

# Automatic Dam Doors Control Centrifugal Governor

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**Abstract – Dams are typically constructed with a drain & similar mechanism to control water levels in an impoundment for normal maintenance or emergency purposes. By define a disaster is any event that causes great harm or damage serious sudden misfortune. Automatic door opening and closing is depend on many mechanical system this mechanical system are given by, By using centrifugal governing, By using rope mechanism, By using gear mechanism. The opening of doors takes place when: When the water level go up the dam door will be open automatically. When the water level drops down the dam door will be close automatically. Due to this the operation is easy to handle. This operation is safe and it will consume less time as compared to other systems. Skilled operators are not required.**

**Keywords – Rope mechanism, gear mechanism, centrifugal governor and water level scale.**

## I INTRODUCTION

Turning of normal working of dam's doors to the advancement by using centrifugal governor day by day industrialization & civilization grow too much & heavy population is also genuine problem. Industries have their bulky water, water supply system very low against water demand. That problem can be solve by big water dam, as excellent engineering made by civil engineers but poor technology applied with mechanical engineering. We survey some concrete dam like, 'Sardar sarovar Dam-Navagam', 'Indira gandhi Dam-Maharashtra', 'Pali Dam-Rajasthan'.

All dam used mechanical jack & screw type door system to control water flow. The overflow system is very dangerous mechanical operator or finally unwanted water flow every year after monsoon water storage problem creates our objective is to regulate the dam water level with the help of centrifugal governing system.

Dams are man-made or artificial barriers are a constructed across the stream channel to impound water. Dams are typically to provide with spillway systems to safely purpose to pass a broad range of flows over around the dam. The various materials are used for dam construction such as timbers rocks concrete earth steel and the combinations of these are materials. However in Connecticut most dams are constructed of earth & combinations of earth or other materials like Spillways are commonly constructed of non-erosive

materials such as the concrete an also the rocks. Dams are typically constructed with a drain or similar mechanism to control water levels in an impoundment for at the normal maintenance as an the emergency type of purposes. These are the define as an a disaster is any event that they are causes to the great harm an also a damage of an the serious part of the sudden miss-fortunes. The Dam are failures clearly fit this define are part of the sudden an unexpected manner are in which the dam are to be a failures can occur they are potentially as destructive as an the earthquakes are in the hurricanes anare to the tornado. In order to maximize a reservoir usage of an a river it is that essential to make an all-embracing plan that considers long-term of prospects an to the proceeds with the project as planned. The selection of dam type should be based on full considerations of that are all types a Topographical geological-conditions hydrological features availability of a construction materials safety environmental issues economic evaluation. The dams have sustained human lives for more than three thousand years. The selection of dam type has altered the overtime are also to the desired part of the results are have still to be an obtain. Almost every time of water in to a resources project has been reservoir to the diversion work of an the part of control the floods to the store of water for an irrigation to the power generation for

### **What is Centrifugal Governor?**

Centrifugal governors work on the principle of balancing the centrifugal force on the rotating balls by an equal and opposite radial force call as the controlling force. A centrifugal governor is a specific type of governor that controls the speed of an engine by regulating the amount of fuel (or working fluid) admitted, so as to maintain a near-constant speed, irrespective of the load or fuel-supply conditions. It uses the principle of proportional control.

It is most obviously seen on steam engines, where it regulates the admission of steam into the cylinder. It is also found on internal combustion engines and variously fuelled turbines, and in some modern striking clocks the recent developments in the new generation of sensor rich, distributed autonomous control technology has had a profound effect on the design of modern automotive vehicles.

### **Different types of governors**

There are two types:

- 1) Centrifugal governor
- 2) Inertia governor

Centrifugal governor are further classified as:

- Pendulum type
- Loaded type

Loaded type are further classified as:

- Dead weight
- Spring controlled governor

Dead weight types are classified as:

- Porter governor
- Procell governor

Spring controlled governor are classified as:

- Hartnell governor
- Willson Hartnell
- Hartung governor
- Pickering governor

## II LITERATURE SURVEY

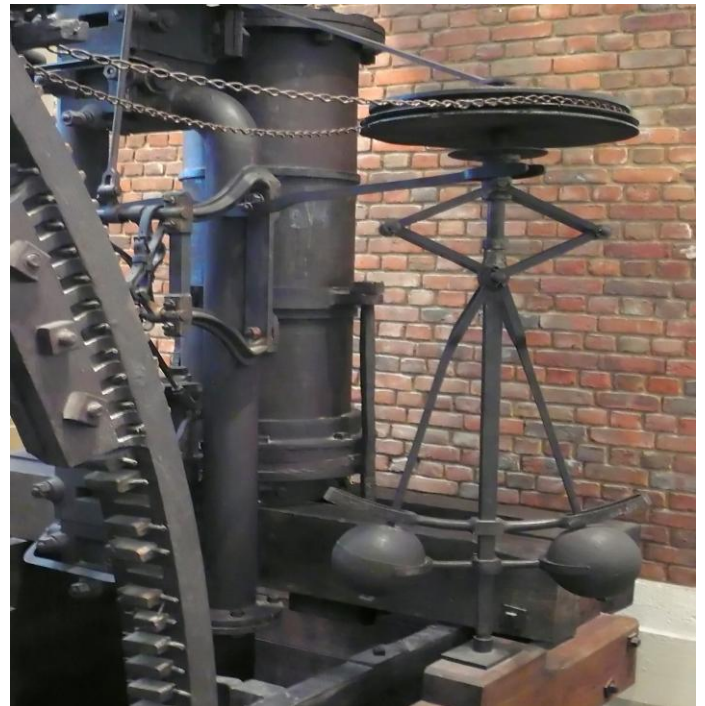
[Mr. Doshi Sahil Sanjeevkumar, IJSRDV- Vol. 4, Issue 02] The automatic closing an opening of door of dam is very important part regarding the dam. This is an automatic opening and closing of a dam door is also depending upon various types of methods and design parts but my topic is based on mechanical systems. The project topic are required the following mechanical parts to run our project topic. 1) Rack and pinion, 2) Lever, 3) Storage tank, 4) Gate, 5) Gear, 6) Manual valve, 7) Chain drive.

In order to maximize a reservoir usage of an a river it is that essential to draw up a total plan that are considers all aspects as an long times of an the topic prospects. The site for the dam are must be determined by the investigating all possible locations making case studies on an the single and the multiple cases an at the various scales, an comparing their advantages or the disadvantages are as very carefully so that maximum types of benefit can be achieved at an very minimum cost an also at a minimum risk in accordance with are the total project plans an the Problems before during or after construction may go beyond more technical as an one an the extend to that are those are the relating to the local communities the economy these are the natural environment and in some parts are the political issues. It is natural that the way of thinking about the selection of the dam sites differs are according to the purpose of the project data. If these dam is intended for the flood control the water supply to an a irrigation it is an preferable that as on a site is sought as close as possible to the place of that will be benefit it is in the middle and the lower reaches of the river from the perspective of ensuring as an stable effect. No matter how ideal as an proposed the dam site is, if they affect any large scale of an also important to a farmlands, an other ways of value villages railroads mine power-station forest fisher sightseeing areas or an the cultural assets, reconsideration may be unavoidable. Also the dams are designed to control rivers artificially an they are must be concerned with the users and they are who have to be the vested right. The natural sours of an environment is to

be conserved of course that the main purpose of construction is to contribute to human development it is an important that a dam site is to be selected such that maximum harmony with nature can be achieved nature must be conserved where it is possible as enclosing door of a dam.

## III HISTORY OF CENTRIFUGAL GOVERNOR

Boulton & Watt engine of 1788 James Watt designed his first governor in 1788 following a suggestion from his business partner Matthew Boulton. It was a conical pendulum governor and one of the final series of innovations Watt had employed for steam engines. James Watt never claimed the centrifugal governor to be an invention of his own. Centrifugal governors were invented by Christian Huygens and used to regulate the distance and pressure between millstones in windmills in the 17th century.



*Figure 1 Historical image of centrifugal governor*

## IV SCOPE

The automatic opening and closing the door of dam are also the most important part. This automatic system also work on many types like rope mechanism, sensor mechanism, centrifugal governor mechanism.

These type of system is also implement on the following places.

- Rivers
- Dams

## V OBJECTIVES

- Our objective is to regulate the dam water level with the help of centrifugal governing system.
- The opening and closing of dam doors depends on the centrifugal force and increase or decrease in water level.

- The wastage of water due to overflow can be prevented.
- The main purpose of it is to provide safety.
- Operator effort can be eliminated.

### VI SITE SELECTION FOR DAMS

A dam is a huge structure requiring to the lot of fundan the Extreme care shall be taken on while selecting the site of a dam. As are the wrong decision may be lead to the excessive cost of an any type difficulties in that of the construction are in a maintenance. Various factors those are should be the consider for the selecting the site of the dam.

