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Mechanical Concept applicable for Continuous Irrigation System an Extra Challenge towards shortage of Petrol, Diesel and Unavailability of Electric Supply in Odisha for Agriculture.

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Abstract: Agriculture is the strength of Indian financial system. It includes all those behavior which are connected to the farming of land for production of crops. It also found that in india the historical, social and cultural background of state affects agricultural output. agriculture is a basis of occupation for underprivileged farmers in india. Irrigation is the controlled application of water for agricultural purposes by rainfall, diesel-driven pumps, electricity supply. Weather in India is becoming progressively more complicated to forecast, both in the short and the long phrase. In India four seasons based on the climate. Summer, winter, autumn, and spring are found but now a days farmers are facing so difficulties like in rainy season the percentage of rainfall is so less. In summer season number of cyclones are there. Awfully Severe Cyclonic Storm Fani was the strongest tropical cyclone strike the Indian state of Odisha on date 26th april 2019, that was the summer season. After that cyclone there was failure of current supply for at least 30 days, all petrol tanks remain closed for number of days, farmers were suffered a lot for that purpose, an energy disaster is any considerable bottleneck in the provide of energy resources to an economy. So it can told access to dependable and reasonable irrigation water for agriculture is a vital factor for the economic growth of the country. In this work a product has been developed where mechanical advantage, Velocity ratio, efficiency, gear terminology, energy store by flywheel concepts has been used and finally water lifting from tube well is possible without diesel pump or electricity.

Keywords: Agriculture, crops, energy resources, economy, petrol, diesel, electric supply

I. INTRODUCTION

Irrigation is the purpose of controlled amounts of water to plants at desirable gap. Irrigation helps to grow farming crops, maintain landscapes, and revegetate concerned soils in dry areas and during periods of less than normal rainfall. In this paper a new product has been developed for continuous irrigation system, where the concept of MA (Mechanical Advantage), gear terminology, energy storage concept by flywheel has been concerned, number of works has been done by many authors, Kumar, S [1] studied Effect of Sodicity on Soil-Water Retention and Hydraulic Properties and found the effect of sodicity on unsaturated soil hydraulic properties Permeameter and pressure plate experiments were conducted on six texturally special soils at varying sodicity altitude to gain drenched hydraulic conductivity and van Genuchten soil-water retention constraints. The results show that soils retain less water with high soil-water sodicity relative to low sodicity at the same matric suction. Song, X and Liu, C [2] studied on inlet vortex in pump sump frequency of pressure fluctuation at the bottom of the pump sump is twice of the rotational frequency of the impeller blade. The vortex below the flare tube is easy to generate under the large flow conditions and mainly concentrates at the right front position below the flare tube. Jondhale et.al [3] studied irrigation structure and its method and found that the water arrangement structure can be tainted in accordance with an collection of particular yield needs and requires least maintenance. The most convincing method for deciding the water needs of crop is the in view of the uninterrupted inspection of soil humidity, and manage water application extend as a part of

