the Rose Bamboo or Rappoo, and at the present time the company is experimenting with ten different varieties.

The cane under cultivation is grown at an elevation running from 50 to 1800 feet and will average three tons of sugar to the acre or twenty-six tons of cane to the same area. The general character of the soil is a dark clay and is made ready for planting by the aid of "Fowler's Steam Tackle" which is described most fully in this paper in connection with the Paauhau plantation in the Hamakua district. The method of conveying cane to the mill is by the aid of wagons and V flumes, water for the flumes being obtained from streams in the Kohala mountains, and also by the aid of 1200 feet of tunnels which have been driven above the plantation, and the water supply collected therefrom. Upon the property are some seven miles of flume which includes the portable laterals radiating through the plantation.

In this particular district it is important that the forests contiguous to the plantation should not only be preserved to insure a certain amount of rainfall, but also to maintain a continuity of artesian water, and in this connection the gulches and waste lands are being planted with trees of the ironwood variety. A number of miles of road have been constructed in and about the various cane fields for the purpose of handling seed, fertilizers, flumes, etc. Of the total area under cultivation, some 400 acres is handled under the cooperative or profit sharing system, which is apparently proving very satisfactory. Like other plantations on this side of the island of Hawaii, the cane matures in from eighteen to twenty months, while the mill grinding season is from February to August.

Owing to the scarcity of labor the company is not running with its full complement of men, but is now working some 400 contractors, company men and day laborers. In the cultivation of the soil from 1000 to 1300 pounds of high grade fertilizer is used to the acre, while 33 horses, 126 mules and 100 head of working steers, are found necessary to plow, fertilize, haul by wagons, etc. The average rainfall at the Kohala mills at an elevation of 300 feet for the past twelve years is as follows: 1899, 58.26; 1890, 98.09; 1891, 70.34; 1892, 42.59; 1893, 47.09; 1894, 64.48; 1895, 53.46; 1896, 48.89; 1897, 26.94; 1898, 55.38; 1899, 40.97; 1900, 46.85. Average for twelve years, 54.43 inches.

The question of water development for irrigation purposes has received marked attention on the lands of the Kohala Sugar Co., and at the present time some 600 acres are under irrigation. Water to irrigate the above area is obtained by sinking shafts and running drifts in Wainaia Gulch and collecting the supply. This was the first and most extensive underground water proposition on the Island of Hawaii and is working successfully, there being no perceptible decrease in the daily supply, but on the contrary an increase.



Mill, and V Flume for Transporting Cane to Mill, Kohala Sugar Co., Island of Hawaii

At a point 78 feet below the collar of the shaft a large chamber has been excavated and finished in concrete in which has been installed a duplex double acting Reidler pump driven by four cylinder triple expansion Corliss engines, having a normal capacity of 7,600,000 gallons against a head of 310 feet. In the shaft house are located two Babcock & Wilcox boilers of 500 h. p. each, which supply the steam to operate the entire machinery in connection with the pumping system. At present the above plant is pumping about 7,000,000 gallons a day, which is conveyed by means of two miles of 24-inch steel riveted pipe to concrete reservoirs having a combined capacity for holding several million gallons, from whence it is conveyed by flumes to point of use for irrigation purposes.

As the pumping plant is situated in a deep gulch which of itself is a natural water shed and subject to heavy freshets, the pumping system has been protected from inundation by the construction of a heavy stone and concrete wall 200 feet in length with an average height of 12 feet. Below the mill a large reservoir has been constructed having a capacity for holding 18,000,000 gallons and designed to hold the freshet waters as likewise any excess emanating from the pumping system. For storing the mountain water four other reservoirs have been constructed above the plantation, which have a joint capacity of 6,000,000 gallons. The water obtained through shaft work is pure and wholesome, and contains 10 grains of chlorine.

Of the crop of 1900, five acres which were irrigated produced 65 tons of cane to the acre, containing 17 per cent of sucrose and producing nine tons of sugar to the acre. It must be understood, of course, that the yield is regulated largely by the water supply, which in this case was the waste water from the mill.

Upon the plantation has been erected a modern nine roller mill, the cane being fed by means of an endless carrier direct to a "Smith Cane Cutter" and thence through the three 3 roller mills which are subjected to a combined hydraulic pressure of 820 tons, and showing a mill extraction of from 91 to 93 per cent, according to the fibre and general character of the cane produced. No. 1 mill is driven by a separate engine of 100 h. p. ,while Nos. 2 and 3 mills are driven by a Hamilton-Corliss engine of 250 h. p. Connected with the mill is an automatic juice weigher. Every 500 pounds of juice is taken automatically for the purpose of analysis from which is obtained the basis of the day's work. The mill is supplied with nine open clarifiers, capacity 120,000 gallons, one 16-ton vacuum pan, ten 30-inch centrifugals driven by a Hamilton-Corliss engine, triple effect, 100,000 gallon capacity, eight single mud presses, and other modern mill appliances.

Two grades of sugar are made and designated as Nos. 1 and 2, the mill having a capacity for turning out 50 tons of sugar in a day of 24 hours, while special features connected therewith are 18 to 20 per cent maceration and the use of lime as the principal agent in clarification. The trash or residue from the mill is conveyed by an endless carrier to the furnace room, and fed automatically direct to the furnace. From the sugar room below the sacked sugar is conveyed direct from the mill over a gravity tramway to the Hawaii Railway Co.'s cars for shipment at Mahukona. E. E. Olding is the general manager of the above plantation and has resided on the Island of Hawaii for the best part of eleven years and in the fall of 1898 succeeded Geo. F. Renton as manager, who is now manager of the Ewa plantation on Oahu.

Following are the officers and directors: S. C. Allen, President; M. P. Robinson, Vice President; J. B. Atherton, Treasurer; W. A. Bowen, Secretary; H. Waterhouse, Auditor.

Castle & Cooke, Ltd., of Honolulu, are the agents for the plantation.

YELLOW CALEDONIA CANE, KOHALA PLANTATION, SHOWING A VIGOROUS GROWTH