

# BORE WELL PIPE LIFTING AND TRANSPORTATION MACHINE

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**Abstract:** Presently Bore well is very important and popular water source in India for household and also horticulture field. The bore well penetrating is done with the accessible highly cost machine. The normal size of bore well boring in India changes from 2 to 5 inches. Bore wells are deep long and the submersible pump is at the base of the long bore well pipe. Regularly the bore well pipe and pump are lifted out of the bore well utilizing which and pulley block. This is mostly time consuming and difficult work with labor. The bore well pipe lifter and transportation machine gives more than 3m/min transfer rate which makes the mounting and getting off of the submersible pump in bore wells quick and simple.

**Index Terms - Lifter, Gear, Bore well, Motor, Installation, Feed Roller.**

## INTRODUCTION

Presently days bore well are the most important water source in india. It can be for residential and farming reason. The bore well drilling is conveyed with help of machine. The cost of process is high. The span of drill hole is fluctuates between 2 to 5 inches in india. After the procedure is finished we required number of part to lift the water. There are number of procedure to introduce the drag well pipe. For that we should require the system and machine. Additionally there is need of number of workers to convey the entire procedure. Late day workers are reduced because of the automation. In the ancient day, process is done by chain pulley mechanism. The procedure required additional time and in addition number of work. After there is some development are done, where hydraulic and other kind of machine which help in get to lifting and installation process. The cost is more it is not affordable to everybody. The present necessity is to plan little size machine or mechanism to lifting the installing the procedure with least cost.

Bore wells are deep and the submersible pump is at the base of the long bore well pipe. Conventionally the bore well pipe and pump are lifted out of the bore well utilizing which and pulley block. This is an extremely time consuming and laborious work . The bore well pipe lifter and transportation machine gives more than 3m/min transfer rate which makes the mounting and getting off of the submersible draw in bore wells quick and extremely easy. So that the integrated information data and steps to be taken after Bore well installation and lifting is to be focused. In the ancient days these procedure is carried out by chain pulley mechanism. This technique is conventional method and very time consuming. This chain pulley system likewise required no of worker to complete the procedure. The main reason behind this project is to lift the pump and motor in less time and human efforts with simple and convenient mechanism. The extra advantage of this project is to lift anything falling down in the bore (child ,any object).

## I. LITERATURE REVIEW

**Mayur N. Adhude [1]:** He explained that bore well drilling required numbers of segments to lift the water. The components required might be bore well casing pipe, submersible water pump, water lifting channels, electric cables, starter and any more. One of these components i.e. Bore well motor pump has an extraordinary significance and installation in the bore well after drilling is a major task. There are some major steps that to be taken after while introducing the bore well motor pump. For this installation procedure we required specially designed mechanism and machines.

**Prithiviraj S [2]:** describes that now days we are facing more issues in bore pipe arrangement structure. A one most essential issues is bore pipe cut from original way line in the pipe lifting process due to way line in the pipe lifting process due of the presence of tree root, small rock and wear and tear of the pipe material. So we require lifting instruments for additionally lifting process. The lifting apparatus name is SPR hook. Modeling, analyzing and fabrication is shown in this present examination. The detailed description about the pipe, bore and hook is been done in this present examination.

**K.Saran[3]:** The advancement in the field of robotization alongside the mechanical design greatly affects the society. The goal of the task is to design and develop a "Bore well pipe lifter and transportation machine (i.e. to save a caught infant from bore well). This project includes arrangement of process improvement from hand drawn sketches to PC created design. The modern equipment's were implemented for different parts of the machine, since the machine plays a life rescue activity. The light weight servo motors were executed for the machine tasks. A safety balloon was introduced all together with give additional security.

**J. Prabhakaran, C. Prabakaran [4]:** To minimize the labour and manual worry in the field of bore well businesses and to decrease the lead time, this project has been analysed and fabricated. The main task is to diminish work of filling pebbles into the bore well by less labor (i.e.) automated way. Here a distributor is fitted to the mouth of the bore well, which is a turn enabled machine. And the pebbles made to spill out of the hopper to the distributor through belt conveyor.

