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Modification of Coal Handling System in Boiler Power Plant

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Abstract: **In this paper we are modified the coal handling method for small or medium scale plant which is used in small or medium scale organization. In coal handling plant (CHP) if we use the low grade coal that is imported type coal, this coal is found in powder form as well as in large scale form. But in boiler we use the pulverizing method to feed the coal in boiler from coal bunker to furnace in size of 10mm to 20mm. But it is not possible to feed large scale coal to furnace. So we use the crushing method. So this method is explained in this paper.**

Keywords: **simple coal handling plant (CHP), vibratory screen, crusher, bucket elevator.**

I. INTRODUCTION

A thermal power station works on the basic principle that heat liberated by burning fuel is converted into mechanical work by means of a suitable working fluid. Coal need to process from loading and unloading to stockpile, this procedure can finish by coal conveying system. This system includes add up to tens mechanical, guarantee the important of these mechanical are normal operation, it is very important for this system stable operation. And it is a key problem of reduce costs, ensure safety in production, improve the efficiency of work.

The main function of boiler to produce the steam, and this steam is used for various purposes like to rotate the generator and produce the electricity, also use of this steam in pasteurization of various liquid.Coal handling system in thermal power plant, usually means the technique procedure that coal fromloading and unloading outside the factory to boiler Coal Storage. Because of the large number ofmechanical involved, we can sort as we used it, the important part includes unloading coal mechanical, coal storage , convey and Accessoryequipment includes vibratory screen and coal crusher, coal blending and coal supply, magnetic separator, weigh, sample,dust removalequipment.

II. HISTORY OF COAL HANDLING PLANT

The initially developed reciprocating steam engine has been used to produce mechanical power since the 18th Century, with notable improvements being made by James Watt. When the first commercially developed central electrical power stations were established in 1882 at Pearl Street Station in New York and Holborn Viaduct power station in London, reciprocating steam engines were used. The development of the steam turbine in 1884 provided larger and more efficient machine designs for central generating stations. By 1892 the turbine was considered a better alternative to reciprocating engines; turbines offered higher speeds, more compact machinery, and stable speed regulation allowing for parallel synchronous operation of generators on a common bus. After about 1905, turbines entirely replaced reciprocating engines in large central power stations.

The largest reciprocating engine-generator sets ever built were completed in 1901 for the Manhattan Elevated Railway. Each of seventeen units weighed about 500 tons and was rated 6000 kilowatts; a contemporary turbine set of similar rating would have weighed about 20% as much.

Coal has been used for centuries for small-scale furnaces. Around 1800 it became the main energy source for the Industrial Revolution, the expanding railway system of countries being a prime user. Britain developed the main techniques of underground mining from the late 18th century onward with further progress being driven by 19th and early 20th century progress.[2]

By 1900 the United States and Britain were the chief producers, followed by Germany. However oil became an alternative fuel after 1920 (as did natural gas after 1980). By the mid-20th century coal was for the most part replaced in domestic as well as industrial and transportation usage by oil, natural gas or electricity produced from oil, gas, nuclear or water power. Since 1890 coal has also been a political and social issue. Coal miners' labor unions became powerful in many countries in the 20th century. Often, the miners were leaders of the left or Socialist movements (as in Britain, Germany, Poland, Japan, Canada and the U.S.).[3][4][5][6][7][8] Since 1970, environmental issues have been paramount, including the health of miners, destruction of the landscape from strip mines and mountaintop removal mining, air pollution, and contribution to global warming. Coal remains the cheapest energy source by a factor of 50% and even in many economies (such as the U.S.) it is the primary fuel used in electricity generation.

III. SIMPLE COAL HANDLING SYSTEM

The following equipment used in coal handling plant:

In simple coal handling systems following equipment are used in old days.

