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MULTI DRILL HOLDER

T.Udhayakumar, Lecturer,Murugappa Polytechnic College,Chennai-62

kumarudhaya854@gmail.com

ABSTRACT

The MULTI DRILL HOLDER (Eccentric Drive) is a tool that may be used to drill a number of holes at varied locations on both symmetrical and asymmetrical layouts with a single attachment. Multi spindle Drill Heads are employed in situations when traditional multi spindle drill heads cannot be used. geared drill heads that are attached to universal joints are offered with the Multi Drill Holder. Mounted on the drilling machine table is the drill head. The spindle of the drill head is fitted into the spindle of the machine. It is possible to undertake a drilling operation at any place on the job site by incorporating an eccentric drive and universal joints into a holder assembly.

1. Introduction

Continual advancement in the domains of electronics and mechanical engineering is critical to our economy's survival and growth at its core. Our MULTI DRILL HEAD, which can be used to drill products such as printed circuit boards, engine heads, and other automobile components, was created to assist in these industries. When drilling multiple spindle holes at different layouts, extreme caution should be exercised. The MULTI DRILL HEAD aids in the manufacture of accurate and identical drilled layouts in large quantities of material. This MULTI DRILL HEAD model has been created to drill three holes of varying diameters in an asymmetrical arrangement using a single drill head. This sort of drill head can be used in the case of drilling huge layouts in mass production. Continual advancement in the domains of electronics and mechanical engineering is critical to our economy's survival and growth at its core. Our MULTI DRILL HEAD, which may be used to drill products such as printed circuit boards, engine heads, and other automobile components, has been intended to assist in these fields. When drilling multiple spindle holes at different layouts, extreme caution should be exercised. The MULTI DRILL HEAD aids in the manufacture of accurate and identical drilled layouts in large quantities of material. This MULTI DRILL HEAD model has been created to drill three holes of varying diameters in an asymmetrical arrangement using a single drill head. This sort of drill head can be used in the case of drilling huge layouts in mass production. Many different types of drills exist: some are operated manually, some by electricity (electric drill) or compressed air (pneumatic drill), and a small number are powered by an internal combustion engine (ICE) (for example, earth drilling augers). The majority of hard materials, such as masonry (brick, concrete, and stone), and rock are drilled with drills that have a percussive effect (hammer drills). Water and oil drilling rigs are used to bore holes in the earth in order to extract water and oil. With the help of big drilling rigs, oil wells, water wells, and holes for geothermal heating can be produced. Hand-held drills can also be used to drive screws and other fasteners, depending on the model. Drills can be used to power some small appliances that do not have their own motor, such as small pumps, grinders, and other similar devices.

2. Literature survey

To reduce formation damage and enhance productivity, efficient field development need high-quality drill-in fluids (DIF). By optimising the loading and Particle Size Distribution (PSD) of fine and medium calcium carbonate particles, DIFs were designed to avoid fines and polymer plugging [1]. The creation of the GLX-50 drill carriage is critical for improving the technical level of geological survey and sample operations, as well as exploration, in isolated marsh and intertidal zones where equipment and materials are difficult to obtain in our nation [2]. This article designed and trail-produced a GLX-50 drill carriage for usage in marsh and shoal areas based on the landform features of these places. The GLX-50 drill