coincidence with the information in relation to soil hydrological belongings. Roy and Ansari [4] studied on smart irrigation control system where they used PLC based irrigation system to sense soil moisture, and depending on moisture content sprinkler irrigation method was used to minimize water loss. Safarzadeh and Mohajeri [5] examined Solid and porous weirs with various properties and the drag coefficients of the porous weirs in the nonlinear flow resistance model were determined using sensitivity analysis. Feng, Y. et.al [6] studied on Water-nitrogen coupling result by mulched drip irrigation on dry matter and yield of maize and generate that in the arrangement of high water level and 270 kg/hm 2 fertility, higher total dry substance biomass can be acquire, but the harvest index is minor than that in the grouping of medium nitrogen and water. An advanced yield index can be obtained, which can better standardize the allocation of photosynthetic crop between grains and vegetative organs. Daniel T et.al [7] studied Development of smart irrigation system In this work they focus on development of irrigation system for agricultural field. The irrigation system which was develop the most important things is water sprinkler: that measure soil moisture and temperature. As compare to manual irrigation system this system is more effective to reduces waste water in agricultural land. L. Akubattin et.al [8] studied Smart Irrigation System it found that solution about for correct use of water in a agricultural field, that is how a farmer can use the store water in crops more easily and smoothly for that smart operation of water pump is needed. For irrigation process here researchers focus on android based system. Singh [9] studied on Smart Irrigation System using IOT, In this paper by using smart irrigation system that is a IOT based optimally controlled water pump, which give more electricity consumption and at the same time 30% crop firms are taken observation by using of controlled water supply and found 17.23% increase of production rate. Ashwini B V [10] studied on Smart Irrigation System Using IoT for Surveillance of Crop-Field where they concentrate on development of agricultural field that is food production through smart irrigation by using internet of things. The whole process are controlled by a microprocessor for detection of soil moisture, air moisture ,temperature, with the help of sensors. Irrigation will be automatically detected when moisture and temperature of agricultural land is reduced at the same time through mobile farmer will receive all the messages regarding soil condition and temperature. Zhao,R [11]studied effectiveness and longevity of amendments to a cadmium-contaminated soil where it has explained that why the diminution in plant Cd content beg to be excused over time is the change of accessible Cd content in soil over time, which is significant for direct agricultural perform. It was accomplished that RM, CS, RS, and their arrangement with Zn fertilizer as successful improvement can have a thoughtful and enduring activist impact on Cd-contaminated soils.

II. EXPERIMENTAL PROCEDURE AND RESULTS:

The figure 1 shows the arrangement for a continuous irrigation system, which consists of Gears, Flywheel, Handel, bearings. This arrangement placed on a frame which is made of mild steel angles having dimension (40x40x5)mm. In this work two gears, a flywheel, four numbers of bearings, shaft having 25 mm diameter are used. driver and driven gears having 200 and 40 teethes respectively, for future work of this project the number of teethes for driver and driven may be varied. shafts lengths having 2.5 feet(ft) each as shown in figure, one of the shaft carries driver gear(200 teethes) and handle at its end, other shaft carries driven gear(40 teethes) , flywheel 30 kg, handle of the tube well as shown in figure, shafts are supported by bearings at various positions.
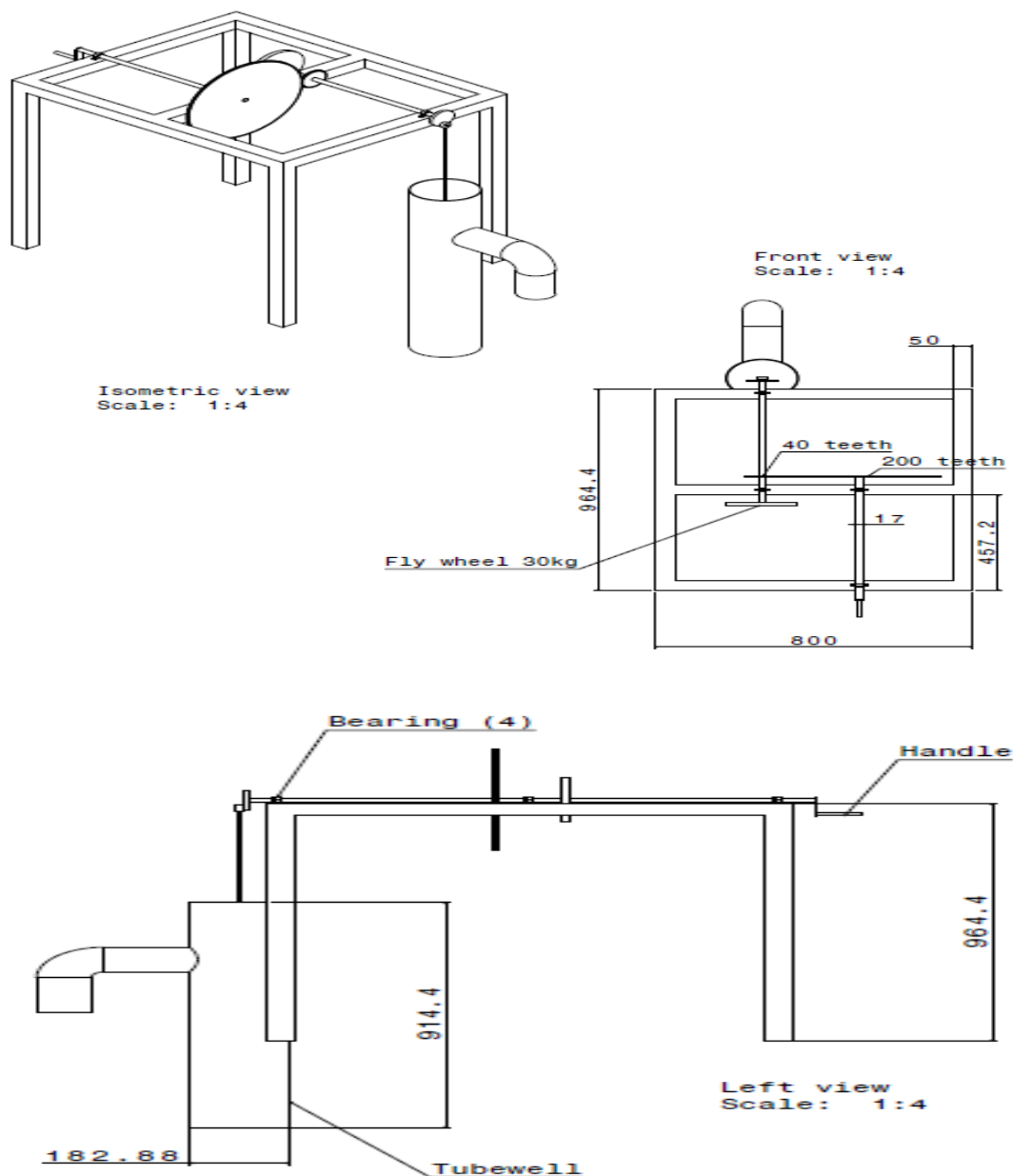
Fig.1

