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Sugar Cane Juice Extractors – A Review

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ABSTRACT: The main objective of the product is to design the a sugar cane juice extracting machine, that will extract juice from sugar cane and that will separate the juice from the sugar cane and bagasse. The sugar cane juice extractor machine is a machine use to extract the juice from sugar cane. These juice extractor machines were built to help human extract the juice from sugar cane through crushing and rolling process. A conventional machine is simple machine consists of several gears, rollers, and lever attached on a cast iron chassis body. Most conventional machines are made up of cast iron material which is strong and durable. These machines were made by simple mechanism of rolling and crushing. Crushing a sugar cane requires strong force due to its strong and hard characteristics. Juice extractor machines were built mostly focused on the mechanical of the machine. The efficiency of the machine depends on the mechanical system that has been designed on the machine. Mechanical power is the most essential needs in these identified areas.

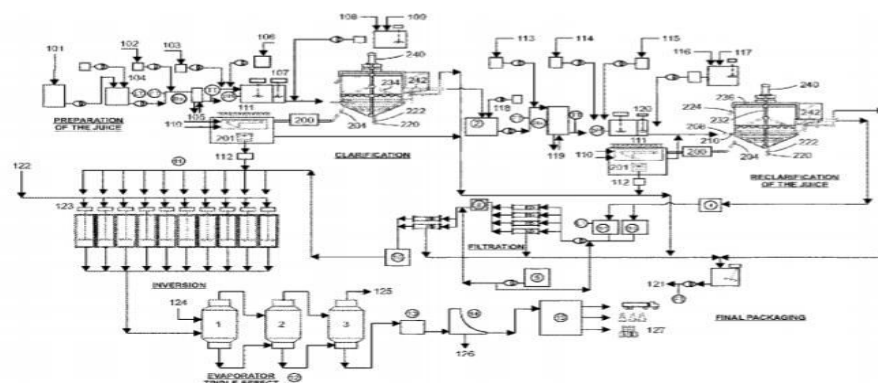
I. INTRODUCTION

The development of sugar cane juice extractor machines have been going on for hundreds of years in many countries. The development of sugarcane crushers to extract juice from the cane over this century can be viewed in this article along with a few very important designs of the past centuries.

1. Method for processing raw sugar cane maximizing the preservation of policosanols during production of a natural sugar cane juice-bases product

Applicant and inventor: Jorge Enrique Gonzalez ulloa

The Cane Juice Company, LLC, Jupiter, FL (US)



A method for processing sugar cane juice from raw sugar cane stalks to produce varies forms of a natural sugar cane juice product preserve policosanols naturally occurring in the raw sugar cane stalks, resulting in policosanols rich natural sugar cane juice based product such as a drinking beverage, a concentrated sweetening agent, and a nutraceutical product. The present invention relates to a method for processing a shelf stable sugar cane juice product from raw sugar cane, which preserves naturally occurring policosanols found in raw sugar cane, as well as to the

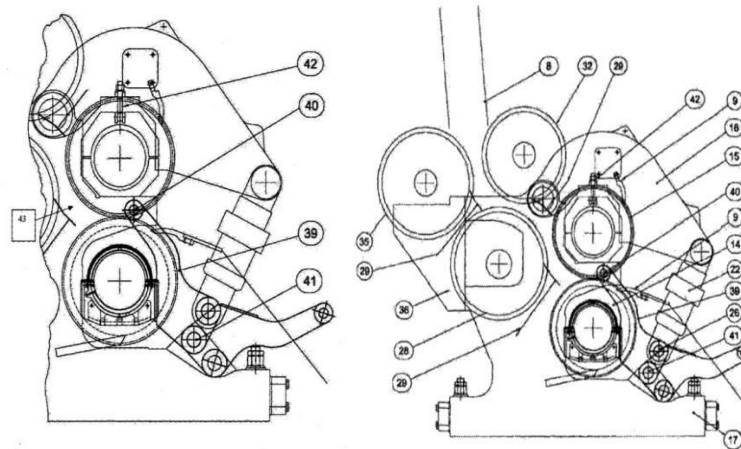
products produce by the inventive method. The method incorporates a sugarcane juice extraction process that preserves the natural flavor of the juice, prevents natural fermentation of the processed juice and preserves the natural color of the juice. In general exemplary implementation of the method, sugar cane juice is extracted manually harvested high sucrose content sugar cane sticks using a roller mill tandem juice extracted from the mills is filtered and then stabilized at a pH of about 7.4 to 7.6 through the addition of calcium hydroxide. Subsequently, the juice product may be heated from a temperature in the range of about 20⁰ C. to 30⁰ C., to a temperature not exceeding 90⁰ C.