carriage's structural features, technical data, and field production test circumstances were also detailed **[3].** The instrumented tool holder's acceleration measurement offers high-quality signals from close to the cutting zone. The data collected by the instrumented tool holder can be examined using the monitoring system, especially in the case of unexpected tool wear, cutting edge chipping, or end mill breakouts **[4].** A thermal infrared camera and two K-thermocouples fitted in the drill's internal coolant holes were used to measure the heat impacted zone (HAZ) generated by drilling. As a result, two different setups were used: one with a rotating drill and a fixed specimen holder, and the other with a rotating holder and a fixed drill bit. The Kistler dynamometer type 9272 was used to measure thrust force/torque through drilling **[5].** The CTX alpha 500 two-spindle multi-axis CNC lathe was chosen for the component's manufacture in order to fulfil the required tolerances and shape deviations. Its control system allows for automatic or block-by-block programming and simulation of individual operations in the workshop **[6].** The wash fluid flow in a standard bit is modelled, the resulting bit washing pattern is examined, and recommendations for PDC bit design modifications are provided **[7].** The estimation of the physical parameters of the flexible shaft, which is utilised to replicate the features of the drill–string and plays a critical role in the formation of unwanted vibrations, is given special attention **[8].** The Versatile Strip Seed Drill (VSSD) was designed to make up to 40 mm wide and 60 mm deep strips in untilled land, as well as apply seed and basal fertiliser in a single pass, using the 8.95 to 11.93 kW 2WT engine **[9].** The technique allows a robot to calculate its 6D posture in relation to the work item and construct a drilling reference coordinate system. The current robotic drilling system achieves an average position deviation of 0.334 mm and a perpendicularity deviation of 0.29° **[10].**Around 35,000 years ago, Homo sapiens realised the advantages of using rotating tools in their daily lives. In its most basic form, this would have included spinning a pointed rock between one's hands in order to bore a hole through another substance. This resulted in the development of the hand drill, which was a smooth pole that was occasionally linked to a flint tip and rubbed between the palms of the hands. Many ancient civilizations throughout the world, notably the Mayans, made use of this technique. The Upper Paleolithic epoch is characterised by the discovery of the oldest perforated items, which include bone, ivory, shells, and antlers. Bow drills (also known as strap drills) are the original machine drills because they convert a back and forth motion into a circular action. They have been around for approximately 10,000 years and are still in use today. It was discovered that tying a cord around a stick and then attaching the ends of the string to the ends of a stick (forming a bow) allowed a user to drill more quickly and efficiently than previously possible. Bow drills were mostly used to start fires, but they were also utilised in ancient woodworking, brickwork, and dentistry. Archaeologists unearthed a Neolithic graveyard in Mehrgrath, Pakistan, that dates back to the time of the Harappans, approximately 7,500—9,000 years ago. The graveyard had nine adult bodies with a total of eleven teeth that had been drilled by archaeologists during the excavation. In a tomb near Thebes, there are hieroglyphs depicting Egyptian carpenters and bead makers working with bow-drills, as well as other tools. Ancient Egyptian artefacts dating back to roughly 2500 BCE show that these tools were in use at the time. During ancient times, the use of bow-drills extended throughout Europe, Africa, Asia, and North America, and it is still in use today in some parts of these regions. A large number of modest variations of bow and strap drills have developed over the years for a variety of applications ranging from boring through materials to lighting fires. By 3000 BC, the ancient Egyptians had perfected the core drilling technique (5016 years before now). The pump drill was invented during the reign of the Roman Empire. It is made out of a vertical spindle that is aligned with a piece of horizontal wood, as well as a flywheel that keeps the precision and momentum constant. When the hollow-borer tip was initially used, it was made of a stick with a tubular-shaped piece of metal on the end, such as copper. It was invented during the 13th century. This allowed for a hole to be drilled while just the exterior piece of the hole was actually ground down. Creating a perfect separation between the interior stone or wood and the surrounding material allows the drill to pulverise less material in order to make a hole of similar size. While the pump-drill and the bow-drill were employed in Western Civilization to bore smaller holes for a significant portion of human history, the Auger was first used to drill larger holes sometime between the Roman and Medieval times, according to historians. The auger was able to produce more torque for