Site selection of dams depends on the following factors:

- Topography
- Suitable Foundation
- Good Site for a reservoir
- Large storage of capacity
- Shape of reservoir basin
- Water tightness of in the reservoir
- Good hydrological condition
- Deep of a reservoir
- Small submerged of an Area
- Low silt inflow
- No objectionable minerals
- Availability of material
- Accessibility

### VII CONSTRUCTION AND WORKING OF CENTRIFUGAL GOVERNOR

#### Construction of centrifugal governor

1) The centrifugal governor consists of two fly balls or fly weights of same mass.

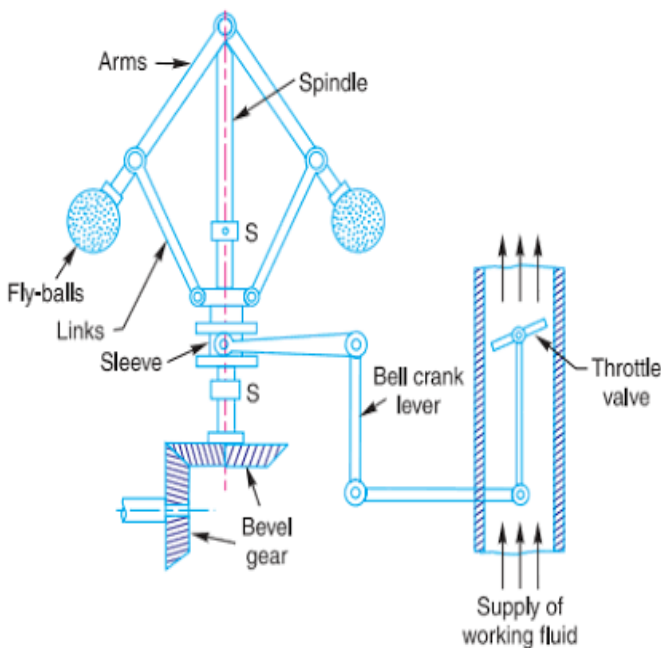


Figure 2 Centrifugal governor

- 2) It consists of two slides or sleeves, one main shaft on the top of which the balls are connected through a rods.
- 3) The stoppers are provided on main shaft to prevent the excessive movement of sleeves.
- 4) Due to the revolution of engine shaft the governor also rotates here the bevel gears arrangement is used to mesh the engine shaft and main shaft of governor.

#### The working of centrifugal governor

Centrifugal governors work on the principle of balancing the centrifugal force on the rotating balls by an equal and opposite radial force call as the controlling force.

A centrifugal governor is a specific type of governor that controls the speed of an engine by regulating the amount of fuel (or working fluid) admitted, so as to maintain a near-constant speed, irrespective of the load or fuel-supply conditions. It uses the principle of proportional control.

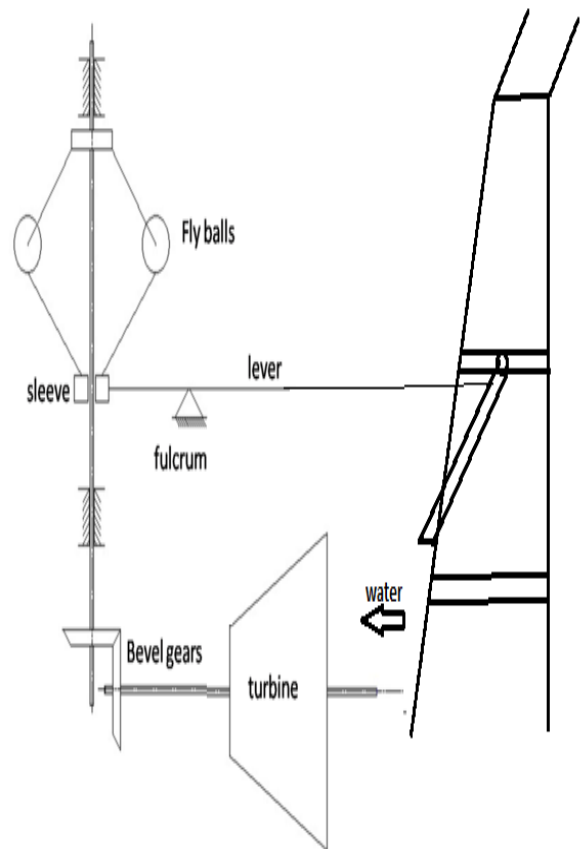


Figure 3 Working diagram for dam's doors control by centrifugal governor

#### Construction

- The arrangement consists of a centrifugal governor, a turbine, bevel gears arrangement, sleeve, fly balls and a lever.
- Due to the striking of water the turbine rotates.
- The shaft of turbine is connected to bevel gears.
- One gear is further connected to the main shaft of governor.
- The fly balls are connected at the top end of the main shaft of governor.