### II. INSTALLATION AND LIFTING PROCESS

Bore well drilling finished we need to introduce a submersible motor pump to lift the water. One by one bore well water lifting pipes likewise must be bring down in the bore drill. There are a few stages to be taken after while installation of water pumps for its smooth and safety operation. The installation method is one of the important task in the bore well water lifting system. There are a few machines and mechanism are accessible for installation. But here we are describing the detailed steps carried out in the chain pulley mechanism utilized as a part of old days. This mechanism is less expensive yet required more opportunity to do the entire procedure. Additionally the pulling of chain continuously is monotonous task creates fatigue and also and furthermore the labour’s health issue. Worker faces the pain in the spine after a long span of service.

One of the significant assignments in the establishment procedure is to coordinate the focal point of bore well. This issue can be settle by utilizing the most recent installed machines yet to match its high working expense. There are following significant advances engaged with the installation system. The all means here are appeared by the chart. These all means are completed in the installation technique with the assistance of chain pulley mechanism. At least one stages might be included this while the installation procedure is done with the assistance of different machines and instruments. These all exercises ought to be contemplated for sheltered and compelling establishment. These are the essential exercises or steps contemplate. At least one activities might be included or wiped out.

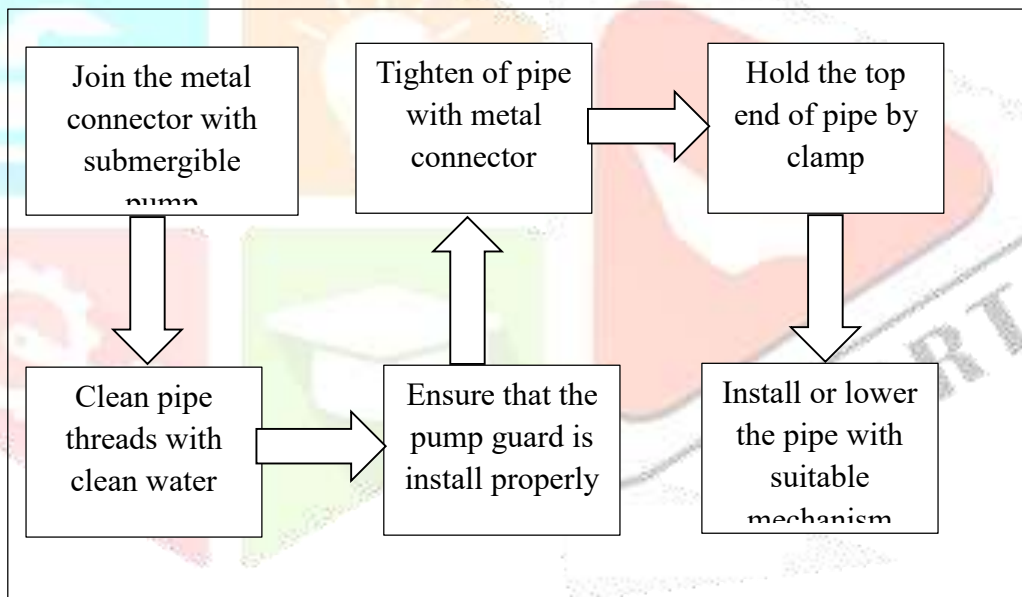


Fig.1 Steps in installation procedure

### III. PIPE LIFTER MACHINE

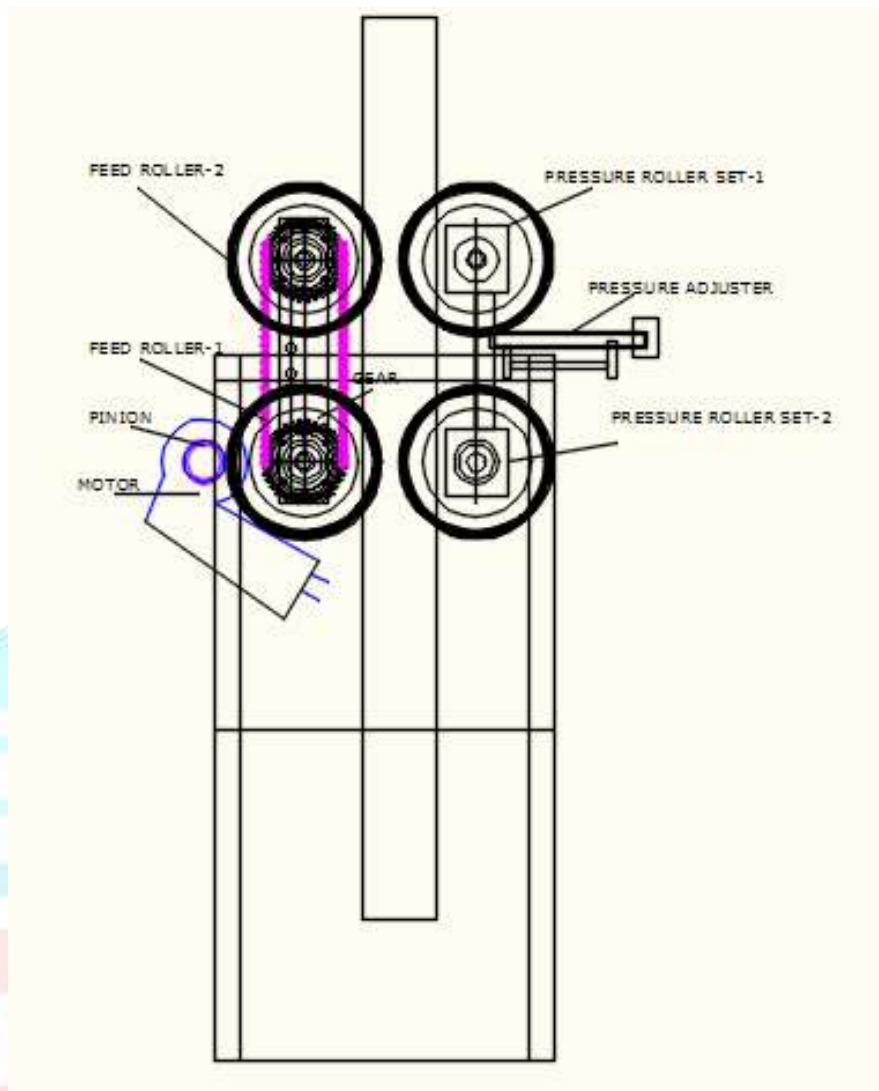


Fig.2 Pipe Lifter machine

