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THE RESEARCH ON METHDOLOGY OF GEAR MANUFACTURING USING GENEVA MECHANISM

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Abstract:- *The convectional indexing process of gear mechanized at milling machine is the moderate (time consuming) to reduced this wastage of time & manual work other indexing technique is introduce the view of article is shown the designing & mechanized of gears using Geneva mechanism.*

Keywords:- *Gear, Types of gears, Common gear processing method, Gears on milling machine, Paul and ratchet mechanism, Indexing mechanism, Geneva mechanism, One teeth revolution gear and Standard gear, Working of system, Conclusion.*

I. GEAR

Gear plays a vital (important) role in mechanical systems to transmit not only power but also motion between two shafts. Mechanized a gear is very interesting process involving various methods, mechanism and changes with type of gears formed on it. This article shows an assortment of methods of manufacturing methodologies followed for all type.

Gear manufacturing mainly is categorized on the basis of type of gear manufacturing. The type of gears can be classified as follows:

- Spur Gear,
- Helical Gear,
- Bevel Gear,
- Worm gear.

II. COMMON PROCESSING METHODS ON GEAR

Manufacturer of gears required several processing operations in order stages based upon the material, method, manufacturing techniques, category of gear and quality required. These stages mainly categorized as follows are:

- Performing the without teeth gear which is called gear blank.
- Heat treatment process, Annealing is happens on work piece.
- Preparation of gear work piece by giving the necessary size by machining process like milling, hobbing, etc.
- Producing tooth of gear with using a multiplicity of cutters in machining.
- Surface hardening or hear treatment on the machined gear, if mandatory.
- Surface finishing is taken from many finishing operation like shaving, grinding operation etc.
- Qualities of planes are check by inspection of completed gears. In this part, carry out the dimension procedure, generate tooth via machining as well as gear tooth quality and surface finish was discuss.

III. GEAR MILLING

Milling is the machining procedure of eliminate material from work piece using rotary cutter via giving feed in a way or an angle with the reference of axis of the tool. Manufacturing of gear by using milling machine consist of a large range of many operations and machineries, for balance the light weight object to large, heavy objects group milling operations. Milling was commonly seen in industries and machinery shops for making different parts and it made in particular sizes and shapes.

Milling is a cutting process where the milling cutter was used to take away material from plane surface of a work piece or gear blank. The milling cutter is a rotating cutting tool, it basically categorized in two type single point cutter and multipoint cutter. In drilling operation the tool is superior along its revolving axis, the milling cutter was typically moved at right angles through its axis because of that cutting was happened on surface. The milling cutters was touches the work piece, cutting edges of tool again and again cut and remove the material, flake off chips from the work piece with each exceed. The cutting stroke is obtained by shear deformation, in this the material is pressed the work piece within small clumps that fall mutually to a major or minor extent be contingent on the objects to shape chips.

The milling method of withdraw material within performing lots of receive independently, small cuts. This is complete via way of a cutter which have number of teeth, cutter was rotates at higher rate, or forwards the material

straight the cutter gradually; in most of cases it has a number of solution of these three accesses. The speed as well as feed used in different a solution of variables.