- The weight of both the balls is same.
- Sleeves are connected to the fly balls which rotates with the governor and can rise or fall with the movements of balls.
- When the movement of sleeves takes place the lever attached to the door operates the opening and closing of doors.

**The working of doors of dams using centrifugal governor**

- Centrifugal governors work on the principle of balancing the centrifugal force on the rotating balls by an equal and opposite radial force call as the controlling force.
- A centrifugal governor is a specific type of governor that controls the speed of an engine by regulating the amount of fuel (or working fluid) admitted, so as to maintain a near-constant speed, irrespective of the load or fuel-supply conditions. It uses the principle of proportional control.
- It is most obviously seen on steam engines, where it regulates the admission of steam into the cylinder. It is also found on internal combustion engines and variously fueled turbines, and in some modern striking clocks.
- Working of centrifugal governor in the case of opening and closing of dam doors
- The figure shows the representation of assembly of dam's doors control by centrifugal governor.
- The setup of assembly is done in such a way that when the water level rises then the water strikes on the blade of turbine.
- Due to which the turbine will rotate and the shaft attached to it will also rotate.
- As the shaft of turbine is connected to the bevel gear, the bevel gear will also rotates.
- Due to rotation of bevel gears the main shaft of centrifugal governor also rotates.
- The shaft rotates with sufficient speed which is enough to carry out the movement of balls and sleeves.
- When the governor rotates with full speed then the balls will move in outward direction due to acting of radial outward force on the balls.
- When the balls moves in outward direction then the sleeves attached to the balls also get raised.
- When the sleeves rises the lever operates the opening of doors.
- Due this the speed of governor decreases and the balls will move in inward direction.
- This inward direction of balls leads to the fall of sleeves.
- When the sleeves falls then the closing of doors takes place through the lever.

- In this way the opening and closing of dams can be controlled.

**VIII COMPARISON**

**Table 1 Ccomparison between normally operated dam doors and the operating of dam doors using centrifugal governor**

Sr. No.	Normally operated dam doors	Operating of dam doors using centrifugal governor
1)	Normally operated doors are generally operated by hand driven mechanism.	The doors of dam are opened and closed by centrifugal governor.
2)	In this system screw & jack mechanism is used.	In this system centrifugal force operates the operation of doors.
3)	Here the operator is required to carry out the operation.	Here there is no need of operator to carry out operation.
4)	Investment of cost is less.	Investment of cost is high.
5)	More wastage of water during rainy season.	There is no chance of wastage of water.
6)	More efforts are required for opening and closing of doors.	As in this case the operator is not required so efforts required are less.

**IX ADVANTAGES AND DISADVANTAGES OF CENTRIFUGAL GOVERNOR**

**Advantages**

- 1) The wastage of water can be prevented or controlled.
- 2) Less effort required as compared to screw and jack mechanism.
- 3) There is no need of operators the opening and closing is carried out automatically.
- 4) Relatively cheap.
- 5) Easy maintenance.
- 6) Suitable for high pressure.

**Disadvantages**

- 1) Sounds too much one has to arrange a room for it or it in isolating box.
- 2) High outlet temperature of compressed air.
- 3) Cost is high.
- 4) Weight is high.

**X APPLICATION**

- 1) The centrifugal governor can be used in dams for controlling opening and closing of doors.
- 2) The governors were also used in speed control of mechanical music box.
- 3) Used in automobile to regulate the fuel supply in loading condition.



- 4) Governors are also used in stem engines.
- 5) Its application also involves in speed control of turbine shaft in hydroelectric power plant since the varying water pressure may increase or decrease the speed the governor operates the water nozzle.

### **XI CONCLUSION**

Hence we have conclude that the automatic opening and closing of a door dam successfully operated on the mechanical system by using rack and pinion arrangement. And this is the accurate method of the operating the automatic opening and closing of a door dam.

By using the centrifugal governor in the opening and closing of dam's doors the wastage of water can be prevented and human effort can be reduced.

Due to this the operation is easy to handle. This operation is safe and it will consume less time as compared to other systems.

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