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Review on Design and Development of Combustion Chamber of Boiler

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Abstract: Boiler is most widely used in industries and power plant for generation of steam .a some portion of world energy consumption is being used in boiler .A small improvement or some small changes in boiler or in combustion chamber we improve the efficiency of the boiler, will help to save the large amount of fuel and also reduce carbon dioxide emission. This efficiency of boiler can be improved by doing some changes in the combustion chamber of the boiler. By using tornado effecti.e. most effective method of producing acute turbulence by impingement of one flame on the other flame. By doing the arrangement of burner located in four corner of the furnace, tornado effect is created in the boiler. Due to the arrangement the intensive mixing of fuel and oxygen occurs at the centre, this promoting rapid combustion and reduces carbon loss. By using this arrangement we can increase the boiler efficiency.

Key-Words: Boiler efficiency, Boiler losses, combustion, heat transfer, and tornado effect.

I. INTRODUCTION

This Paper Discusses the design of combustion chamber of boiler by using tornado effect .tornado effect is most effective method of producing acute turbulence by impingement of one flame on other flame .by using the secured arrangement of burner located in four corner of the furnace .the burner located such a way that the streams of air are projected along a tangent to each other .due to this a small fire circle is form at the centre of the furnace. Intensive mixing occurs at thecentre. Due to the scrubbing action is present which assure contact between fuel and oxygen, this promoting rapid combustion and reducing carbon loss.The largeamount of heat produce in the combustion chamber is moves upward direction and uses the heat the water inside the tube. Maximum amount of heat is used to produce the steam.By using this effect we increase combustion rate similarly the maximum heat is used and water is heated in less time. Due to this the frequency of boiler increases.

II. LITERATURE REVIEW

Ronald Hannesen, et.al (1998) [1] the data shows cyclonic rotation in the tornado parent cloud. This point preferred area of tornadic activity. Due to the small distance between the tornado and the radar, detailed analysis of the tornadic storm.

Willy Vandermeer (1998) [2] this paper provides the basic principles of operation and application of Flame Detectors in multi-burner environment. It guided through the principles of burner and safety systems, the combustion process and burner configuration, flame Detection.

Steve Londerville et.al (2012) [3] thispaper describes conversion of Oil to Gas in tangential Fired Utility Furnaces. It included modelling to optimize air flow distribution and predict flame Pattern in the Furnace. Coen equipment includes gas burner, local burner, boiler header, local control panels for the burners.

Joon Ahn[1,] and Jong Jin Kim[2] (2013) [4]this paper describes the combustion and heat characteristics inside the combustion chamber of a wood pellet boiler. A firing boiler was developed for wood pellet fuel and its combustion characteristics were tested. Woody biomass is widely available renewable fuel.

Acharya Chirag et.al (2014) [5]in this paper boiler losses are studied to improve the efficiency of power plant. Calculating the boiler efficiency is the most important type of performance measurement in any stream of power plant. This paper is determining operating efficiency of boiler and calculates major losses.

M.C.Barma, et.al (2017) [6] in this paper boiler energy used, energy saving and emission reduction are explained. Boiler is widely used steam generation system in industries and power plant. A small improvement on the boiler efficiency helps to save large amount of fuel and reduced CO_2 emission.

III. EQUATIONS

Boiler Efficiency = Q*(H-h)*100/ (q*GCV)

Q= Quantity of Steam Generated per hour (kg/hr.)
q= Quantity of fuel per hour (kg/hr.)
GCV= Gross Calorific value of fuel (kcal/kg)
H=Enthalpy of steam (kcal/kg)
h= Enthalpy of Feed Water (kcal/kg)