II. AN IMPROVED TWO ROLLER SUGARCANE CRUSHING MILL

Applicant and inventor: KULKARNI, Anil; Pune, India

World intellectual property organization

Publication date: 6-march-2014



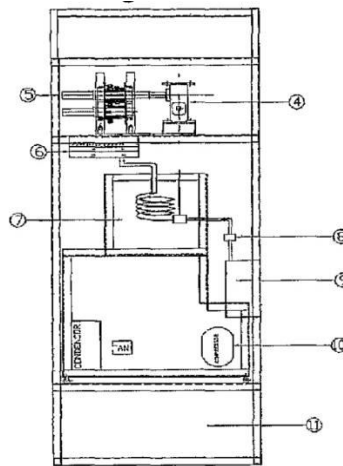
The present invention provides an improved two roll sugarcane crushing mill with a semi closed frame comprising plurality of the improved two roll mill modules in tandem. Each improved two roll mill modules comprises a bottom roll and a top roll, the bottom roll which is mounted in a pair of rotatingly main frames at the two ends and the top roll is rotatingly mounted in a pair of top beams. One end of the each said top beams are being pivotedly attached near the upper end of the main frame towards the main frame towards feed side for swinging the said top beams along with the top roll. A hydraulic loading means is provided which is pivotally attached between the end of top beam and the base main frame. The semi closed frame fitted at the bottom end to the base of the headstock is designed to bear the forces of heavy and fluctuating loads. Sugar cane crushing mill comprising; an auxiliary frame to which said at least one feeder roller is mounted, said auxiliary being pivotally mounted on pair of main frames so as to adjust a loading and a setting of at least one feeder roller in a desired position. The semi closed frame having a top end i.e. fixed to the pair main frames.

III. SUGAR CANE CRUSHING AND JUICE VENDING MACHINE

Applicant and inventor: ARAVIND, VELUMANI. Chennai, India

World intellectual property organization

Publication date: 22-october-2009



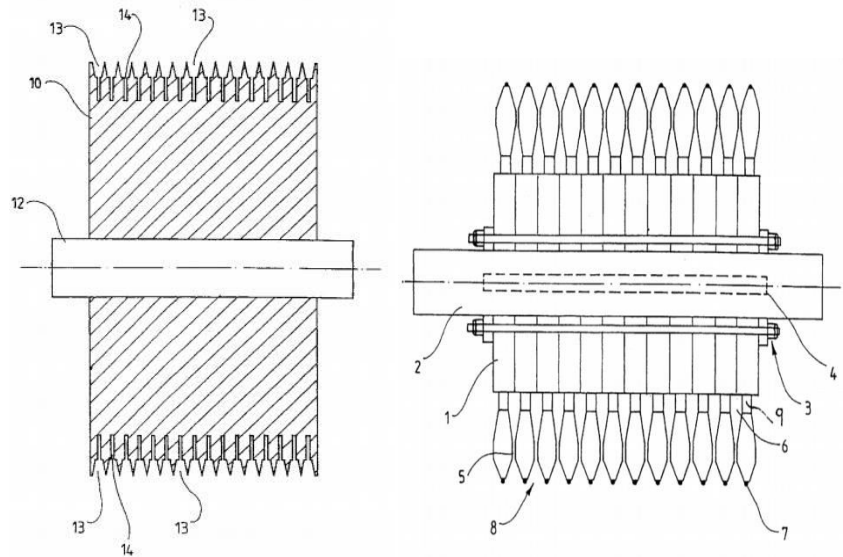
The rollers are provided to pick up and break the cane into half to avoid overloading torque to the gears and to crush 95% of the juice in a single crush. The juice crushed from the rollers are passed through the various set of filters made of S S mesh. Each filter various in different microns. After filtration it is passed through a specially developed rapid chilling system. The juice is cooled instantaneously to 10-14 deg. Then juice is vended using a solenoid switch controlled by GSM microcontroller. The controller record the sale of juice in various filling such as 250ml, 500ml and 1000ml. It simultaneously transmit the data through GSM to the remote location where all machines are monitored as single point. In four roller assembly, the two pairs of rollers are assembled in tandem in the roller assembly and the pair longitudinally opposed rotatable feed rollers from a inlet to feed the sugarcane into the said roller assembly which pickup and break the cane to avoid the overloading torque to the gears and the second pair of longitudinally opposed rotatable rollers are mounted free determined angle beside the first pair of rollers and the second pair of rollers crush about 95% of the juice in a single crush.

