Manhole Cover Lifter For Under Ground Drainage

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Abstract- *A lifting apparatus for a lifting a manhole cover include a first frame section with a first end assembly that support a hook to engage a lifting block on a manhole cover and a frame section with bottle jack. In this apparatus two sections are comprised. First section consists of main frame. Wheels are assembled to main frame for moving the device and bottle jack is also mounted on main frame. Second part consists of plate and vertical frame attached to bottle jack piston rod. Plate is attached to manhole cover by using hooks. Operator exerts force on bottle jack by using lever then rod get extended and then lift the cover by lifting second frame.*

Keywords- Manhole cover, Bottle jack, Less effort

I. INTRODUCTION

In urban areas, overloaded sewers may result in surcharge that causes surface flooding. The overflow from sewer systems mainly starts at the inlets until the pressure head in the manhole is high enough to lift up its cover, at which stage the surcharged flow may be discharged via the gap between the bottom of the manhole cover and the ground surface. Urban drainage systems are fundamental components of flood risk management in modern cities. Like all structural measures, the designed capacities of drainage systems limit their performance such that, when the system capacity is exceeded, flooding may occur during heavy rainfall events. With the rapid advances of computational methods and computer technology, numerical models have become the most popular solution for flood risk analysis. A numerical model can produce enough information to help engineers evaluate flood risk effectively.

II. PROBLEM STATEMENT

The present invention based on foreign design of manhole cover. There is no manhole lifter which compatible with Indian manhole covers. In India manhole covers lifted by using hooks and rod. No one take safety precaution at the time of lifting covers in India. Too much time & manpower required and also more money. More chances of getting damage cover due to manually lifting. Using chain and hook to remove and replace manhole cover result in high forces in shoulder and stress on human which are risk factor for human safety Using second class lever it lower the risk of shoulder and back pain on human body but still not effective.

Fig 1 Man lifting a cover using Hook and Chain

III. OBJECTIVES

- Easy lifting of manhole covers.
- To reduce efforts required.
- Avoid damage of covers.
- To reduce time required for removing.
- To work safely for workers.

IV. LITERATURE SURVEY

Hydraulic Lifting Apparatus Invented by Michael T. Panio, Jeffrey Baynon. Publication Number: - US20140301819 A1, Publication Date: - 9 Oct 2014. A lifting apparatus for lifting a manhole cover includes a first frame section with a first end assembly that supports a hook to engage a lifting block on a manhole cover, and a second frame section with a second end assembly that supports a hook to engage a lifting block on the manhole cover. At least one of the first and second end assemblies is movable, via an actuator, with respect to the other to change a distance between hooks. The hooks are movable in a way that the hooks engage with the lifting blocks on an adjacent manhole cover. The first frame section is coupled to the second frame section during a lifting operation, and the first and second

frame sections are selectively detachable from one another when not in use.

Tool For Handling A Sewer Cover Invented by Thomas Garcia .Publication Number: - US9663340 B2 Publication Date :- 30 May 2017The tool for handling a cover, in particular covers for sewers or vents, or for manholes, relates to the covers of sewers or vents or manholes, having a substantially planar top surface. The tool includes a holder defining a surface for engaging with the top surface of a cover, a lifting fulcrum, and a handle. The handle has one end spaced apart from the lifting fulcrum. The holder, fulcrum and handle are arranged such that a force exerted by an operator on the one end is transmitted as a force on the holder by the lifting fulcrum. The holder includes a leg connected to the handle and is rigidly configured such that, in the position for lifting a cover, the assembly formed of the cover- and the holder with the leg is rigid. The invention further relates to a method for removing or re-placing such a cover.

Method of Making A Hydraulic Jack Invented by BiBTeX, EndNote, RefMan .Publication Number:- US3890684. Publication Date:- 24 june1975A weight lifting hydraulic jack has a supporting base consisting of a single block with the pump cylinder cast integrally with the base. A vertical assembly consists of a central vertical hydraulic cylinder in which a lifting ram reciprocates and the hydraulic cylinder is concentrically mounted within a cylindrical housing and these two parts are cast as a single unit. Free ends of the cylinder and housing are given cast shapes precisely fitting cast receptacles in the base. Self threading bolts extend through cast holes in the base into cast holes in the vertical assembly holding the entire jack together. After a conventional ram is fastened in the hydraulic cylinder and a conventional pump piston and actuating linkage is pinned in place on the base by a single screw, the jack is ready for operation.

