Industrial Engineering Journal
ISSN: 0970-2555
Volume : 52, Issue 4, April : 2023

FABRICATION OF PEDAL OPERATED MULTIPURPOSE MECHANICAL MACHINE

M.Rajesh Assistant Professor, Department of Mechanical Engineering, Gates Institute of Technology, Gooty[1]
S.Ejaz Ahamed[2], S.Imran[3], K.Pavan Kalyan[4], M.G.Sri Datta Reddy[5], C.Laxmanna[6], B.Uday Kiran[7], IV B,Tech Mechanical Students, Department of Mechanical Engineering, Gates Institute of Technology, Gooty[234567]

Abstract: Nowadays most of the machines are performing one operation at one time, because of that it consumes much more time & also those machines are driven by electricity and highly expensive. The machine operating by means of electricity has limited application in the rural area. So, therefore it is possible to convert human applied energy through pedalling into mechanical work. It will save cost, electricity as well as find application in rural area.

This project work deals with the fabrication of a pedal powered multipurpose mechanical machine. Pedal power is the transfer of energy from a human source through the use of a foot pedal. This project consists of scotch yoke mechanism and gear mechanism. For shaping operation, the scotch yoke mechanism is used. For drilling the bevel gear mechanism is used. The drilling operations are performed by the help of chain & sprockets and pillow block bearings. For Grinding operation, the grinding wheel is directly connected to the shaft. The cutting wheel also directly connected to the shaft.

Keywords: Multi-Purpose, Bevel gears, Grinding, chain & sprockets, shaping, shafts, cutting, drilling.

1. INTRODUCTION

The world being led by innovations has headed to the accomplishment of the activities that we encounter in our day to day life to be snappier and quicker. Yet, this progression additionally requests high level investments as well as expenditures. Each and every industry is striving to make productivity at a higher rate, at the same time maintaining product's quality and product's standard to be of a normally low cost. In this work proposed, a conceptual prototype of a machine that would be fit to perform distinctive operation simultaneously was developed. The proposed system includes the feature of being more economical too. The main goals of this proposed model are conserving electricity, minimizing cost that is related to power utilization, enhanced production and reduction in floor space. A significant part of the investment is usually used up for installation purposes in machines. Therefore the work proposed was envisioned in such a way that the operations like drilling, sawing, grinding and other lathe functionalities do not consume additional costs for such operations. Various machining process in manufacturing industries are carried out by separate machining devices. It needs more space, time and investment that involves high expenses. But the fabrication of multi tool operating mechanical device encompasses three operations on a single machine. The operations are categorized as drilling, cutting, grinding. It is a new concept specially meant to reduce the work time and save the cost. This is done to save the added investment cost that occurs during drilling and shaping the device in the industries. The machine operates the drilling machine with the bevel gear arrangements.

2. LITERATURE REVIEW

[1] Rakesh S.Ambade, Komal D.Kotrange(2016), In this paper author has designed multipurpose machine which does not required electricity for several operation like cutting and drilling etc. This is a human power machine runs on chain drive mainly with human effort. But if we wanted to operate this machine by electric power this machine can also does that.

[2] Dr. Toshimichi Moriwaki(2006) according to recent trends in the machine tool technologies are surveyed from the viewpoints of high speed and high performance machine tools, combined multifunctional machine tools, ultra precision machine tools and advanced and intelligent control technologies.

[3] Frankfurt am Main,(2011),According to author the trend towards the kind of multi-purpose machining centers that are able to cost efficiently handle a broad portfolio of products with small batch sizes accelerated significantly during the crisis. “With a multi-purpose machine, you’re less dependent on particular products and sectors”, explains Biermann. “But there are still going to be specialized machines for large batch numbers.”

3. WORKING PRINCIPLE

In this machine we can able to operate multiple operations at a time. When pedaling starts the small pedals shaft will rotate the big main shaft. The main shaft consists of another two sprockets which are placed for two shafts upper side. Both the upper shafts consists of one individual sprockets. The main shaft sprockets are driver sprockets and individual sprockets are driven sprockets. When the main shaft starts rotating, the the other two shafts are also starts rotate. The first shaft consists of Shaping and grinding operations then the second shaft consists of drilling and cutting operations. If the connection of chain is given to both driven shafts, then all operations starts working. If the worker doesn’t need of two operations, the non required shaft’s chain will be removed and the two operations will be worked. All shafts are supported by the pillow block bearings. The shaping operation will be performed by using Scotch yoke mechanism. When pedaling stops, the rotation of shafts will be stopped and also the working of operations will be stop.