IV. CONSTRUCTION Of BOILER

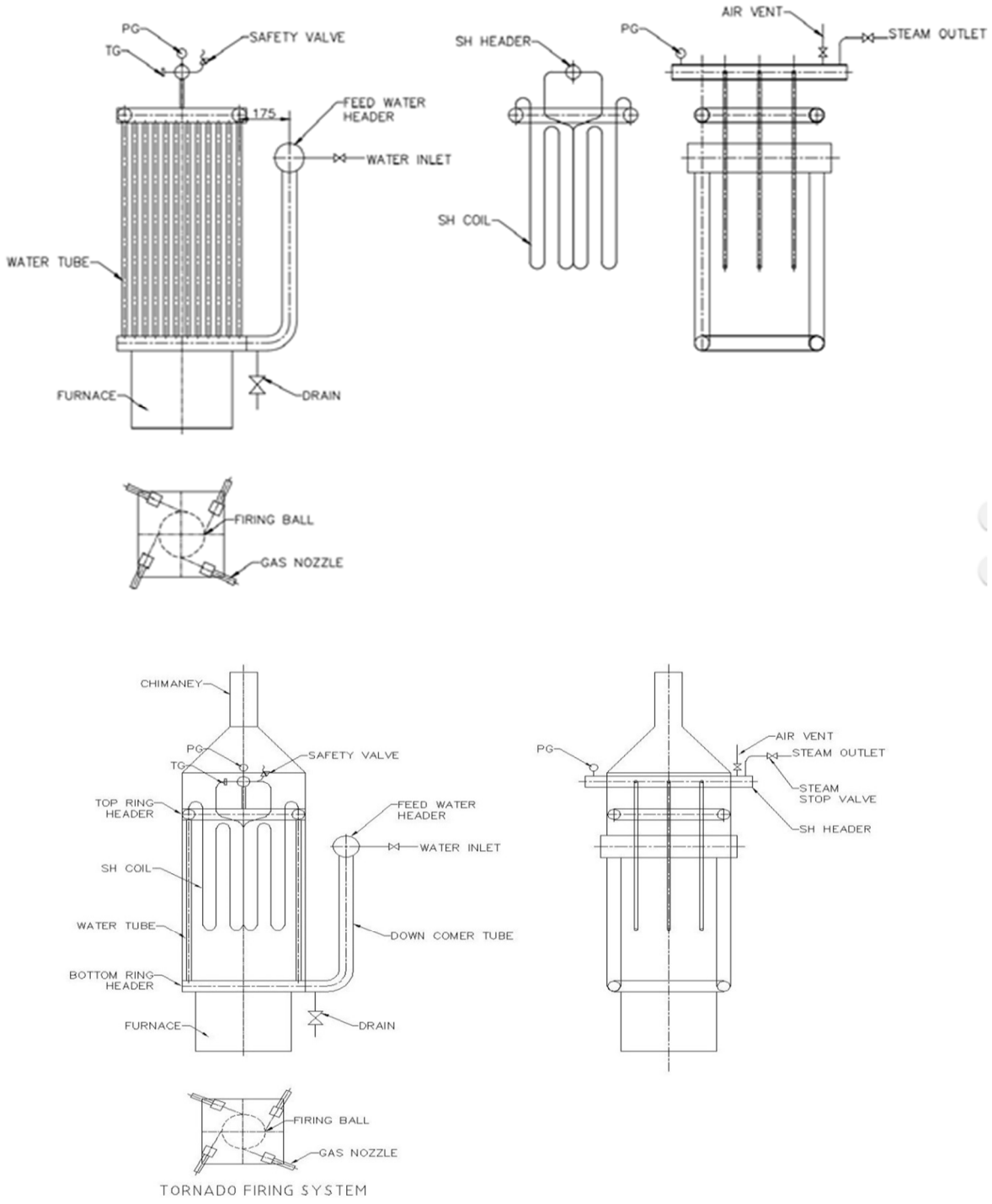

Fig. Shows Construction of Boiler

V. FUTURE SCOPE

In order to achieve the above stated objectives we need to make modern combustion chamber for increasing efficiency of steam power plant by modifying the combustion chamber as per modern industry required.

A. It is used as boiler in domestic purposes
B. It is used in industries as boiler
C. The steam generated by boiler is used to rotate the turbine
D. It is used in food processing unit
E. It is used in Milk processing unit.