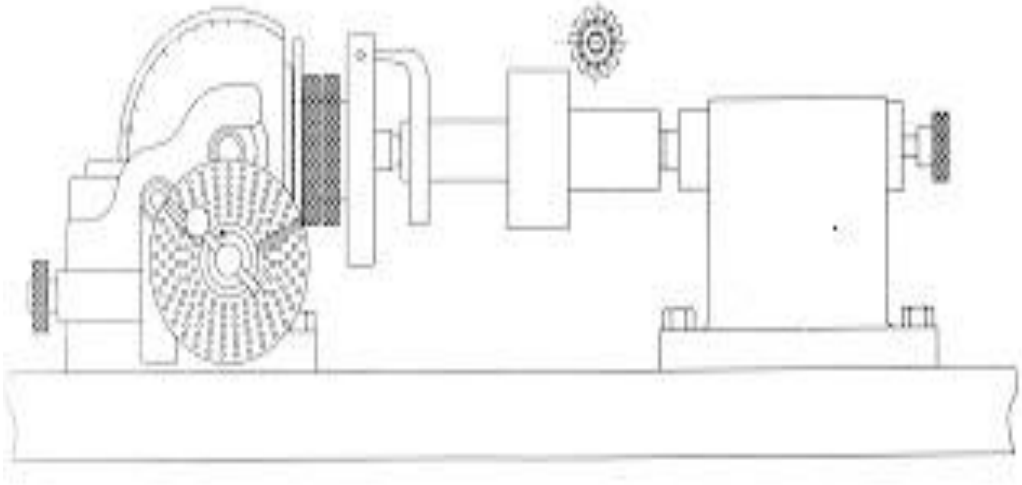

Fig. Gear Milling

In working of milling on gear the work piece is placed on arbor which is supported between the center of the separating head and one more center at the another end. At a time one tooth gap was cut via the milling cutter, and a separating head is used for indexing to index the object for the subsequently required tooth space. The cutter was selected as per the module with numbers of tooth on gear which is cut. This cutting tool as seated into milling arbor, before the gear could be cut. It is required for check the cutter centered correctly similar to gear holding arbor.

Adjust milling surface perpendicular and longitudinal at one corner of cutter make contact with arbor at one side. The table & knee set to its initial place. The table then adjusted for cutting to presently contact the other part of the arbor with straight down disk which shows zero reading Note the reading on longitudinal feed screw that reading separated via two then it gives the mid location of the arbor virtual to the cutter. Gives the feed to table vertically to that the object contact between cutters. The vertical disc was then place initial position. This is necessary to gives a depth of cut to the object when table was locates in centre position it must be fixed in that positioning machine will set for working and it started and travel particular to axis of object for cutting tooth complete the total perimeter of the gear.

The depth was greater than before slowly in anticipation of it attains the required depth of tooth. After one tooth gap is cut, the objects are indexed through 1/z revolution by way of the parting head and the working is recurrent until all the number of teeth is cut. Milling uses for creating straight teeth, helical, spur gear, bevel gear, rack and so on.

IV. GEAR INDEXING

Indexing is process of parting a perimeter of a circular workpiece into same numbers of divisions with the help of indexing crank and indexing plate. A labour-intensive indexing head have a hand over crank. Rotates the hand over crank in turns and revolve the spindle & the workpiece. The hand crank used a worm and worm gear drive to produce accurate control of the revolve the work.

The work may be rotate and then fixed in the position, before, the cutter will applies or it perhaps to rotate for the period of cutting depends on the type of machining being made. Most parting heads drives at 40:1 ratio; it is takes 40 revolution of hand over crank render 1 revolution of spindle of work piece. It means 1 rotation of hand operated crank rotate spindle by manually 9^0.

Because the worker on mechanism may probably want to turn around the part the random direction indexing plates is utilizes to make certain the parts are exactly position. Direct indexing plate: Nearly all are dividing heads receives the index plate lastingly joined to the spindle. This surface is positioned at the last of the spindle, extremely close to where work piece is mounted and it is attached to the spindle and rotates with it.

This indexed plate is generally prepared for number of holes that enables quick index at angles, such as 20, 35, or 80^0. A connected pin was makes connection to the dividing head which was place on the direct index plate to fasten the head quickly at any required angle. It have drawback which is only for limited number of angles as per requirement. Similar index plate was employ when the job must be revolving to position not existing on the straight index plate. Because the hand cranks are rigid with spindle at a known ratio (commonly 40:1) the separating plates placed on hand wheel can be used to produce better-quality divisions for particular point of reference at random angle. This separating plate is providing in location of a number of plate. Each one plate have ring of hole with dissimilar divisions.