IV. APPARATUS AND METHOD FOR SUGARCANE

Applicant and inventor: Raymond john hatt; David john Wilson, Australia

Bundaberg Foundry Engineers Ltd., Queensland, Australia

Publication date: 21-march-2000



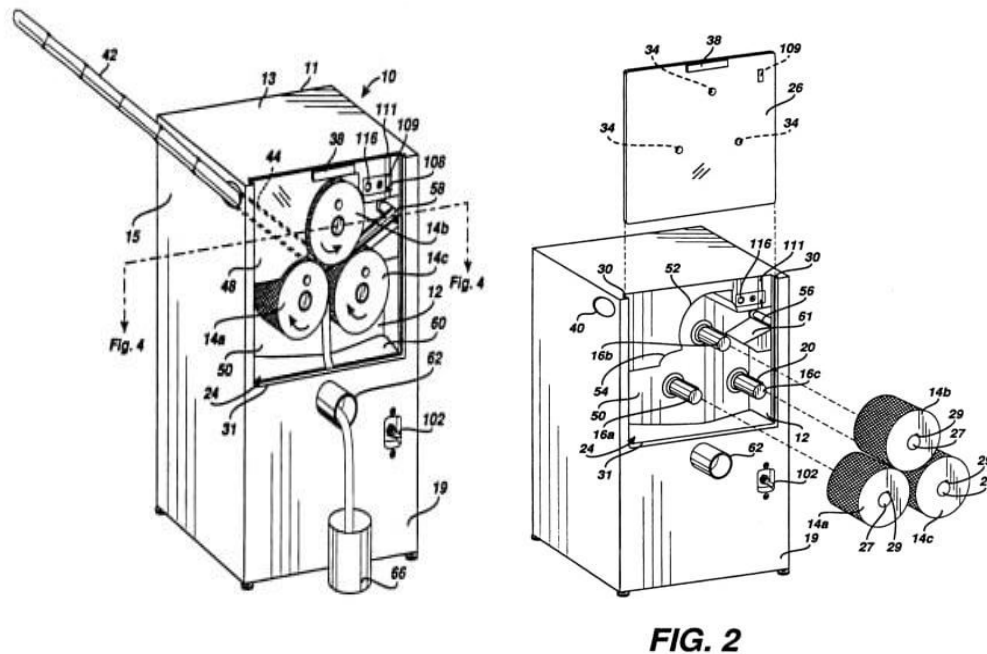
An apparatus for crushing sugarcane to extract the juice has opposed crushing rules at least one of which is formed with juice channels which are temporarily plugged by bagasse after the juice has entered into the channel further rotation of the rolls removes the trapped juice away from the cane blanket and the bagasse plug is then scrapped out of the top of the channel to allow the juice to drain. The juice is drained away from the cane blanket and is not reabsorbed there by. Efficiency of juice removal is improved further efficiency improvements are obtained by having pairs of crushing rules positioned above each other such that the cane blanket moves in generally vertical direction. An apparatus for extracting juice from sugar cane, the apparatus having pair of counter rotating rolls with crushing zone between the rolls in which the cane is crushed at least one the rolls having a peripheral juice channel extending about the roll and into which sugar juice can flow, the channel being configured such that, in use, a sealing plug of a bagasse forms in an upper portion of the channel with a lower portion of the channel left free for holding the juice, bagasse plug removing means to remove the plug of the bagasse after the bagasse has moved through the crushing zone to allow the juice drain from the channel.

V. SUGAR CANE JUICE EXTRACTOR

Applicant and inventor: Alfredo J. Sanchez; Rafael E.

