Working Model of Lamont Boiler

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Abstract- *Boilers are pressure vessels designed to heat water or produce steam, which can then be used to provide space heating and/or service water heating to a building. In most commercial building heating applications, the heating source in the boiler is a natural gas fired burner. Oil fired burners and electric resistance heaters can be used as well. Steam is preferred over hot water in some applications, including absorption cooling, kitchens, laundries, sterilizers, and steam driven equipment. Boilers have several strengths that have made them a common feature of buildings. They have a long life, can achieve efficiencies up to 95% or greater, provide an effective method of heating a building, and in the case of steam systems, require little or no pumping energy. However, fuel costs can be considerable, regular maintenance is required, and if maintenance is delayed, repair can be costly. Guidance for the construction, operation, and maintenance of boilers is provided primarily by the ASME (American Society of Mechanical Engineers). Boilers are often one of the largest energy users in a building. For every year a boiler system goes unattended, boiler costs can increase approximately 10%. Boiler operation and maintenance is therefore a good place to start when looking for ways to reduce energy use and save money.*

Keywords- BOILER, WATER TUBE, METAL SHEET, FIRE CLAY, BINDING WIRE, Etc.

I. INTRODUCTION

The steam generator or boiler is an integral component of a steam engine when considered as a prime mover. However it needs be treated separately, as to some extent a variety of generator types can be combined with a variety of engine units. A boiler incorporates a firebox or furnace in order to burn the fuel and generate heat. The generated heat is transferred to water to make steam, the process of boiling. This produces saturated steam at a rate which can vary according to the pressure above the boiling water. The higher the furnace temperature, the faster the steam production. The saturated steam thus produced can then either be used immediately to produce power via a turbine and alternator, or else may be further superheated to a higher temperature; this notably reduces suspended water content making a given volume of steam produce more work and creates a greater temperature gradient, which helps reduce the potential to form condensation. Any remaining heat in the combustion gases can then either be evacuated or made to pass through an economiser, the role of which is to warm the feed water before it reaches the boiler

1.1 (Brief) History of Boilers

BefoCentral heating boilers are a popular alternative to furnaces in Edmonton households. Modern boilers are available in a variety of designs depending on the budget and a home's heating and hot water options. You can also choose from electric, oil and the more conventional gas units. Some people prefer them over more common hot air furnaces as they are generally more efficient, quieter to operate and generate more consistent heat. How much do you know about the boiler that provides heat to your home? Residential boilers have a long and storied history, with the steam-generating designs dating back to late 1700s. Always Plumbing & Heating has complied a brief history of this simple yet ingenious invention that has withstood the test of time.

1.2 Classification of Boiler

Horizontal, Vertical or Inclined:

Depending upon the orientation of the axis of a boiler it can be classified as horizontal, vertical, or inclined. If the axis of the boiler is horizontal, it is called horizontal boiler. If the axis is vertical, it is called vertical boiler and if the axis is inclined at an angle then it is called inclined boiler.**Fire Tube and Water Tube**: In fire tube boilers, hot flue gases flows through the tubes and water surrounds the tubes. Examples: Cochran, Lancashire and Locomotive boilers. In water tube boilers, water flows inside the tube and hot flue gases surrounds the tubes.

Examples: Babcock and Wilcox, Stirling, Yarrow boiler.

Externally Fired and Internally Fired:

If the fire or burning of the fuel is done outside the shell then it is called externally fired boiler. Examples: Babcock and Wilcox, Stirling boiler. If the burning of fuel or

the furnace is located inside the shell then it is called internally fired boiler.

Example: Cochran, Lancashire boiler.

Forced Circulation and Natural Circulation:

In forced circulation boilers, a forced pump is used for the circulation of water through the tubes. Examples: Velox, Lamont, Benson boilers. In natural circulation boilers, circulation of water takes place due to natural convection currents produced by the application of heat. Examples: Babcock and Wilcox, Lancashire boiler.