1. Hopper
2. Vibro-feeder
3. Belt conveyor-1
4. Crusher
5. Belt conveyor-2
6. Bunker
7. Furnace

Simple working of coal handling plant:

Coal handling is the essential preparation of coal for the feeding coal to the biller for the efficient combustion. For efficient feeding and burning we can use above parts

1. Hopper :

Hopper is the first part use for feeding the coal to the belt conveyor. The main function of this part is to store the coal and feeding to the belt conveyor with constant discharge with help of wagons loading unloading mechanism. This wagon mechanism is installing bottom of the hopper which is to reduce the load on the belt conveyor because it's keep the constant discharge.

2. Vibro-feeder:

Vibro-feeder is use for the preparation of coal. The large particle of the coal removed with help of electric motor is use for create the vibrations. Hence the small coal practical come out and large particle remove.

3. Belt conveyor-1:

Incoming coal from the vibro-feeder is loading on the belt conveyor1. Here belt conveyor we are use for the transfer of coal vibro feeding to the crusher with constant discharge.

4. Crusher:

Crusher reduces the overall large size of the feed coal so that it can be more easily handled and processed within the coal handling plant. Crushing requirements are an important part of coal handling plant.

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5. Belt conveyor-2:

The incoming coal fromcrushertransfer to theBunker. Here belt conveyor we are used for the transfer of coal from crusherto the bunker with constant discharge.

6. Bunker:

For large storing capacity of coal bunker is use top of the boiler. Stoaring capacity depend on the type of boiler and there boiler capacity.

7. Furnace:

Coal from bunkers the discharge rate controlled by the wagons use. This coal particlesis burn in the biller furnace.

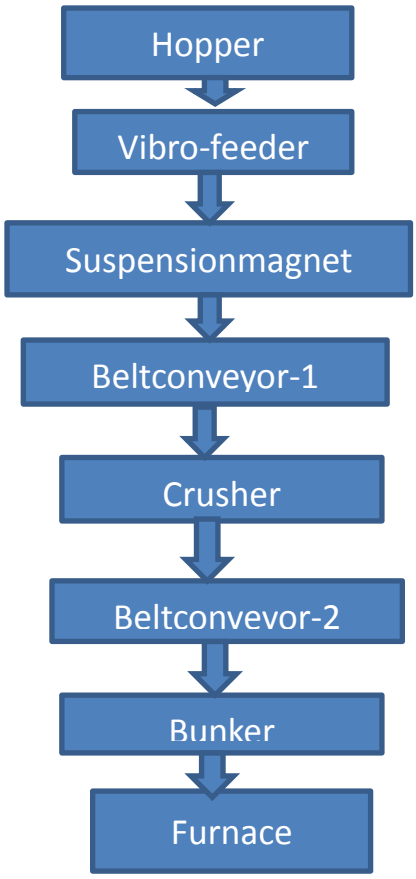

Fig.1 The line diagram of simple coal handling plant

IV. MODIFIED COAL HANDLING PLANT WORKING

In simple coal handling plant there is need to do modification for improvement the prformance of coal handling system. So this paper is published for this purpose. In simple coal handling plant there is no vibratory screen machine as well as there is no bucket elevator. This two machine we will put in modified coal handling plant to improve the prformace of hole system as well as to burn the coal properlly in furnace or reduce the west of coal in furnace. The purpose of putting this two machine in simple coal handling plant is that, in imported type coal the mixture of fine coal as well as large size coal also there. So this large size coal going to bunker after crushing process, in crushing process it is not possible to crush the all large size coal at a time so after crushing some large scale coal goes to bunker then furnace. But in pulverizing process if large scale coal come in it load is also applied on it. And other problem is that large scale coal is not proprlly burn. Large amount carbon deposit also seen in out going ash of boiler.

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If you putting this two machine e.g. vibratory screen and bucket elevator this above problem will solve properlly. The fig. line diagram shows the working of modified coal handling system. Vibro-feeder feed the coal from ground level to belt conveyor-1 then these belt conveyor- 1 gives coal to vibratory screen. The vibratory screen is made from iron net, and whole diameter is 10mm to 20mm. then this small scale pass to belt conveyor-2, then this belt conveyor convey this coal to bunker. The remaining coal from vibratory screen which is size grater than the 20mm, this coal pass to crusher then bucket elevator then bucket elevator pass this coal to belt conveyor in vertical direction. This cyclic process is continue carryon.