United States Patent

Date of patent: june-14-1994



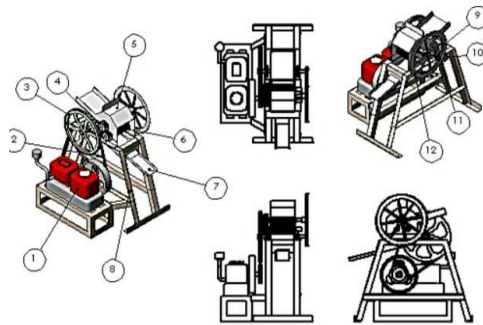
This sugar cane juice extractor contains removable crushing rollers. It includes housing with a juice extracting compartment and a closure for accessing the compartment. The closure is preferably a clear plate which permits viewing of the compartment during the operations and, when removed, allows access to the compartment for removal of the crushing rollers and cleaning of the rollers and the compartment. A safety switch can be provided to prevent the rotation of the rollers when the closure is displaced. A guide into the compartment is preferably provided to direct the sugarcane and any flavorings into the crushing rollers. A waste channel is provided for the exit of crushed cane pulp. A sugarcane juice extractor comprising; a plurality of spaced, crushing rollers, adjacent crushing rollers counter- rotating to form the opposing pairs; a drive means for axially rotating crushing rollers so as to crush the sugarcane stalk which passes between opposing pairs of said rollers, thereby extracting juice from sugarcane stalk, the crushing rollers being irremovably connected to the said drive which means; the crushing rollers are being enclosed within the housing.

VI. DESIGN AND CONSTRUCTION OF A SMALL SCALE SUGARCANE JUICE EXTRACTOR

N. Oji, M.A. gwarzo, U. S. Mohammed.

Department of agricultural and Bio resources engineering Ahmadu Bello university, Zaria, Nigeria.

Publication date: 16-oct-2019



The production of sugar cane is increasing in Nigeria nowadays. Juice extracted from sugar cane can be used extensively in manufacturing brown sugar, industrial sugar and bioethanol fuel through the process of fermentations; hence, the need to develop a the machine can extract juice from sugar cane effectively. This work involves the design, fabrication and performance evaluation of sugar cane juice extractor. The prototype machine was designed, fabricated, and the developed machine was evaluated using coma variety. The development and performance of a small scale sugarcane juice extractor was achieved at the department of agricultural and bio researches engineering workshop of the Ahmadu Bello university. The sugarcane juice extractor was tested recorded and output capacity of 148.20 kg/hr and extraction efficiency of 67.44% for koma, variety respectively at speed of 30 rpm.

VII. DESIGN AND FABRICATION OF SUGARCANE JUICE EXTRACTOR

Azez, N. A, Okpara, I.N and Ologunye, O.B.

Department of mechanical engineering technology, Federal polytechnic Ede Osum State, Nigeria.

Publication date: 19-july-2019



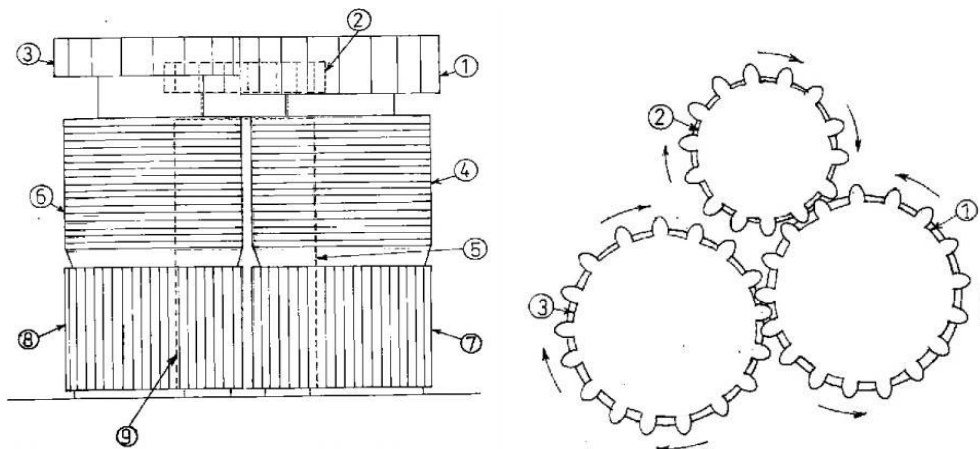
Over the years, small-scale formers have supported Nigerian sugarcane production, which finally stop its using teeth to bite the rind and to chew the inner tissues to sweet the juice. At the concentration level, the juice is extracted. In