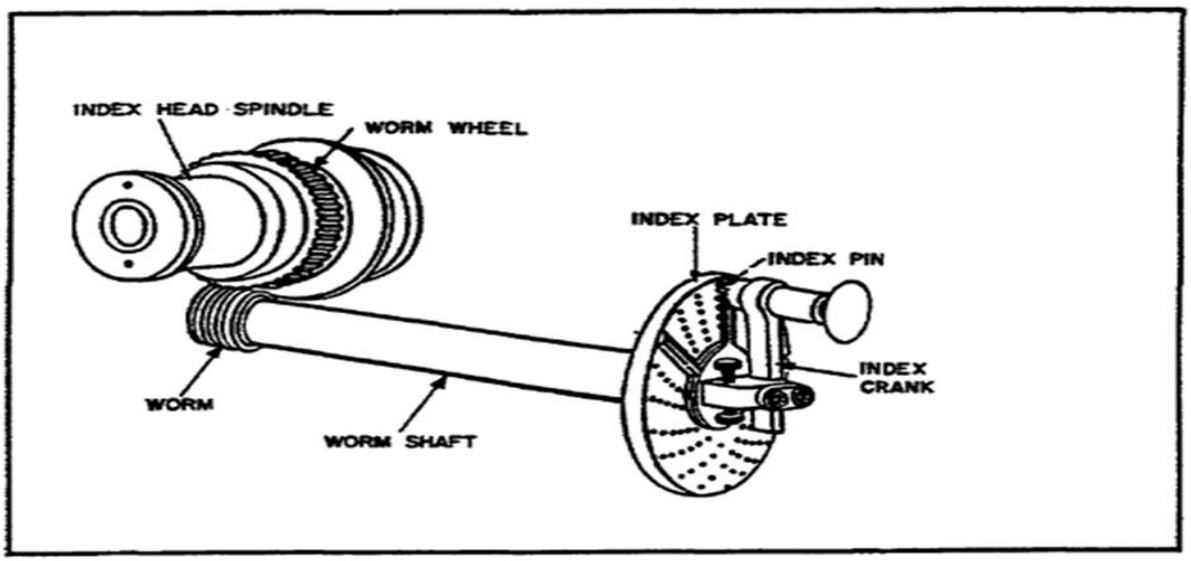

Fig. Direct Indexing.

V. RATCHET & PAWL MECHANISM

A ratchet system is helps to provides linear or rotational movement in only single way. It is uses in rotary system to index air operated indexing tables.

Ratchet have a rotating gear was known gearwheel and a pivot spring loaded pawl for engage the tooth. The connecting tooth or pawl are at a position as a result with the aim of when the tooth is moves in single way pawl make engage in between the teeth. spring force because of that pawl reverse into the despair on next tooth. ratchet and pawl is not automatically lock for this reason simple to position. The table may in excess of pass through if the table is weighty when they are disconnected. Maintenance is easy.

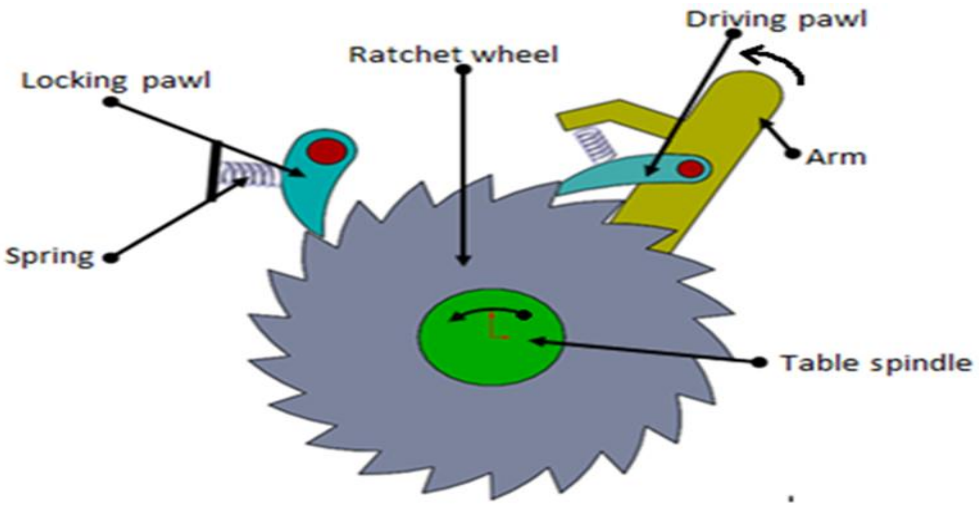

Fig. Ratchet & Pawl Mechanism

VI. GENEVA MECHANISM

The Geneva force is generally known as Maltese cross system. Geneva mechanism converts a continuous revolving into a discontinuous rotary motion. A rotating driving wheel has a stick which reached on a gap of the driven wheel.