Modified line diagram is follows:

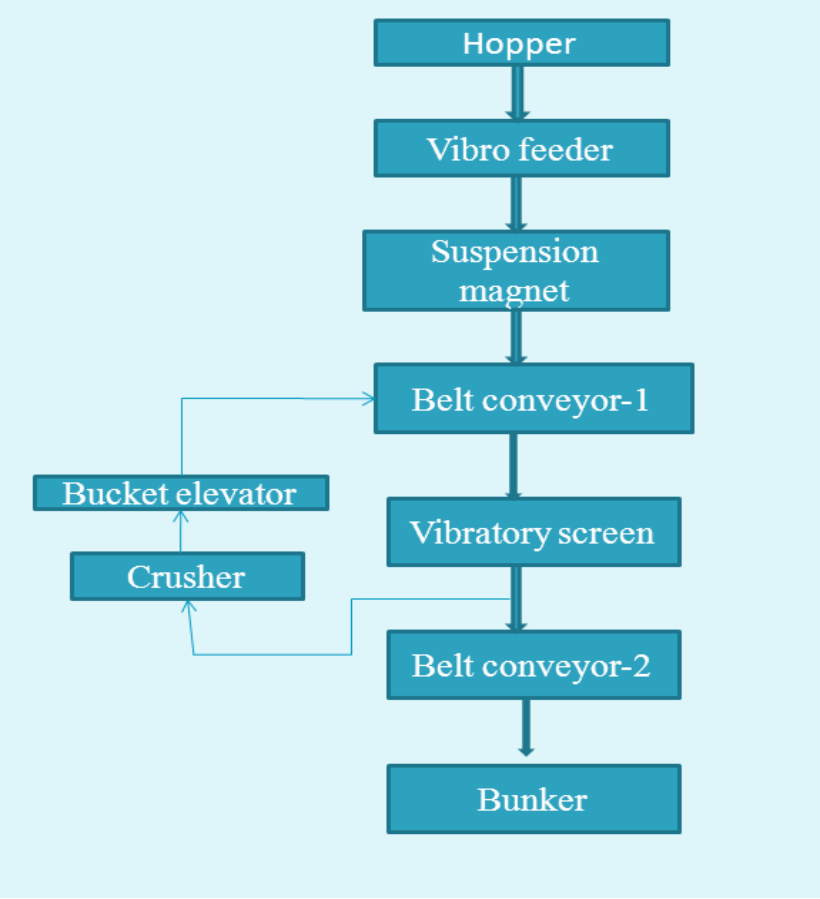

Fig.2 Modified line diagram coal handling plant

Block diagram for this cyclic process for converting large scale coal to small scale coal:

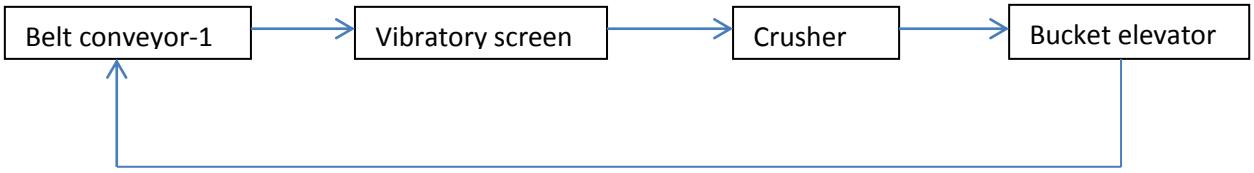

Fig.3 Cyclic process for conversion of coal in to small scale

V. CONCLUSION

From this paper we concluded that this system will improve the efficiency, reliability, and safety of the process. Also increase the performance of coal handling plant. The system suggested in this paper is a simple model which can be useful for coal handling which are not related with thermal power plant with slight changes.

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