High Pressure and Low Pressure Boilers:

The boilers which produce steam at pressures above 80 bar are called high pressure boilers. Example: Volex, Lamont, Benson, Babcock and Wilcox boilers.

Boilers which produce steam at pressure below 80 bar are called low pressure boilers. Example: Cochran, Lancashire and Locomotive boilers.

Stationary and Portable: Boiler which are fixed at one place are called portable boilers like the boiler used in power plants. Portable boilers are small in size and are used in locomotive type, and temporary on site purposes.

There are two general types of boilers: "fire-tube" and "water-tube". Boilers are classified as "high-pressure" or "low-pressure" and "steam boiler" or "hot water boiler." Boilers that operate higher than 15 psig are called "high- pressure" boilers. A hot water boiler, strictly speaking, is not a boiler. It is a fuel-fired hot water heater. Because of its similarities in many ways to a steam boiler, the term ‘‘ hot water boiler’’ are used.

1.3 Fire-tube Boilers :

Fire tube boilers consist of a series of straight tubes that are housed inside a water-filled outer shell. The tubes are arranged so that hot combustion gases flow through the tubes. As hot gases flow through the tubes, they heat the water that surrounds the tubes. The water is confined by the outer shell of the boiler. To avoid the need for a thick outer shell, fire tube boilers are used for lowerpressure applications. Generally, the heat input capacities for fire tube boilers are limited to 50 MBtu/h or less, 5 but in recent years the size of fire tube boilers has increased. Fire tube boilers are subdivided into three groups. Horizontal return tubular (HRT) boilers typically have horizontal, selfcontained fire tubes with a separate combustion chamber. Scotch, Scotch marine, or shell boilers have the fire tubes and combustion chamber housed within the same shell. Firebox boilers have a water-jacketed firebox and employ, at most, three passes of combustion gases. Most modern fire tube boilers have cylindrical outer shells with a small round combustion chamber located inside the bottom of the shell. Depending on construction details, these boilers have tubes configured in either one, two, three, or four pass arrangements. Because the design of fire tube boilers is simple, they are easy to construct in a shop and can be shipped fully assembled as a package unit. Table2.1.1 identifies various types of fire tube boilers and the associated fuels that they typically burn.

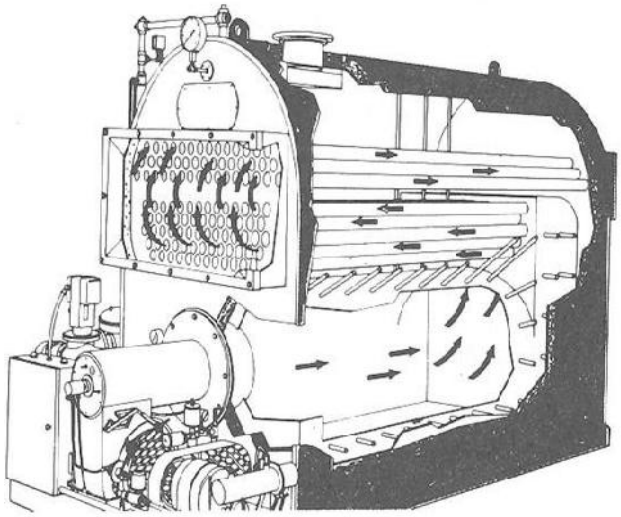

Fig . Fire-Tube boiler

II. CONCLUSIONS

Boiler or steam generator is an integral part of most of the core industries like power plant, steel plant etc. As machines are always susceptible to damages, any problem related to boiler will hampers the total process of production or service in an industry. We are highly honoured to be part of the project which deals with immediate steps to repair, renovate and re-establishment of small industrial package boilers. From the project we have learned basic ideas about stream generator, its working processes, requirement in industries, individual parts and their functions and the means to improve the efficiency of the boiler while maintaining the environmental laws and pollution act. The project has immensely helped us to use our theoretical knowledge and skills in practical field while dismantling the boiler parts and analysis for any defects and needful works for their repair.Overall it has been a great learning experience and gain a lot of experience which we can utilize in practical field in future.

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