larger holes because of its design. However, the first known depiction of the Brace and Bit dates back to the 15th century, making it difficult to determine when it was designed. Hand crank drills are a sort of hand tool that are divided into two sections, as seen in the illustration. The bit is located on the lower half of the brace, while the user holds and twists it on the upper half of the brace. When a bit wears out, it can be replaced with another. The auger makes use of a rotating helical screw, which is similar to the Archimedean screw-shaped bit that is now in use in the industry. Because it is a scaled-down counterpart of an auger, the gimlet deserves to be mentioned as well. Churn drills, which were invented as early as 221 BC during the Chinese Qin Dynasty and were capable of drilling to a depth of 1500 metres, were first used in the East. Churn drils were constructed of wood and required a great deal of labour, yet they were capable of passing through solid rock. During the 12th century, the churn drill makes its appearance in Europe. After learning about the Chinese churn drill process, Isaac Singer is said to have developed his own steam-powered version around 1835. Additionally, the early drill presses, which were machine tools evolved from bow drills but powered by windmills and water wheels, are worth mentioning briefly. It was the powered drills that could be lifted or lowered into a material that made drill presses so popular since they allowed the user to use less force. The electric motor, which was the next significant leap in drilling technology, was responsible for the invention of the electric drill. The invention of the electric drill is attributed to Arthur James Arnot and William Blanch Brain of Melbourne, Australia, who received a patent for it in 1889. The first portable handheld drill was invented in 1895 by the brothers Wilhem and Carl Fein of Stuttgart, Germany, who were inspired by their grandfather. Black & Decker received a patent in 1917 for the world's first trigger-switch, pistol-grip portable drill. This marked the beginning of the current drilling era. Over the last century, the electric drill has been developed in a number of types and sizes to suit a wide range of specific applications.

3. Methodology

The procedures of turning and facing have been accomplished. The milling machine completes the boring operation by marking the plate, drilling it, and then boring it again. Afterwards, when the bottom and top plates have been completed, the main spindle rod and driven rods are twisted and finished in accordance with the plans. After that, the turning operations in the bearing caps are accomplished. The taper shank drilling sleeve is turned to the exact size that is required.. Then all of the tool components are arranged, and the components are checked, and the burrs and sharp edges are repositioned. The components were then assembled in accordance with the assembly drawing. Then double-check everything and go on a trail run in the component. First and foremost, the trail product does not conform to the PCD's parameters. As a result, the gear wheel alignments were modified. The procedure for the component trail has now been completed. The pcd is now correct, and the final assembly and rigid fixation of the drill head can take place. After that, the supporting accessories are welded in place and securely secured. After that, the completed product is checked to ensure that it is accurate in terms of dimensions.

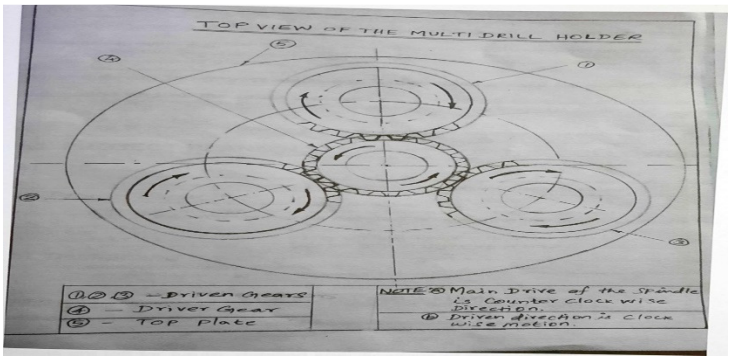

Fig 1 shows the multi drill holder

3.1. Hand drills

Over the decades, a variety of hand-powered drills have been used to accomplish various tasks. Here are a few examples, starting with the one that is most likely the oldest: Gimlet with a bow on it. Drill with a hand drill, sometimes known as a "eggbeater" drill or (particularly in the United Kingdom) a wheel braces drill Breast drills are similar to "eggbeater" drills, except that they include a flat chest piece instead of a handle. A spiral ratchet mechanism is used in the construction of a push drill. A pin chuck is a miniature jeweller's drill that can be carried around in one's pocket. An antique hand drill, sometimes known as a "eggbeater," with a hollow wooden handle and a screw-on cover that was used to store drill bits.