#### Machine consists of the following system:

1. **Feed roller shaft-1** : This sub assembly includes metal ball 6201 on the two sides housed inside particular housing , wheel , shaft and locknut. The sprocket is mounted on the one end of the shaft.
2. **Feed roller shaft-2** : This sub assembly involves metal ball 6201 on the two sides housed inside particular housing , wheel , shaft and locknut. The sprocket is mounted on the one end of the shaft. This shaft likewise carries gear which is driven by the motor.
3. **Motor and gear pair** : The motor is 12 volt DC motor which conveys an integral pinion of 9 teeth that drives the gear with 58 teeth mounted on the feed roller shaft.
4. **The pressure roller sub assembly**: This sub assembly involves roller shaft held in ball bearing 6201 and the rollers ( two on each shaft are uninhibitedly turning about it ). The Pressure roller is balanced utilizing the pressure adjuster mechanism.
5. **Pressure adjuster**: The pressure adjuster mechanism contains the screw and nut that are driven by the handle. At the point when screw rotates nut will slide on the slide to drive the pressure roller forward to increase the pressure.
6. **Frame**: The casing is the cover structure that holds the whole sub assembly of the system set up at one place

#### IV. WORKING

1. Load pipe between the pressure roller and feed rollers.
2. Adjust the contact pressure using pressure adjuster screw

3. Select the direction of rotation of motor depending upon the raising or lowering operation using 2-pole -2-way switch.
4. Start motor.
5. Motor rotates the pinion which drives the gear which then drives the roller shaft-1
6. Roller shaft-1 rotation is transferred to roller shaft-2 via chain drive.
7. Motion of the fed rollers will cause the pipe to move up or down simultaneously the pressure rollers will also rotate.
8. Stop motion of the motor when desired height of the pipe is reached.

