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MULTIPLE SPINDLE HEAD

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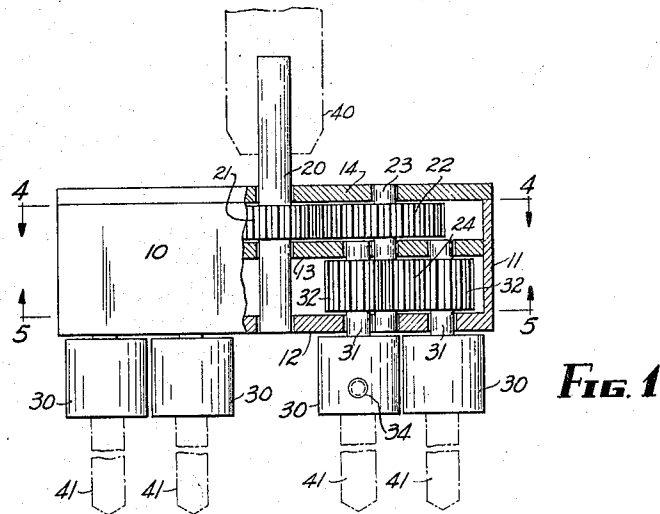


FIG. 1

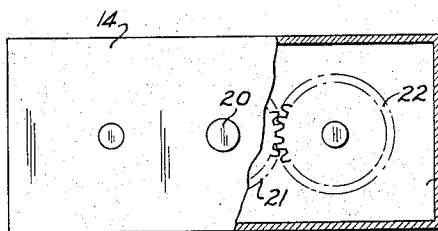


FIG. 2

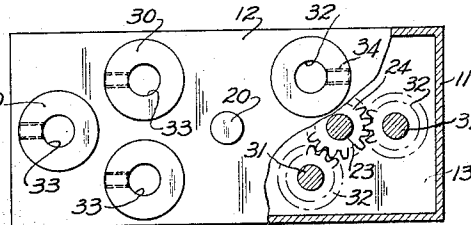


FIG. 3

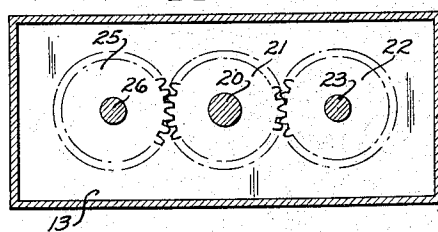


FIG. 4

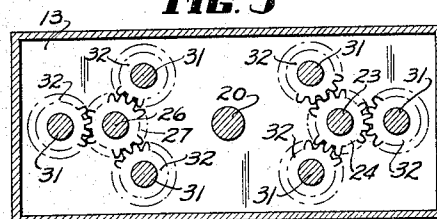


FIG. 5

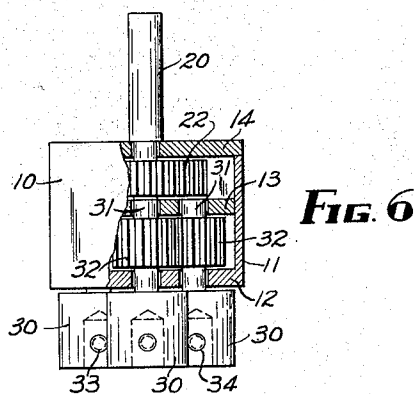


FIG. 6

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MULTIPLE SPINDLE HEAD

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4 Claims. (Cl. 74-665)

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This invention relates to drill heads and particularly to multiple spindle drill heads.

The primary object of this invention is to provide a multiple spindle drill head that can be used with any single spindle drilling machine.

Another object is to provide a compact multiple spindle drill head whose drive shaft can be easily and quickly connected to or disconnected from the chuck or spindle socket of a drill press, in the same manner as a single drill.

A further object is to provide a positive drive, non-adjustable, multiple spindle drill head that is rugged in construction and economical to manufacture.

These and other objects of the invention will become apparent from a reading of the following specification and claims, together with the accompanying drawing in which like parts are referred to and indicated by like reference characters and wherein:

Figure 1 is a front view of the multiple spindle drill head with a portion broken away to show the two inner compartments and the arrangement of the gears therein;

Figure 2 is a top view of the device with a portion of the top wall broken away to reveal the first compartment;

Figure 3 is a bottom view of the same with a portion broken away to reveal the second compartment;

Figure 4 is a view taken along the line and in the direction of the arrows 4-4 of the Figure 1;

Figure 5 is a view taken along the line and in the direction of the arrows 5-5 of the Figure 1; and

Figure 6 is a right end view of the device with a portion of the side wall broken away.