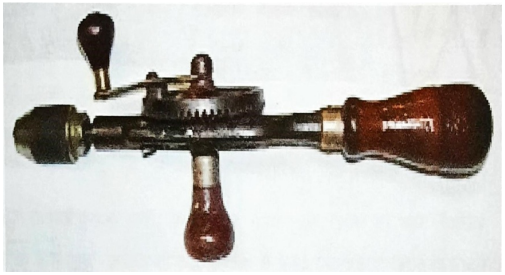

Fig 2 shows the hand drill

3.2. Pistol-grip drill

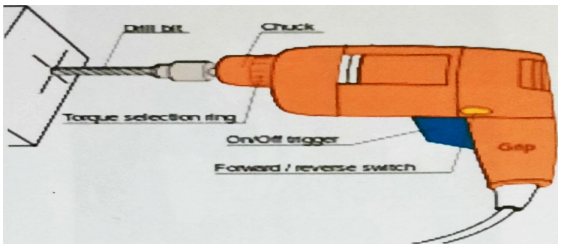

Fig 3 shows the pistol-grip drill

Today, pistol grip drills are the most prevalent form of drill used, and they are available in a wide range of subtypes to meet the needs of each user. A less common form is the right-angle drill, which is a specialised tool used by tradespeople such as plumbers and electricians to create right-angle holes in materials. Due to the excellent power to weight ratio of universal motors, they are frequently employed in corded drill applications. A wide variety accessories could be purchased to convert corded electric hand drills into a variety of other power tools, such as orbital sanders and power saws, at a lower cost than purchasing conventional, self-contained versions of such instruments for much of the twentieth century (the greatest saving being the lack of an additional electric motor for each device). As the cost of power tools and appropriate electric motors has decreased, however, the availability of such accessories has decreased significantly. For cordless tools, a similar method is currently in use, where the battery, which is the most expensive component, is shared among a variety of motorised devices, as opposed to a single electric motor being shared among a variety of mechanical attachments. Drills can also be used to attach two boards together at an angle.

3.3. Magnetic Drilling Machine

Fig 4 shows the magnetic drill machine

BDS Maschinen GmbH in Germany manufactures the Basic 200, a portable magnetic drilling machine with a small footprint. At a workshop, a magnetic drilling machine is seen cutting holes in an H-beam with the help of an HSS annular cutter, as shown in the photograph. A magnetic drilling machine is a portable drilling machine that can be used to drill holes in large and heavy work components that are difficult to carry or transport to a stationary conventional drilling machine for processing. A magnetic base is used to hold the drill bit in place when cutting tools such as annular cutters (broach cutters) or twist drill bits are used to drill holes. There are various types depending on their operations and specialisations, such as magnetic drilling and tapping machines, cordless drilling and tapping machines, pneumatic drilling and tapping machines, compact horizontal drilling and tapping machines, automatic feed drilling and tapping machines, and cross table bases, among others. It is also referred to as a magnetic core drilling machine, magnetic base drilling machine, magnetic base drilling machine, magnetic base, magnetic base drilling machine, magnetic base, magnetic base drilling machine, magnetic base, magnetic broach cutter machine, magnetic drill, or magnetic drill. It is composed of the following components: gears, an adjustable transmission system, ball bearings (top and bottom plates), a drill chuck (for holding the drill tool), shanks and keys (for turning the key), and a shaft (for turning the key). It is possible to have two sorts of attachments on a multi-spindle machine: fixed attachments and adjustable attachments. The centre distance of the drilling spindle can be adjusted in the adjustable drilling head to meet your specific needs, whereas the centre distance of the drilling spindle cannot be adjusted in the fixed drilling head. You stand to gain significantly from both of these attachments because they both increase the productivity of your operations. For example, the time it takes to drill one hole will be the same as the time it takes to drill a number of holes, and such drilling ensures the accuracy of the hole positions in your work. Roller thrust ball bearings, for example, will be employed in situations when the spindles are very near to one another. Induction motors drive the spindles, and a variable frequency drive regulates the speed at which the motor runs the spindles. They are employed in mass production due of their high efficiency during operation, as well as the fact that they save a significant amount of time while drilling a large number of holes at the same time.