## V. . MECHANICAL DESIGNS

Mechanical design stage is important from the perspective of designer. as entire success of the project relies upon the right design analysis of the issue. Numerous preliminary choices are killed during this stage. designer should to have satisfactory information above physical properties of material, loads stresses, deformation, failure. theories and wear investigation, He should to distinguish the outer and inner forces following up on the machine parts

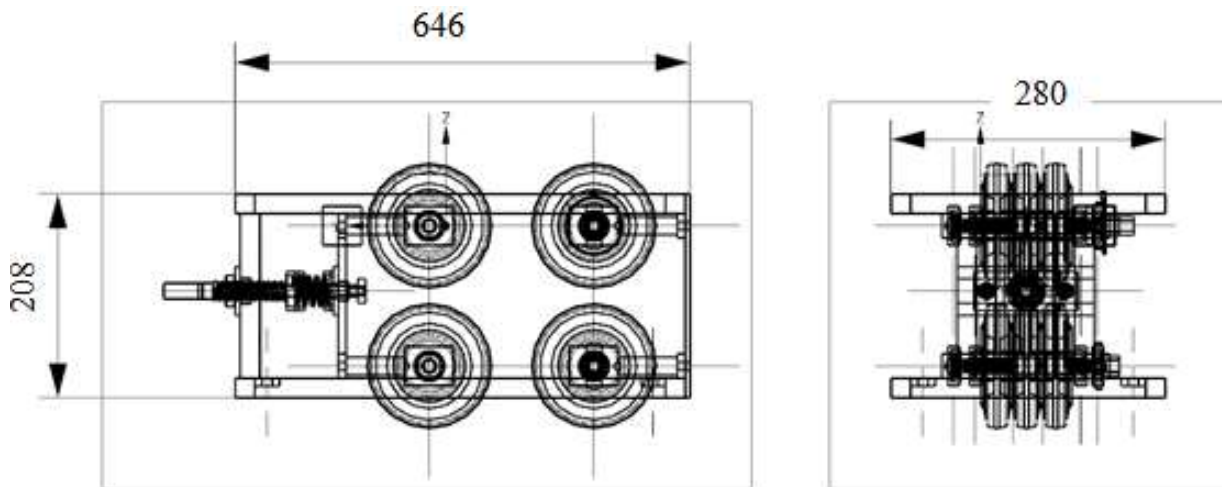


Fig.3 Constructional Diagram

Designer should estimate these forces precisely by utilizing design conditions. If he doesn't have adequate data to appraise them he should make certain reasonable assumptions in view of comparative conditions which will nearly fulfill the functional needs. Assumptions should dependably be on the more secure side.

Determination of components of safety to discover working or design stress is another vital advance in design of working measurements of machine components. The adjustment in the theoretical stress values are to be made according in the sort of loads, shape of parts and service requirements. Choice of material should to be made by the condition of loading shapes of product environment conditions and desirable properties of material. Provision must to be made to limit about nearly adopting proper lubrications methods.

## VI. MOTOR SELECTION

**Selection of motor is done from standard motor accessible in geared motor frame:**

The geared engines are fundamentally DC motor 12 Volt DC coupled to planetary gear set to open up the torque accessible at the shaft end.

Motor choose for above application is :