A driving wheel was raised on round blocking disc which locks the driven wheel in position linking between gap. Geneva mechanism categorized as follows Geneva mechanisms specifically external, internal and spherical. The spherical Geneva mechanism is very infrequently used. In the simplest form, driven wheel have a four gaps and hence for each revolution of drive wheel it progress in single step of 90^0. If driven arrangement wheel has no gaps, it progress by 360^0 per complete revolution of the drive wheel.

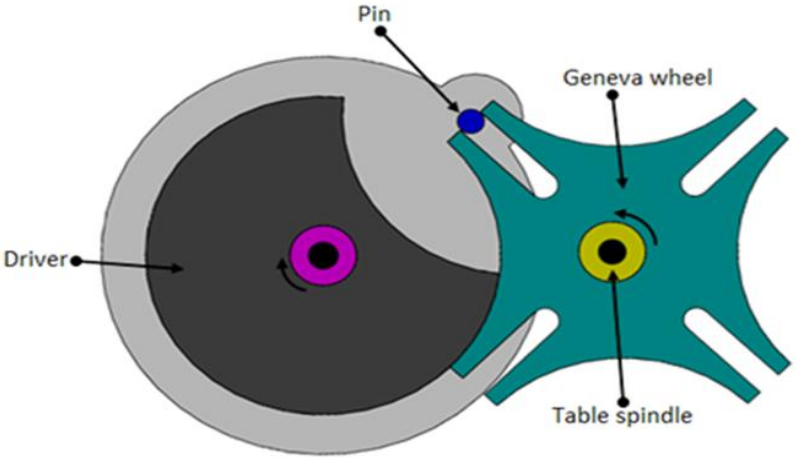

Fig. Geneva mechanism.

VII. ONE TEETH REVOLUTION GEAR

The one teeth revolution gear is made by simple gear. All gear is cutter except one gear & standard gear readily available. One teeth gear are driver &standard size gear are driven.

The handle are connected to driver handle are rotates in 720^0 then the single teeth engaged with standard gear teeth & this standard gear move one teeth with workpiece also move which is connected same shaft with standard gear.

VIII. WORKING OF INDEXING OF GEAR USING GENEVA MECHANISM

The working of this system is mainly depends on the concept of Geneva mechanism. It whole system is consist of first one teeth gear, the one teeth gear is the driver of these system these gear is work in rotation of motors furthermore rotation of hand secondly consider the any types of master gear which is available in standard size when we want gear in batch production the one teeth gear are engaged with standard gear and work piece is also connect to the same shaft where standard gear is attached.

When rotation of one teeth gear reached at the standard size of gear then shaft rotates in between the master gear and blank then takes the place of manufacturing of gear teeth and they also provide pitch of milling cutter. This mechanism was replacement of indexing plates they was took the lots of rotational movement for providing on gear tooth distance on manufacturing of gear on milling machine.

IX. CONCLUSION

In conventional method of indexing process of gear manufacturing on milling machine was time consuming process. when we saw the conventional process it have some disadvantage when we rotates 720 degree of indexing plate that time the gear arrangements was only rotates 9 degree. To reduce this problem we introduced new gear manufacturing methodology using Geneva mechanism. This method was helps to reduced human effort, consume less time, simple construction or working and cost is low, not highly skilled labor required.

X. REFERENCES

[1] John L. Ash, “Gear machine and indexing mechanism” United States patents (patent no. US3213756), Oct 1965.
[2] Machinery's Handbook (1996), pp. 1873–1916.
[3] Bulgin, J. Randolph, "Indexing basics" The Home Shop Machinist, Traverse City, MI, USA. April 2011.
[4] Bickford, John H. (1972). "Geneva Mechanisms". Mechanisms for intermittent motion, New York.
[5] Choy, H.S., Chan, K.W. (February 2003). "A corner-looping based tool path for pocket milling".
[6] Hansen, Allan (April 1992). "An algorithm for generating NC tool paths for arbitrarily shaped pockets with islands ". ACM Transactions on Graphics. March 2015.
[7] Jump up^ Jeong, J.; Kim, K. "Tool Path Generation for Machining Free-Form Pockets Voronoi Diagrams". Springer Link. The International Journal of Advanced Manufacturing Technology 1998.

