INITIAL OPERATING RESULTS ON RILEY'S STEAM CLEANED WATER COOLED GRATE IN LOUISIANA BAGASSE SERVICE

by
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BATON ROUGE, LOUISIANA

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In October of 1976, I had the pleasure of presenting a paper entitled "TRENDS IN BAGASSE FIRING AND FLUE GAS PARTICULATE SCRUBBING" to the Sugar Technologist's Association of Puerto Rico in San Juan. Copies of that paper, in both English and Spanish, are available.

The 1976 paper discussed reasons for our selection of the Riley steam cleaned water cooled grate and the modular traveling grate stoker for bagasse firing and the Riley-Environeering Ventri-Rod™ Scrubber for particulate scrubbing of bagasse flue gas. The first modular traveling grate stoker in bagasse service and the first Ventri-Rod Scrubber in bagasse service have operated successfully at St. James Sugar Cooperative. The modularizing of the traveling grate stoker was essentially a re-packaging of a tried and proven design for the reduction of installation costs. Because of this, I will not comment further on that aspect. Also, Mr. John Stensland of Riley's Environeering subsidiary is presenting a paper at this meeting on the Ventri-Rod Scrubber at St. James, so I will leave that discussion to him.

The first application of a Riley steam cleaned water cooled grate in bagasse service was operated this year at Columbia Factory of Caire and Graugnard in Edgard, Louisiana. This installation, a "retrofit" under a used three drum boiler installed by Columbia Factory, incurred a one-year delay when, approximately eight hours after startup, the accidental loss of water level in the unit almost completely destroyed the boiler. The stoker and furnace suffered little or no damage, however.

The boiler was rebuilt and operated throughout the 1977 grinding season, even though the bagasse feeders were not installed.

The principle of stoker firing involves intimate mixing of fuel and air with a large percentage of the fuel burned in suspension and the balance burned in a relatively thin layer on the grate surface. This is radically different from the pile burning method characteristic of most refractory cells. While I recognize the considerable difference of opinion in the sugar industry between advocates of stoker firing and advocates of refractory cell firing, I feel that this chasm is narrowing. The economies afforded by the greater fuel efficiency and lower operating and maintenance expense of stoker firing will make this method increasingly attractive to the sugar industry. Reduced particulate emissions from modern stokers require less costly emission control systems. The additional factors of larger unit size and better trained operators also favor stoker firing.

We have recently begun to offer the steam cleaned water cooled grate surface as a substitute for the older dumping grate. This is a Riley innovation (although now being offered by others also) in which certain grate clips in the water cooled grate surface are replaced with interchangeable grate clips which are fitted with a steam nozzle. Figure 1 shows one of these steam jet type clips.

These steam jets are located on the grate surface in such a number and pattern as to allow the steam jets to periodically blow accumulated ash into the ash pit. These jets can be operated manually, or they can be automatically controlled for an optimum