Motor: 12 Volt DC motor, 18 rpm, 20watt - 1:55 RATIO GEARED

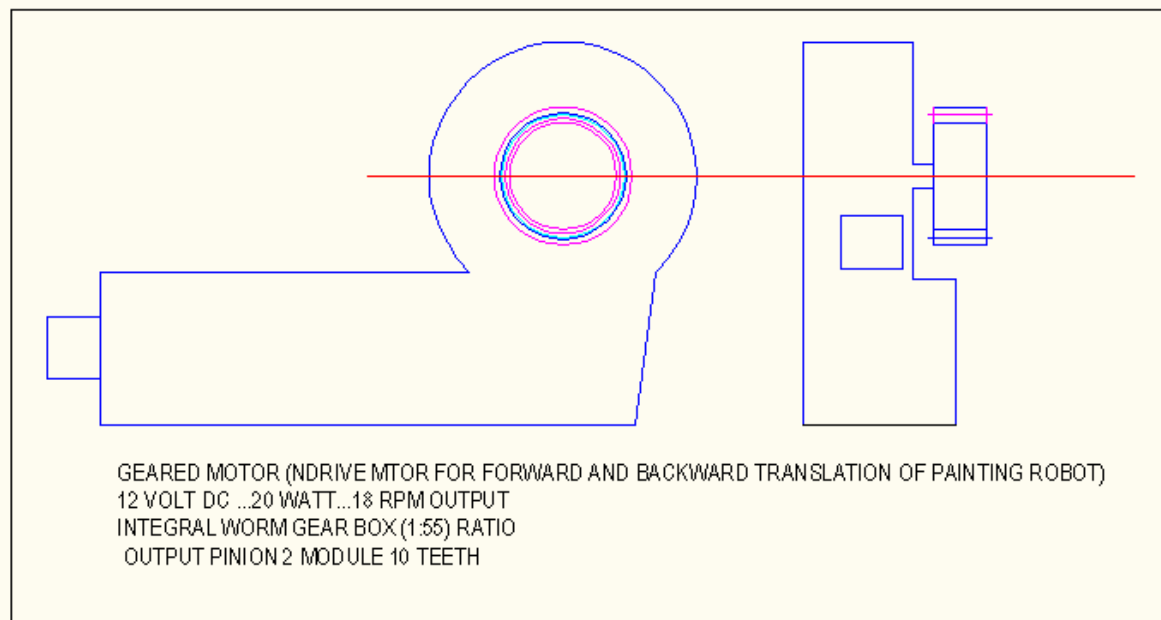


Fig 4 Motor Design

## VII. DESIGN OF WORM AND WORM WHEEL (WORM GEAR BOX)

The pair of worm and worm wheel used in the machine is designated as 1/55/10/1  
 The worm is made of case hardened steel 14C6 whereas the worm wheel is made of Cast iron.

$$Z_1 = 1,$$

$$Z_2 = 55,$$

$$q = 10,$$

$$M = 1$$

$$I = z_2/z_1 = 55$$

$$N = 800 \text{ rpm}$$

$$N_2 = 800/55$$

$$= 14.5 \text{ rpm}$$

$$D_2 = m \times z_2$$

$$= 1 \times 55 = 55$$

$$\tan U = z_1/q$$

$$= 5.71^\circ$$

$$F = 2m \text{ sq.rt } (q + 1)$$

$$= 9.94$$

$$D_{a1} = m(q+2)$$



$$=12$$

$$C = 0.2m \cos U = 0.3$$

$$Lr = \{ da1 + 2c \} \sin^{-1} [ F / (da1 + 2c) ]$$

$$Lr = 632$$

For case hardened steel

$$Sb = 28.2$$

For BRASS,

$$Sb = 6.2$$

$$Xb1 = 0.25$$

$$Xb2 = 0.48$$

$$Mt1 = 17.65 Xb1 Sb1 m lr d2 \cos U$$

$$= 4.694 \times 10^6 \text{ N-mm}$$

$$Mt2 = 17.65 Xb2 Sb2 m lr d2 \cos U$$

$$= 1.98 \times 10^6 \text{ N-mm}$$

The lower value of torque is on the wheel =  $1.98 \times 10^6 \text{ N-mm}$

$$Kw = 2\pi n2 Mt / 60 \times 10^6$$

$$Kw = 7.46 \text{ Kw}$$

As the drive is capable of transmitting 7.46 Kw and we intend to transmit 0.08 Kw the drive is safe.

## VIII. DESIGN OF SCREW

Power screw is mechanical device design for changing over turning movement into translation motion and for transmitting power. The principle use of power screw is;

To raise load, e.g. screw jack.

To clamp a work piece e.g. vice etc.

Power screws are easy to design, simple to make and give smooth and quiet service. They give vast mechanical preferred advantage and highly accurate motion. Square thread profile is positively utilized as a part of utilizations like vices; clamps and so on, because of its property of most extreme productivity and least radial or bursting pressure on nut. We might design a screw jack having a single begin, square thread screw with no collar friction.

## IX. DESIGN OF NUT

In design of nut the major dimension is the height of the nut. It is chosen by considering about the bearing basis. Nut is likewise required to be safer under shearing. The failure of nut in shearing happens at its core dia and the zone of core diameter of screw opposing shear is not as much as the zone at the centre breadth of nut. Furthermore the materials for nut and screw are distinctive to avoid more friction at contacts.

## X. CONCLUSION

We conclude that our project bore well pipe lifter and transportation machine will to reduce human effort, manual operated errors, it help to Improvement in time economics, i.e. Reduction in the time required for installation and lifting procedure also improve the performance of worker. We tried our best level to create a successful bore-well pipe lifter and transportation machine. Since the actual machine cost is high, we designed in computer and we made it as model with few features excluded from the original proposed machine.

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