order to boost the production of sugarcane and its product, we have embraced a project called SUGARCANE JUICE EXTRACTOR. Assessment of the sugarcane extractor functionality as regards its effectiveness in the extraction of juice. The approach in this project is to design a machine that consists of the 2.0-hp gear motor and crush mechanism of the machine, consisting of gears latches and three rollers which have then been mounted with the juicer and inlet and outlet on the frame. The extractor of sugarcane juice has a unique design that is quite during operation (can be operated in an enclosed door) as well as compact. It squeezes any sugarcane of a diameter less than 52mm. the interaction between contaminants and extracted juice is considered negligible with the supplied isolation of the extraction process from the environment. Due to the electric transmission motor used, the rollers worked without being stuck independent of the sugarcane juice.

VIII. ANIMAL OPERATED SUGARCANE CRUSHER

A K SINGH and JASWANT SINGH, Lucknow, Uttar Pradesh, India.

Indian institute of sugarcane research. Uttar Pradesh.



The performance of animal operated KVIC and ATDA sugarcane crushers was evaluated and compared with traditional sugarcane crushers the results revealed that the average juice extraction was 6.0-7.1% higher as compared to traditional kirloskar's Kumar crusher. Juice extraction varied with the cane varieties and was higher for the varieties having lower fiber content. The increasing was not significant with recycling of crushed cane as compared to without recycling in KVIC crusher. In ATDA design crusher, the juice extraction increased significantly with fourth roller in comparison to without fourth roller. There was non-significant difference in the juice extraction by the KVIC crusher with recycling and ATDA crusher with fourth roller however, there was significant increased in juice extraction in ATDA crusher with fourth roller as compared to KVIC crusher without recycling of crushed cane,

IX. DESIGN AND CONSTRUCTION OF SUGAR CANE JUICE EXTRACTING MACHINE FOR RURAL COMMUNITY

Author name: U Joseph N duka, Adogbeji victor Omoe fi

Mechanical engineering department, moshood abiola polytechnic Abeokuta vogan state Nigeria

Publication date: Aug-2019



The extracting the juice from sugar cane as been a major problem, especially with the use of a traditional way that could damage the gum of the teeth and putting the human teeth in distress and require much energy. The main objective of the design is to design a sugar cane juice extracting, that will extract the juice from sugar cane and that will separate the juice from the sugar cane and bagasse. The crushing unit is made of two rollers which are 134mm thick diameter and length of 265mm, with the crushing section of the roller of 17.8mm and the cutting blade section of the roller 8.7mm, 148 mm long hallow stainless steel cylinders and stainless steel rods of 32 mm diameter. The machine was constructed by several well established methods such as methods, such are as follows; measuring, marking out operation, cutting operation, welding operation, grinding operation.

X. CONCLUSION

The Trapi che is traditional wooden roller used by people of Panama and Columbia to extract sugarcane juice. The Trapi che is a Spanish word for “sugarcane crusher”. It is varying in size and is made up of wood. It has two rollers that are vertically placed and held by a wooden frame.

According to Cesar B.G.C (2004), screw press conveyers that gently squeeze the fiber (sugarcane) in each stage, improves extraction.

Olao ye (2011), developed a sugar cane juice extractor for small scale industries. The designed is a simple mechanical device for the extraction of sugarcane juice.

The aim of the construction was achieved with the ease of extraction of the juice from the sugarcane with a capacity of 61.36 kg/hr which was developed and tested, the design of the sugarcane juice extracting machine possess simplicity in operation and maintenance as well as affordable with low running and maintenance costs with a reliable efficiency.



When commercialized, the machine could go a long way in solving the problem of sugarcane juice domestically and also meeting the sugar requirement of the nation.

The evolution of crushing mechanisms of sugarcane to obtain the juice over the past centuries for production of jaggery can be understood through the above important innovations. It can thus be concluded that an improved design where-in enhanced crushing of sugarcane to obtain more juice can be proposed for improved productivity of jaggery.

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