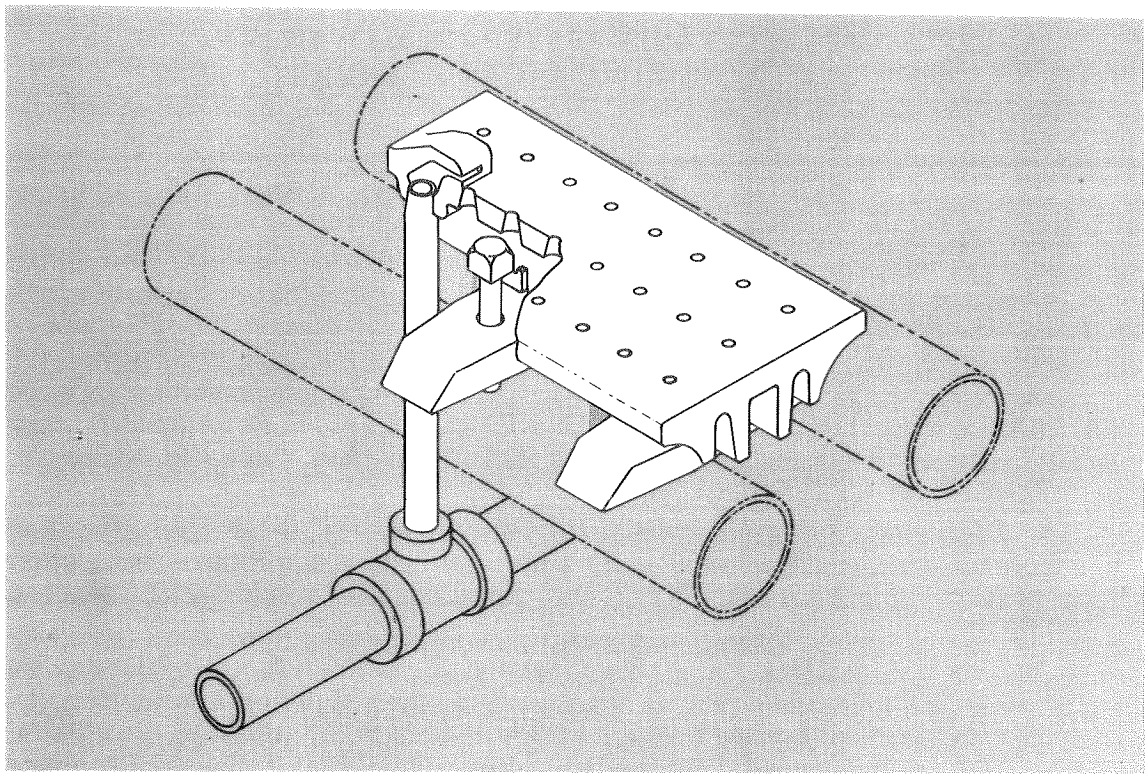

Figure 1 Water-Cooled Grate Clip with Steam Jet Nozzle

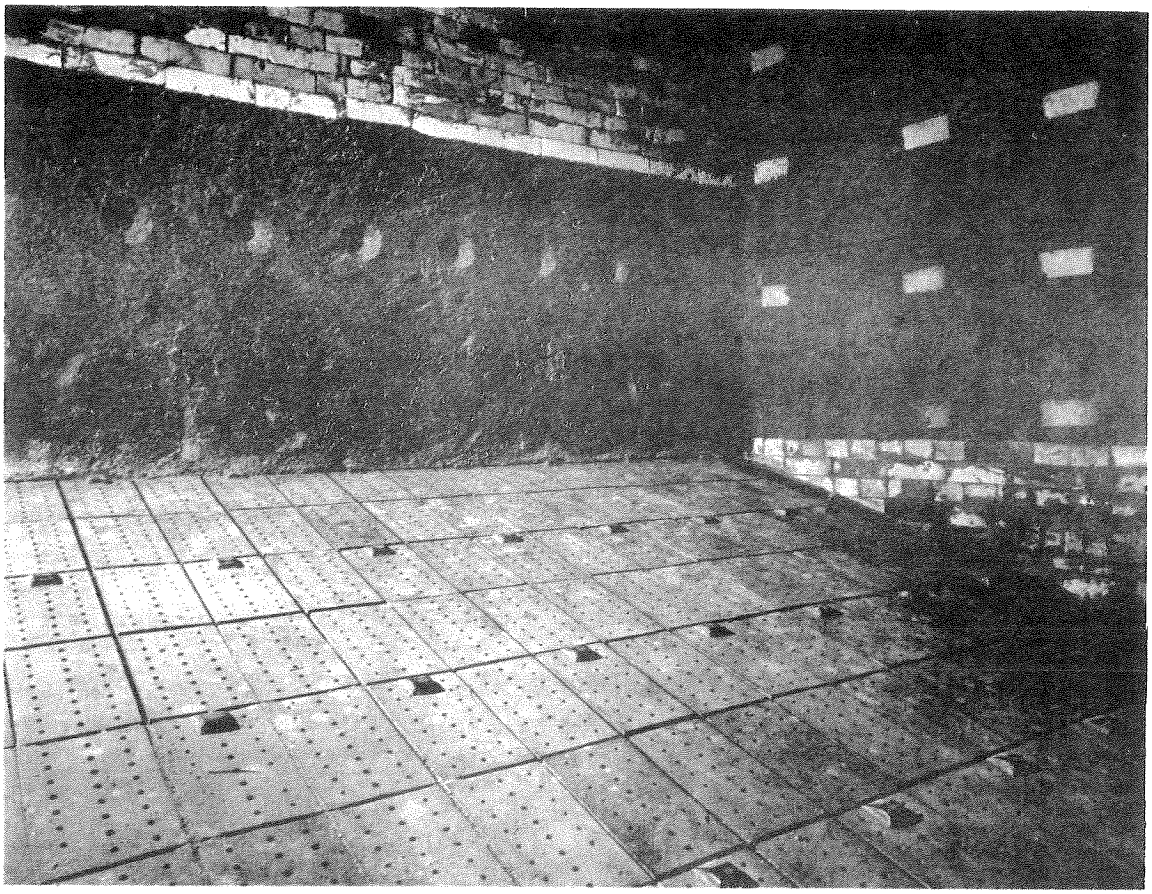

Figure 2 Steam-Cleaned Water-Cooled Grate Surface

sequence of rows, columns, frequency, duration, and pressure. A photograph of a portion of the Columbia installation is shown in Figure 2.