VI. CONCLUSIONS

Generally in other boilers heat supplied is not totally converted into output. There are many losses occurs in it. In this boiler system maximum heat is utilized due to tornado firing system hence losses reduced at minimum level. Therefore, minimum losses give more output hence efficiency increases orderly. In this way, model design of combustion chamber of boiler is very effective and very efficiently used in various applications.

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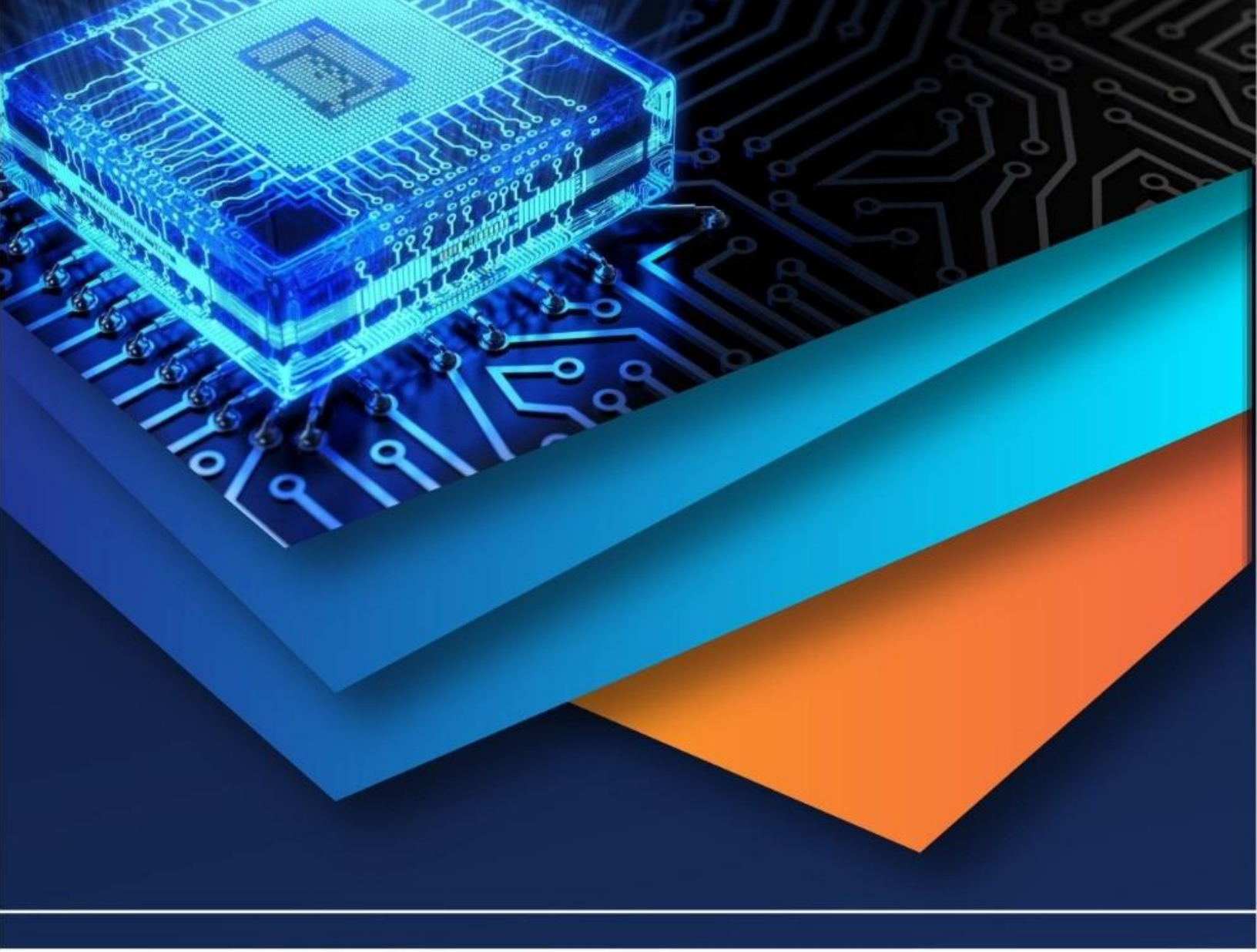

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