Hydraulic Jack Invented by Bibtex,Endnote,Refman.1.Publication Number :- US3959970 A. Publication Date :- 1 june1976The present invention relates to a hydraulic jack with a base plate on which are attached a pump cylinder, a jack cylinder, and a reservoir concentrically surrounding the jack cylinder, the reservoir being connected to the pump cylinder by means of a first passage, passing through the base plate, and a first non return valve which enables hydraulic medium to flow from the reservoir on pumping, the pump cylinder being connected to the jack cylinder by means of a second passage, passing through the base plate, and a second non return valve which enables hydraulic medium to flow from the pump cylinder on pumping, and the jack cylinder being connected to the reservoir by means of a relief passage and a blocking member including an adjustable bolt.

V. MANHOLE COVER LIFTER

A manhole cover is usually round or square piece of RCC that fits inside RCC frame on manhole chimney or roof workers must remove the manhole cover to enter manhole. After existing manhole round manhole cover typically range from 500mm to 900mm diameter. It can weigh 50kg to 150kg. Varity of commercial devices available such as a hook and chain, steel lifting hook and tripod and second class lever can be used to remove and replace manhole cover.

Fig 2 Round shape cover

VI. DESIGN AND FABRICATION OF MANHOLE COVER LIFTER

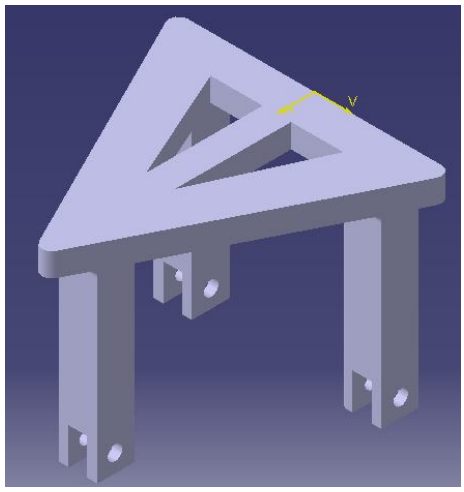

Fig 3 Main frame

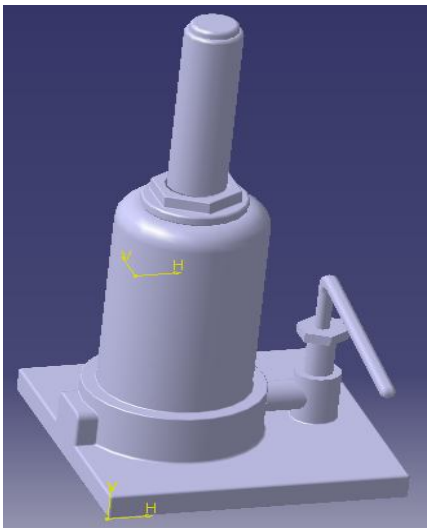

Fig 4 Jack

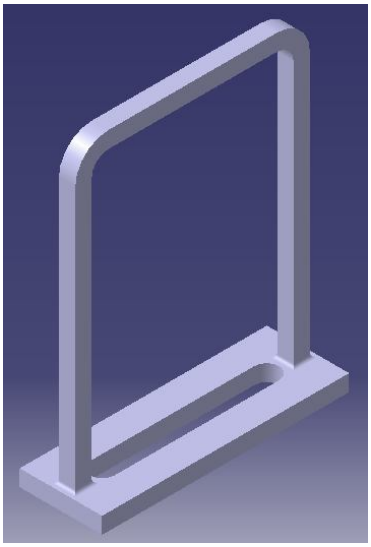

Fig 5 Vertical frame

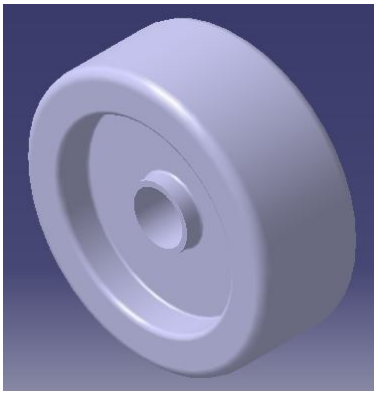

Fig 6 Wheel

VII. WORKING

The manhole cover lifter mechanism is placed over the drainage hole which is covered by cover having two slotes on the upper side to hold and lift. The horizontal frame has two hooks at two ends which are exactly placed over the slots provided on cover. The horizontal frame carries a vertical column which is attached to the bottle jack. The hooks which are present on horizontal plate are attached to the slots. When the handle of the bottle jack is operated, the horizontal plate goes upward along with hooks which are attached to the slots. Hence the cover of drainage hole also gets lifted with less effort as compared to the conventional manhole cover lifting system.