4. Results and Discussion

It is one of the most significant machine tools in a workshop since it is so versatile. It is second only to the lathe in terms of importance in terms of production. Despite the fact that it was originally created to drill a hole, it is capable of performing a variety of other operations of a similar nature. It is possible to drill holes fast and inexpensively with a drilling machine. The hole is created by the revolving edge of a cutting tool known as a DRILL, which puts a significant amount of force on the workpiece that is secured to the table during the drilling process. The term "Drill Press" is used to refer to a machine that applies vertical pressure to a surface in order to create a hole. Drilling machine operations are carried out in this machine.

- Drilling
- Reaming.
- Boring.
- Boring must be countered.
- Sinking Into the Counter
- Affectionately referred to as Spot Facing.
- Tapping.
- Grinding.
- Trepanning.

4.1. Multi drill head

A multi drilling machine is capable of drilling a large number of parallel holes in a single piece of work at the same time. For tasks of a light nature, and especially for repetitive work such as drilling small components for the automobile and aircraft industries, multi drilling machines are used. A multi drilling machine is a drilling machine that has a number of drill spindles that are all operated by a single engine. It is necessary to feed in the drills from all of the spindles that contain them at the same time. Either the drill heads can be dropped onto the work piece or the work table can be lifted to achieve this goal, as appropriate. The main eccentric is driven by the spindle of the drilling machine, which is operated by a single electric motor. The various drill holding eccentrics are driven by the main eccentric through a revolving plate, which is itself driven by the main eccentric. Eccentric motion is a type of mechanism that is commonly employed to convert rotary motion into sliding motion. Keep in mind that an Eccentric is unable to convert reciprocating motion into rotary motion. In this case, we are transforming rotary motion into revolutionary motion and then back into rotary motion again. To put it another way, as the main spindle rotates, the rotary motion of the spindle is transformed into revolutionary motion of the Revolving plate. The main revolutionary motion of the revolving plate is translated into the rotary motion of the drill holding drives by means of the Drill holding drives. The conversion of the motion is accomplished by the use of the drive provided in the movement. Drill bits can be fed into the Drill head by lowering it. The Driller head is guided in motion by the pillars, which are equipped with springs. Drill heads with drill bits are protected from a sudden fall by springs, which also release the Drill head from the machine spindle when the Drill head is released. Drilling three holes with the same diameters in an asymmetrical arrangement is the purpose of this tool. A significant part of this principle is played by the art of driving.

4.2. Procedure for creating a design

The ability to predict the amount of power necessary to accomplish machining operations is useful when developing novel machining processes, optimising existing machining operations, and developing specifications for new machine tools that are to be purchased. The power of every machine tool places a limit on the size of cut that it is capable of executing successfully. When more metal needs to be removed from a work piece, it is a good idea to predict the cutting conditions that will allow the machines to operate at their peak performance levels. The machine tool is responsible for transferring the power generated by the driving motor to the workpiece, where it is utilised to cut the material to size.

Table 1 the bill of materials.

No.	PARTS	SIZE	Qty.	MATERIAL
	Top plate	DIA 215X8	1	M.S
ii.	Bottom Plate	DIA	1	M.S
	Drill Chuck	Range 3-10	3	M.S
iv.	Center Gear Wheel	DIA 55X20	1	C.I
	Spindle Gear Wheel	DIA 70X20	3	C.I
vi.	Center Shaft	DIA	1	M.S
vii.	Spindle Shaft	DIA	3	M.S
viii.	Bearing	NO-.6202	8	STEEL
ix.	Bearing Cap	DIA	8	M.S
X	Drill bit	DIA 6	3	H.S.S
	Fixture Plate	DIA	1	M.S
	Leg Bushes	DIA	3	M.S