Referring to the Figure 1, there is shown a multiple drill head made in accordance with this invention.

Reference character 10 broadly indicates a sheet metal case having a bottom wall 12, a top wall 14, and side walls 11. The case is made of sheet iron and its dimensions are such that the various drills 41, as described hereinafter, will be appropriately spaced.

A case measuring $1\frac{1}{4}$ inches wide by $3\frac{1}{4}$ inches long is sufficiently large to hold the six drills necessary to drill the six holes of a small hinge, in one operation.

The case is divided longitudinally by a partition wall 13, which, together with the top wall 14, forms an upper or first compartment and, together with the bottom wall 12, forms a lower or second compartment as shown in Figures 1 and 6.

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A drive shaft 20 is journaled in the top, partition, and bottom walls and extends beyond the top wall 14, as shown in the Figures 1 and 6.

In the particular multiple spindle head shown, two idler shafts 23 and 26 are journaled in the top, partition and bottom walls of the case on diametrically opposite sides of the drive shaft 20. However, any desired number of idler shafts might be used in arriving at a different pattern of drilled holes.

The drive shaft 20 and the idler shafts 23 and 26 are aligned in axial parallelism.

The drive shaft has a primary gear 21 mounted on it in the first compartment and the idler shafts 23 and 26 have the secondary gears 22 and 25 respectively mounted thereon in the first compartment and the tertiary gears 24 and 27 mounted thereon in the second compartment.

Reference character 31 indicates the spindle shafts which are journaled in the bottom and partition walls as shown in Figures 1, 3, 5 and 6. The spindle shafts 31 are arranged in circular series around each of the idler shafts 23 and 26 and in axial parallelism therewith.

In the device shown there are three spindle shafts 31 around each idler shaft. Each spindle shaft 31 has a gear 32 mounted thereon in the second compartment and a drill holding socket 30 formed on its outer end, which extends below the bottom wall 12 of the case 10.

Conventional twist drills 41, shown in phantom in Figure 1, fit into the socket holes 33 and are held in place by set screws 34.

The primary gear 21 engages the secondary gears 22 and 25 of the idler shafts 23 and 26. The secondary gears are all the same size so that both the idler shafts will rotate at the same speed. Each of the spindle gears 32 engages the tertiary gear 24 or 27 of its respective idler shaft. Both the tertiary gears 24 and 27 are the same size and all of the spindle gears 32 are of the same size so that all the spindle shafts 31 will rotate at the same speed.

By arranging the gears as shown in the drawing, all of the spindle chucks 30 will rotate simultaneously in the same direction as the drive shaft 20.

The spindle chucks are arranged in the pattern of two triangles with opposed bases, as shown in the Figure 3. This arrangement provides for the drilling of three holes in either half of a hinge. Other arrangements and spacing of the spindles can be worked out to suit particular conditions.

The case 10 is filled with grease before the top wall 14 is secured in place.

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The device is attached to any drilling machine by inserting the end of the drive shaft 20 into the chuck 40 of the drilling machine as shown in Figure 1. This is done in the same manner as any ordinary twist drill would be inserted into the chuck. The case 10 is prevented from rotating by use of any suitable fixture or bracket. The drill press is operated in the conventional manner, the multiple drill head being moved in and out of contact with the work just as though it held one drill instead of a plurality of drills. The work is of course held in either a jig or a fixture in the conventional manner.

From the size, $1\frac{1}{4}$ by $3\frac{1}{4}$ inches, of the described device, it can be readily seen that this multiple spindle head lends itself to short runs that are to be repeated periodically, since the spindle head can be easily removed from the drill press and as quickly re-attached when needed. There is no need to laboriously set up a large machine, as has been the case in the past with "Universal" machines. This multiple spindle head is inexpensive to manufacture and therefore a separate head can be made for each job and kept until the job comes up again. Thus the set-up time required on a re-run is drastically reduced, since the multiple spindle head for a particular job need only be inserted in the drill press chuck, the proper fixture aligned and the job is ready to run. The usual time needed to reset and relocate the drills of a "Universal" drilling machine is all saved.

By dividing the case 10 into two compartments by means of the partition wall 13, it has been possible to hold the various shafts rigidly in place within a small space, thus assuring long life and freedom from wear for the gears and shafts which rotate in a sealed grease bath.

By varying the diameter of the various gears, different spacing can be arranged for the spindle shafts 31 and in turn different spacing of the drilled holes can be achieved.

It will now be clear that there has been provided a device that accomplishes the objectives heretofore set forth. While the invention has been disclosed in its preferred form, it is to be understood that the specific embodiment thereof as described and illustrated herein is not to be considered in a limited sense as there may be other forms or modifications of the invention which should also be construed to come within the scope of the appended claims.

