TEMPLETON ROTARY GIN STAND

Duncan B. McCook
Consolidated Cotton Gin Co., Inc.
Lubbock, TX

Abstract

Templeton Process Developments Ltd. and Consolidated Cotton Gin Co., Inc. are jointly developing a "Rotary Gin Stand". This gin stand utilizes many of the same ginning principles as a roller gin stand (lint pulled between a stationary knife and a moving surface), however applies these principles in a completely new way.

Introduction

This is a progress report on the development of a new concept in cotton ginning, the Templeton Rotary Gin Stand. This new gin stand was invented by a British company called Templeton International. Templeton has approached Consolidated to assist in development and testing of this new gin stand. It utilizes a spinning rotor and eight stationary knives to separate lint from the seed. Fiber quality and capacity testing is ongoing.

Discussion

Templeton Process Developments Ltd.

The "Rotary Gin Stand" was invented by Templeton Process Developments Ltd. of the United Kingdom. Templeton is a development company consisting of engineers from many different disciplines. They were approached by a cotton processor in Africa who wanted to gin his cotton more efficiently. Having no preconceived ideas of what a modern cotton gin should look like, the rotary gin idea was developed. After some limited testing of the first proto-type in Africa, an improved second proto-type was constructed and sent to the U.S. for further testing and development. Templeton has entered into a "Cooperative Development Agreement" with Consolidated Cotton Gin Co., Inc. in Lubbock, Texas to jointly develop the idea of the rotary gin stand further.

Rotary Gin Components & Operation

The rotary gin stand operates on principles similar to a conventional roller gin. Lint is pulled between a stationary knife and a moving surface. In the rotary gin stand's case, the moving surface is a "Rotor" or flat disc approximately 1.5 m (approx. 4 ft- 11 in) in diameter and 25 mm (approx. 1 in) thick (see Figure #1). This rotor is constructed of cast iron and spins in a horizontal plane at approximately 350 rpm. Eight pie shaped leather covered segments are mounted to the rotor. Mounted above the rotor is a structure which holds eight stationary knives (see Figure #2). These knives are attached radially from the center to the perimeter of the rotor. Seed cotton is fed from above to one of the eight ginning points where the fiber is pulled under each of the stationary knives by the leather on the spinning rotor. Ginning occurs at all eight ginning points simultaneously (see Figure #3). Lint is pulled from the back of all eight knives with a negative pressure pneumatic system which comes together into one main lint flue. Approximately 800 cfm per ginning point is required for lint removal. Ginned seed is conveyed outward by centrifugal force and air nozzles to the perimeter of the rotor and drops into one of eight seed chutes. These chutes can all discharge into a single seed conveyor located beneath the machine. Approximately 400 cfm per nozzle is required for seed removal. The proto-type currently being tested is driven with a 15 hp motor equipped with a variable speed AC Inverter.

Testing & Development

The current proto-type is installed at the USDA-Southwestern Cotton Ginning Research Laboratory in Mesilla Park, New Mexico. This facility is designed with the capability to monitor and control almost every variable involved in cotton processing. Therefore, ginning capacities and affects on cotton quality by the gin stand can be measured and compared to conventional roller gins. Goals for testing and development are to produce a less complicated, lower cost, higher capacity gin stand that will process long staple variety cottons with no adverse affects on fiber quality. The rotary gin was installed beneath a Consolidated roller gin feeder. This feeder aids in the "single locking" required to allow the rotary gin to operate properly.

So far, most of the testing has dealt with the operation of the gin stand rather than it's affect on fiber quality. Some of the challenges during development are discussed below.

The circular shape of the gin stand and the rectangular shape of the feeder discharge made it difficult to feed all eight ginning points equally. Numerous configurations of "spreaders" were tried in an attempt to correct this problem, however modifications to the front of the feeder are required.

The leather material used on the rotor began to "glaze" the longer the rotary gin stand was operated. This glazing reduced the frictional effect of the rotor on the lint, therefore reducing capacity and lint removal. The next material to test will be Garlok, a material which is currently used on roller gin rolls.