Table 1 contains a list of materials requirements that has been compiled from the designs. This list is referred to as the "BILL OF MATERIALS." This information is sent on to the storekeeper, and the necessary items are obtained from the store with the approval of the storeowner.The next step in the planning process is to determine the optimum manufacturing method to use in order to minimise waste of resources, labour, machinery, and time, among other things. When planning the operation, the machine tools that will be utilised to complete the task are taken into consideration. Following consideration of the aforementioned questions, the optimal method is devised and implemented.When working in a machine shop, it is tough to fabricate all of the components required for the project. The decision on whether to acquire or make a specific item is made by planning after a full examination of the relative advantages and disadvantages of both options.The Base plate, which is positioned on the Drilling machine table, serves as the foundation for the entire arrangement. Two pillars are fastened to the Base plate and are equipped with springs to help them stay in place. The sliding plate assembly is designed to slide vertically over these pillars. It is threaded into the main spindle of the machine. This Eccentric is responsible for transmitting power from the machine to the Revolving plate in the machine. This eccentric comes with a Morse Taper No.3 as a standard. The eccentricity is measured in millimetres. Depending on the design, the bottom pins of these eccentrics contain provisions for keeping drill bits of varying diameters in their respective positions. These eccentrics are responsible for converting the revolutionary motion of the spinning plate into the rotary motion of the drill bits. The eccentricity offered is 5mm, which is the same as the eccentricity of the main eccentric.

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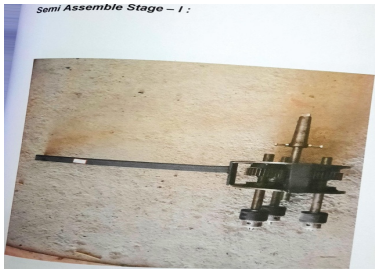
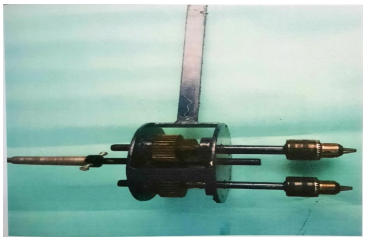
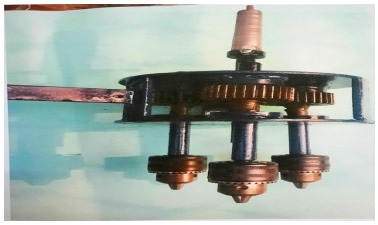
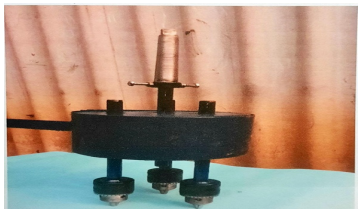
<tr><td> 

(a) Semi assemble stage 1</td><td> 
(b) Semi assemble stage 2</td></tr>
<tr><td> 
(c) Semi assemble stage 3</td><td> 
(d) Semi assemble stage 4</td></tr>
<tr><td> 
(e) Final assemble stage 1</td><td> 

(f) Final assemble stage 2</td></tr>
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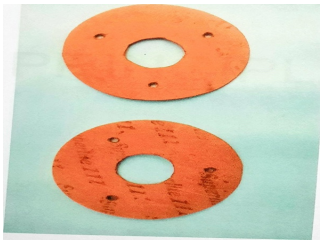
(g) Error component</td><td> 
(h) Original component</td></tr>
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Fig 5 shows the assemble stages and original component

5. Conclusion

We may conclude from the foregoing information that this attachment has a lot of potential in the event of huge and even asymmetrical layout drillings, which cannot be accomplished with traditional multi spindle drilling equipment. The vast scale drilling alone will not be sufficient to make the project economical, despite the fact that it is an essential and first prerequisite for the project. Other

considerations, such as location, precision, parallelism in drilling, profitability, and so on, should be taken into consideration before making a final decision on where to drill.

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