I claim:

1. In combination with a drilling machine, a multiple spindle head, comprising a case having top, bottom and side walls and including a partition intermediate the top and bottom walls, the said partition forming, together with the top and side walls, a first compartment and, together with the bottom and side walls, a second compartment, a drive shaft journaled in the top, partition, and bottom walls, extending thru the top of the case, and engageable with the chuck of the aforesaid drilling machine, the said drive shaft having a primary gear mounted thereon in the first compartment, a pair of diametrically opposed idler shafts journaled in the top, partition, and bottom walls in spaced axial parallelism with the drive shaft, each of the said idler shafts having a secondary gear mounted thereon in the first compartment and a tertiary gear mounted thereon in the second compartment, the said secondary gears being engaged with the primary gear, and a plurality of spindle shafts journaled in the partition and bottom walls, and ex-

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tending beyond the bottom of the case, the said spindle shafts being grouped in axial parallelism and in circular series around each idler shaft, each of the said spindle shafts having a gear mounted thereon in the second compartment, in engagement with the tertiary gear of its respective idler shaft, whereby all of the spindles are caused to rotate simultaneously in the same direction when the drive shaft is rotated by the aforesaid drilling machine.

2. In combination with a drilling machine, a multiple spindle head comprising a case having top, bottom and side walls, and including a partition intermediate the top and bottom walls, the said partition forming, together with the top and side walls, a first compartment and, together with the bottom and side walls, a second compartment, a drive shaft journaled in the top, partition, and bottom walls, extending thru the top of the case, and engageable with the chuck of the aforesaid drilling machine, the said drive shaft having a primary gear mounted thereon in the first compartment, a pair of diametrically opposed idler shafts journaled in the top, partition, and bottom walls in spaced axial parallelism with the drive shaft, each of said idler shafts having a secondary gear mounted thereon in the first compartment and a tertiary gear mounted thereon in the second compartment, the said secondary gears being engaged with the primary gear, and six spindles journaled in the partition and bottom walls in axial parallelism and in circular series of three around each idler shaft, each of the said spindle shafts extending beyond the bottom of the case and having a gear mounted thereon in the second compartment in engagement with the tertiary gear of its respective idler shaft, whereby all of the spindles are caused to rotate simultaneously in the same direction when the drive shaft is rotated by the aforesaid drilling machine.

3. In combination with a drilling machine, a multiple spindle head, comprising a case having top, bottom and side walls, and including a partition intermediate the top and bottom walls, the said partition forming, together with the top and side walls, a first compartment and, together with the bottom and side walls, a second compartment, a drive shaft journaled in the top, partition, and bottom walls, extending thru the top of the case, and engageable with the chuck of the aforesaid drilling machine, the said drive shaft having a primary gear mounted thereon in the first compartment, a plurality of idler shafts journaled in the top, partition, and bottom walls, in spaced axial parallelism with the drive shaft, each of the said idler shafts having a secondary gear mounted thereon in the first compartment and a tertiary gear mounted thereon in the second compartment, the said secondary gears being engaged with the primary gear, and a plurality of spindle shafts journaled in the partition and bottom walls, and extending beyond the bottom of the case, the said spindle shafts being grouped in axial parallelism and in circular series around each idler shaft, each of the said spindle shafts having a gear mounted thereon in the second compartment, in engagement with the tertiary gear of its respective idler shaft, whereby all of the spindles are caused to rotate simultaneously in the same direction when the drive shaft is rotated by the aforesaid drilling machine.

4. In combination with a drilling machine, a multiple spindle head, comprising a case having top, bottom and side walls, and including a partition intermediate the top and bottom walls, the

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said partition forming, together with the top and side walls, a first compartment and, together with the bottom and side walls, a second compartment, a drive shaft journaled in the top, partition, and bottom walls, extending thru the top of the case, and engageable with the chuck of the aforesaid drilling machine, the said drive shaft having a primary gear mounted thereon in the first compartment, a plurality of idler shafts journaled in a wall of the case, in spaced axial parallelism with the drive shaft, each of the said idler shafts having a secondary gear mounted thereon in the first compartment and a tertiary gear mounted thereon in the second compartment, the said secondary gears being engaged with the primary gear, and a plurality of spindle shafts journaled in a wall of the case and extending beyond the bottom of the case, the said spindle shafts being grouped in axial parallelism and in circular series around each idler shaft, each of the said spindle shafts having

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a gear mounted thereon in the second compartment, in engagement with the tertiary gear of its respective idler shaft, whereby all of the spindles are caused to rotate simultaneously in the same direction when the drive shaft is rotated by the aforesaid drilling machine.

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