The steam cleaned water cooled grate system has been used for over ten years in many other fuel applications, but this is Riley's first bagasse application. This successful installation required no significant modification to standard Riley components to accommodate bagasse fuel. A side elevation of the Columbia arrangement is shown in Figure 3. You will note that headers and support tubes have been added, since this is not a water cooled furnace. These support tubes, supplied by Riley, act as an economizer and raise the temperature of the feedwater between ten and fifteen degrees before entering the drum.

Figure 4 shows the grate surface and an isometric view of a piping schematic. The steam jet grate segments are interchangeable with the remainder of the grate segments, providing complete flexibility to accommodate changes in fuel characteristics.

Even though the pneumatic feeders which will achieve a more uniform fuel feed rate and distribution have not yet been installed, the installation operated satisfactorily throughout the season with 100% availability. 1977 was one of the wettest seasons on record and some clinkers were formed from the mud and sand contained in the bagasse. While it was necessary to remove some of these clinkers mechanically, the problem was not as severe as it might have been with dumping grates, for example, since there are no moving parts on this grate surface. The labor required to clean ash from the steam cleaned grate surface seems to be substantially less than for a dumping grate.

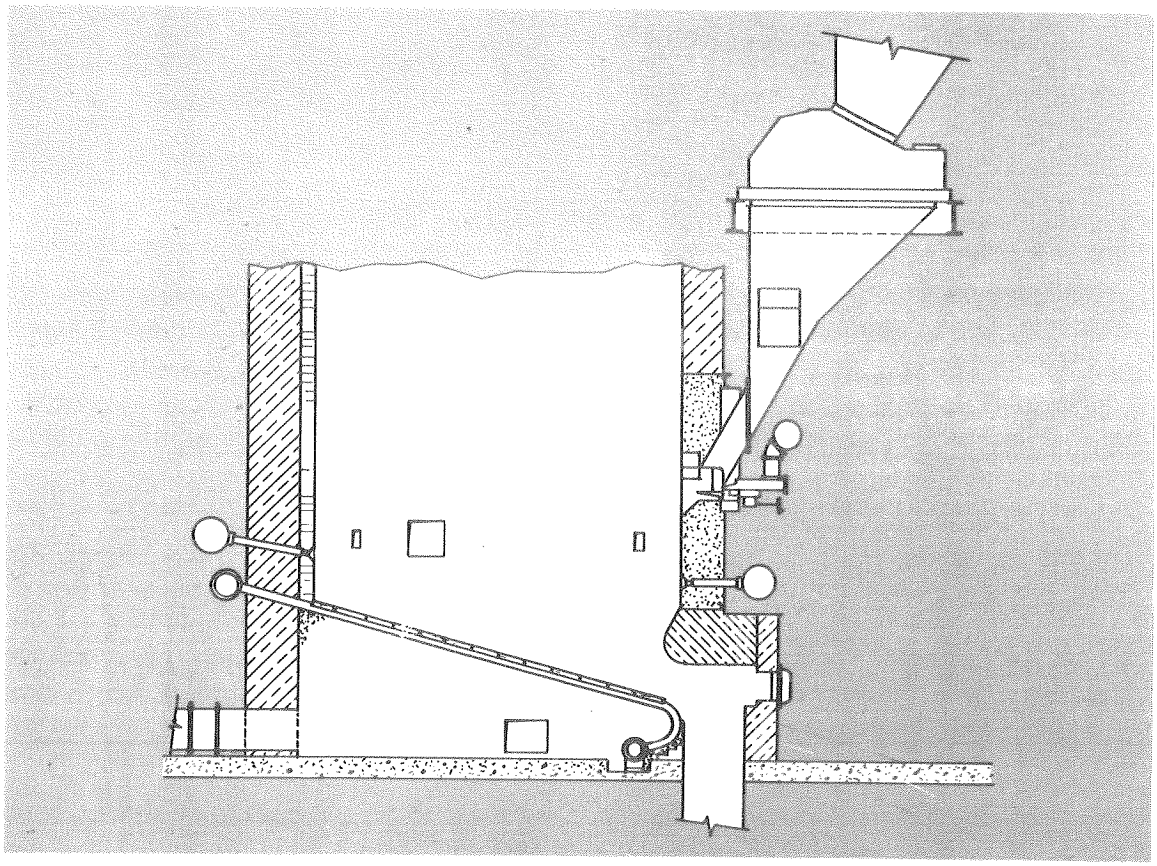

Figure 3 Side Elevation, Water-Cooled Grate

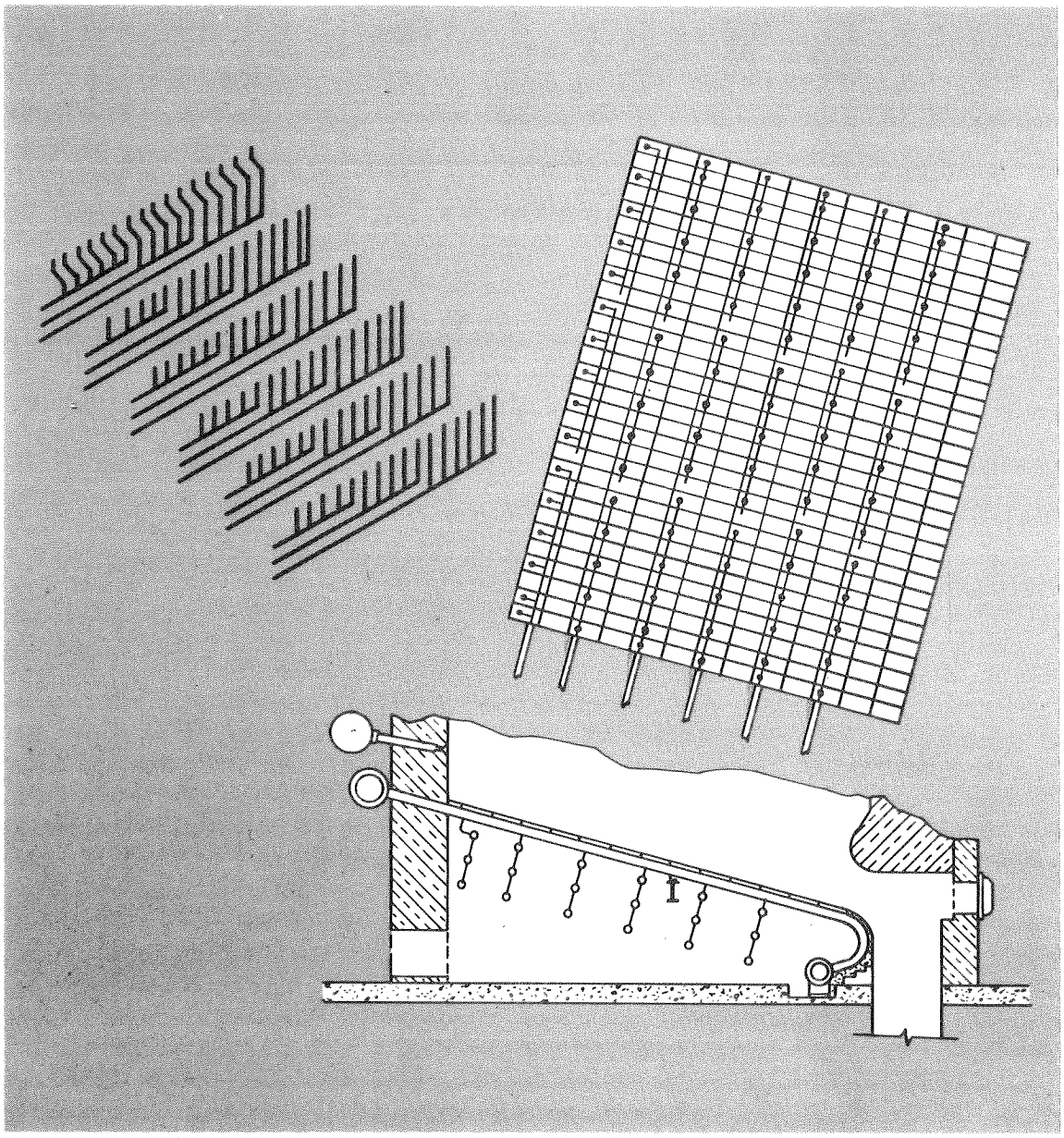

Figure 4 Typical Piping Schematic of Steam-Cleaned Water-Cooled Grate

We recognize that the raw sugar industry demands very high availability for a relatively brief annual operating period. This somewhat unique requirement not only demands reliable equipment, but also requires that the capital investment represented by that equipment must be consistent with the economics which prevail in the industry. In this paper we have described equipment, proven in service, which meets the unique needs of the raw sugar industry.