The amount of stored energy in the flywheel is related to the mass shape and material, moment of inertia and velocity, as illustrated in equation (1)

$$E = 1/2\ I\omega^2 \qquad (1)$$

Where E is the amount of stored kinetic energy, I is the moment of inertia and ω is the velocity. The moment of inertia I depends upon the shape of the spinning mass, for the solid cylinder the moment of inertia is given by the equation (2)

$$I = 1/2\ mr^2 \qquad (2)$$

Where I is the moment of inertia, m is the mass of the solid cylinder, r is the radius.

A gear train is two or more gears working together by meshing their teeth and turning each other in a system to generate power and speed. It can increase/ decrease speed or torque, but never both at the same time.

Gearing is able to convert torque to velocity. The more velocity gained, the more torque sacrifice. The ratio is exactly the same:

Gear Ratio = Teeth input gear / Teeth output gear = Torque in / Torque out = Speed out / Speed in.

After successfully design and development of this product it has been tested in a agricultural farm, where there was vegetable farming in 2 acre areas. Irrigation was by diesel operated pump with tube well. But during the time of Fani cyclone in month of April 2019 all petrol pumps shut down for 2

month at that time we tested our project successfully, water from tube well by connection with our product supply continuous water for irrigation purpose.

III. CONCLUSION

a. The increase of Mechanical Advantage results for maximum efficiency, which concept is applicable here.

b. The concept of energy storage by flywheel has been concerned here, due to which by less effort the lever of tube well operate smoothly.

c. No need of electric supply, Petrol, diesel for operating this product.

d. The cost of this product is less so it can be easily installed by farmers.

e. The weight of this product is also less so it can be easily taken by farmers to their field.

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