Fig : Fabricated Multipurpose Mechanical Machine

Industrial Engineering Journal
ISSN: 0970-2555
Volume : 52, Issue 4, April : 2023

4. COMPONENTS LIST

1.PEDALS

A pedal is operated by foot and used to transmit the power. Bicycle pedal, the part of a bicycle that the rider pushes with their foot to propel the vehicle.

2. CHAIN & SPROCKET

A chain and sprocket drive is a type of power transmission in which a roller chain engages with two or more toothed wheels or sprockets, used in engines as a drive from crankshaft to camshaft.

3. PILLOW BLOCK BEARINGS

A pillow block bearing (or plummer block) is a pedestal used to provide support for a rotating shaft with the help of compatible bearings and various accessories. The assembly consists of a mounting block which houses a bearing.

4. GRINDING WHEEL

Grinding wheels contains abrasive compounds for grinding and abrasive machining operations. Such wheels are also used in grinding machines. The wheels are generally made with composite material.

5. CIRCULAR SAW

A circular saw is a power-saw using a toothed or abrasive disc or blade to cut different materials using a rotary motion spinning around an arbor.

6. BALL BEARINGS

A bearing is a machine element that constrains relative motion between moving parts to only the desired motion. The design of the bearing may, for example, provide for free linear movement.

7. DRILL CHUCK

A drill is a tool used for making round holes or driving fasteners. It is fitted with a bit, either a drill or driver chuck.

8. BEVEL GEARS

Bevel gears are used as the main mechanism for a hand drill. As the handle of the drill is turned in a vertical direction, the bevel gears change the rotation of the chuck to a horizontal ratio.

Industrial Engineering Journal
ISSN: 0970-2555
Volume : 52, Issue 4, April : 2023

9. SHAFT

A shaft is a rotating machine element, usually circular in cross section, which is used to transmit power from one part to another, or from a machine which produces power to a machine.

10. BOLTS & NUTS

A nut is a type of fastener with a threaded hole. Nuts are almost always used in conjunction with a mating bolt to fasten two or more parts together.

11. MS SQUARE BARS

Mild Steel Square Bars are popular in the building and fencing industry and can be used for a wide range of applications. With its high strength and versatility it can be drilled, welded and cut to suit your requirements.

5. ADVANTAGES

- Eco friendly and non-polluting in every way.
- Power saving as it is manually operated.
- Easy machinery used.
- Multiple operations are performed in a single machine.
- Fast performance of all operations.
- Operator can perform operations easily.
- Easy to assemble and dissemble.
- To help the urban people.

6. DISADVANTAGES :

- Without human effort it is not operated.
- Not fit for heavy production.
- More torque is required for operating all the operations.

7. CONCLUSION

We can see that all the production based industries wanted low production cost and high work rate, which is possible through the utilization of multi -function-operating machine. It requires less power as well as less time, since this machine provides working at different center it really reduced the time consumption up to appreciable limit. In the above literature review we see that pedal driven machines are used for driving the power hacksaw machines and it reduces need of electricity and eco friendly in its working. It has to be understood that the washing machine which is a pedal driven machine, it satisfies the need of rural people by giving them an Alternative way of washing clothes which is quick, cost effective.

8. FUTURE SCOPE

1) We feel the project that we have done has a good future scope in any domestic purposes. The main constraint of this machine is the low initial cost and has low operating costs.

2) Savings resulting from the use of this device will make it pay for itself with in short period of time & it can be a great companion in any processing units.

3) The device affords plenty of scope for modifications, further improvements & operational efficiency, which should make it commercially available & attractive. If taken up for commercial production and marketed properly, we are sure it will be accepted to all. There are plenty of scopes if the machine is improvised as explained in the further improvisation concept.

REFERENCES :

[1] Rakesh S. Ambadel , Komal D. Kotrange2 , Khushal D. Nakade3 , Raksha R. Dange4] February 2016, Volume 4, Issue 2, ISSN 2349-4476 ‘Pedal operated Multipurpose machine’.

[2] Krishnappa RI, Venkatesh G2, Shriram M V3, Gowtham T4, U A Varun Prasad5, Venkatesh Patki6 h (IJRTER) Volume 03, Issue 06; June – 2017 [ISSN: 2455-1457] “Motorized multipurpose machine”

[3] Dr. Toshimichi Moriwaki “Trends in Recent Machine Tool Technologies” Professor Department of Mechanical Engineering Kobe University, NTN Technical Review No.74(2006).

[4] Frankfurt am Main “Multi-purpose machines ensure enhanced “, 1 January 11.

[5] Heinrich Arnold1”The recent history of the machine tool industry and the effects of technological change “University of Munich, Institute for Innovation Research and Technology Management, November 2001.