Precise adjustment of the stationary knives to the rotor was hard to achieve due to differences in the rotor knife heights. Therefore, proper ginning occurred at some ginning points and not others. A device to allow the stationary knives to float slightly while maintaining constant pressure on the rotor will be tested next.

Reprinted from the *Proceedings of the Beltwide Cotton Conference*
Volume 1:59-61 (1998)
National Cotton Council, Memphis TN

Periodically, ginned seed would carry seed cotton as it was being conveyed to the perimeter of the rotor. Individual "paddle" rollers were installed to set the seed cotton on the stationary knives. This was a great improvement.

Some ginned lint was carrying past the doffing air chamber to multiple knives. This was reducing fiber length. Improvements to the chamber were made to correct this problem.

Conclusion

The outlook for further testing of the rotary gin is positive. After several more improvements are made and further testing is performed, the gin stand will be installed in a conventional cotton gin for long term testing. From this testing, determinations on maintenance costs, durability and fiber quality can be made. The affective ginning area of the rotary gin is approximately four times greater, therefore, hopes are to double if not quadruple the available capacity over conventional roller gins. This will result in a gin stand ginning four to eight bales per hour of long staple cotton.

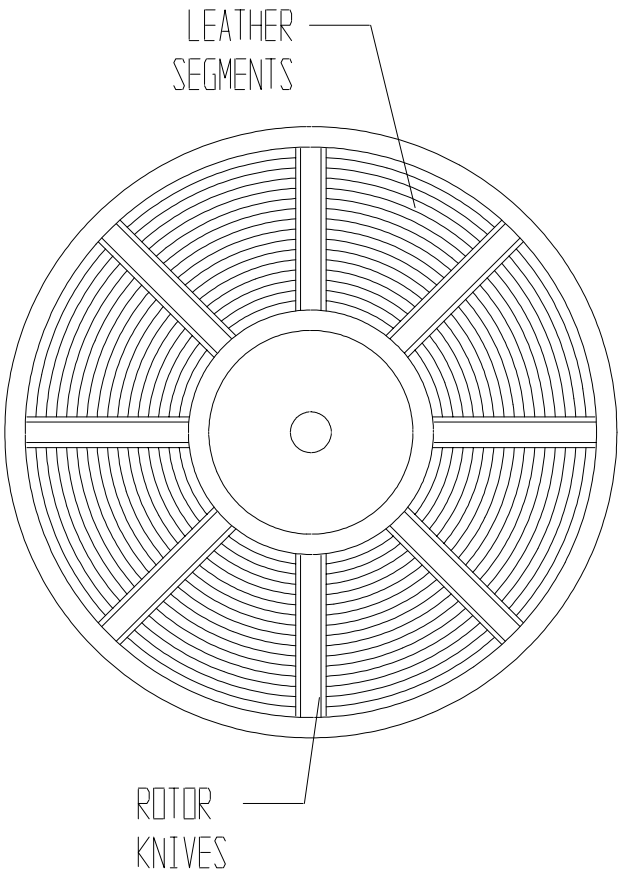

Figure 1 - Rotor

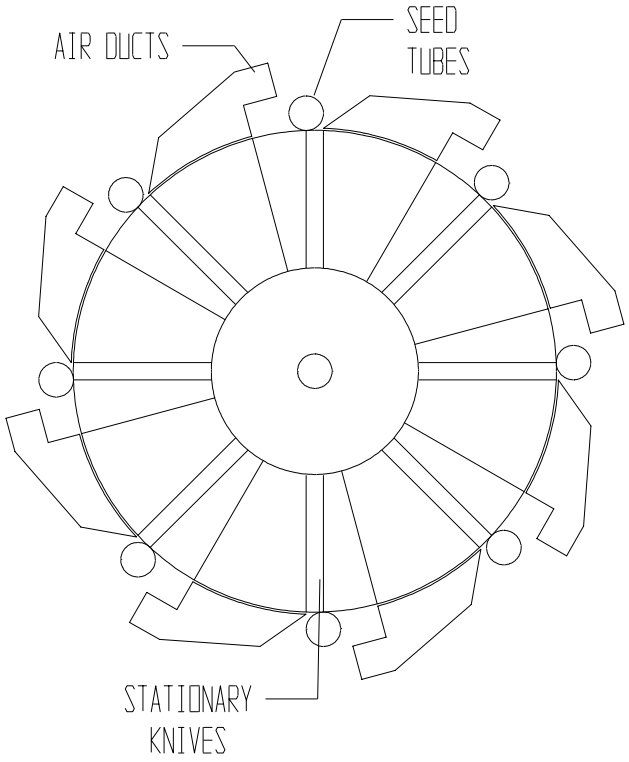

Figure 2 - Stationary Knife Holder

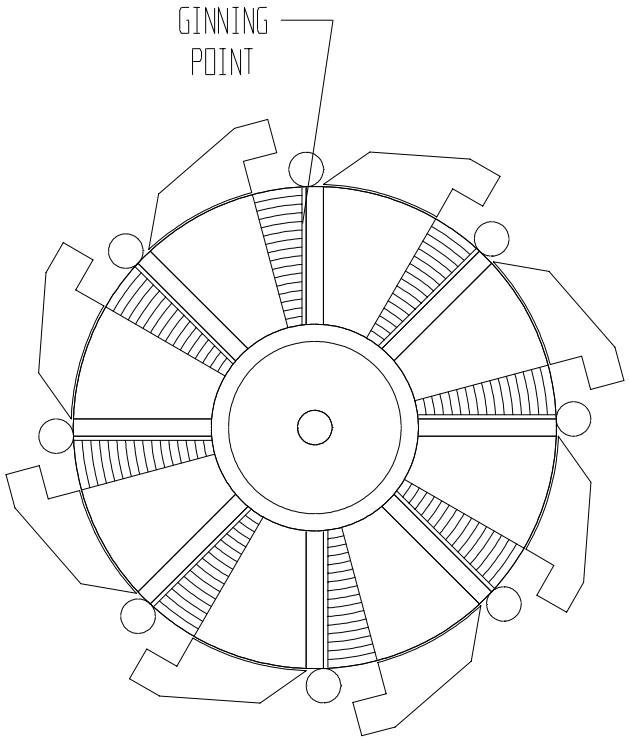

Figure 3 - Rotor & Knife Holder Assembly

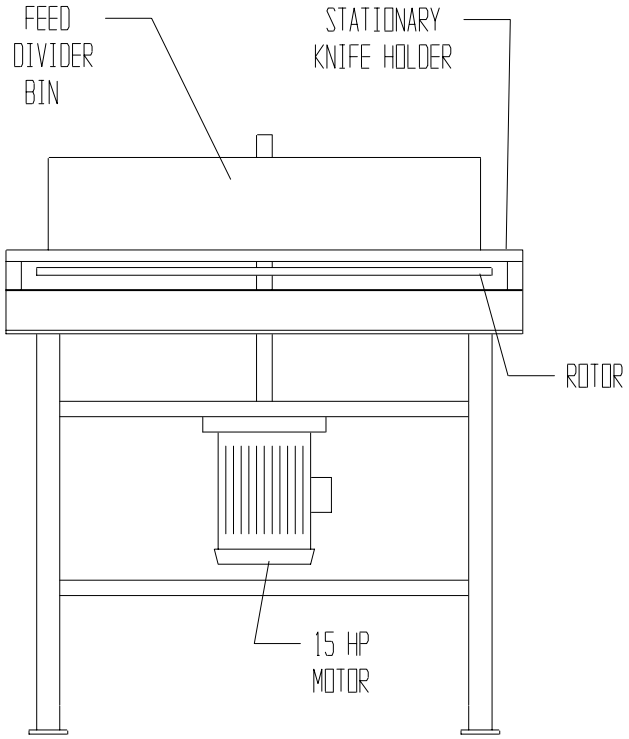

Figure 4 - Elevation of Rotary Gin Stand