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AUXILIARY SPINDLE AND HEAD FOR RADIAL DRILLS

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By
Attorney
To all whom it may concern:

Be it known that I, WILLARD T. SEARS, a citizen of the United States, residing at Montclair, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Auxiliary Spindles and Heads for Radial Drills, of which the following is a specification.

This invention relates to drilling machines and more especially to an auxiliary spindle mechanism for tapping, reaming or performing other like operations in connection with the drilling machine. In performing drilling operations, wherein a considerable amount of tapping or reaming is to be done in connection with the drilling operation, the ordinary drilling machine requires a continual changing from drill to tap or reamer and back again. The primary object of this invention is to eliminate such objection by providing an improved auxiliary mechanism adapted to be used as an attachment in connection with the usual main drill spindle mechanism.

It is an object of the invention to provide a mechanism of the above type in connection with the main drill spindle head of a radial drilling machine, the auxiliary head preferably being located between the said main head and the vertical column of the machine whereby such auxiliary head may be pushed up against the column when not in use.

Another object of the invention is to provide an auxiliary spindle mechanism of the above type adapted to be optionally secured to the main head and means comprising a clutch for driving the auxiliary spindle in either direction from the arm shaft of the radial drill.

With the above and other objects in view, my invention consists in the features of construction and operation set forth in the following specification and illustrated in the accompanying drawing. In such drawing annexed hereto and forming a part of this specification, I have shown certain embodiments of my invention in connection with one type of radial drilling machine but it will be understood that the invention can be otherwise embodied and that the drawing is not to be construed as defining or limiting the scope of the invention, the claims appended to this specification being relied upon for that purpose.

Referring to the figures of the drawing:

Figure 1 is a partial elevation of a radial drilling machine showing my improved auxiliary spindle mechanism applied thereto.

Fig. 2 is a cross sectional view through the arm taken on line 2-2 of Fig. 1.

Fig. 3 is a similar view showing a modified form of spindle drive gearing.

Fig. 4 is a detail view thereof taken on line 4-4 of Fig. 3.

Fig. 5 is a plan sectional detail view through the arm and auxiliary head showing a further modified form of spindle drive gearing.

In the drawing accompanying this specification, I have illustrated my invention in connection with a radial drilling machine of the type shown in my Patent No. 1,360,325 dated August 24, 1920. In such drawing, 1 indicates a vertical column on which is supported for vertical movement a horizontal arm 2. A saddle 3 is slidably mounted on the arm and is provided with a head 4 rotatably supporting a drill spindle 5 therein.

An arm shaft 6 extends longitudinally of the arm 2, through the column, and is adapted to be driven in either direction from a motor on the other end of the arm, as shown in my aforementioned patent. The drill spindle 5 may be driven from the arm shaft in the manner also shown in connection with my said patent. A clamping lever 7 is provided on the saddle whereby the saddle may be secured to the arm in any adjusted position thereon, this clamping mechanism also being shown in detail in my said patent.

An auxiliary spindle head 8 is slidably mounted on the arm at one side of the saddle 3 as shown in Fig. 1. I preferably place this auxiliary head between the saddle 3 and the column 1, as illustrated, although it will be understood that the same may be placed at the other side of the saddle, if desired. When using this auxiliary mechanism, it is necessary that the same be secured from movement along the arm 2. As illustrated, I accomplish such purpose by securing the auxiliary head to the saddle 3, a pair of straps 9 secured by tap bolts 10 being used to connect the head and saddle together. With such a connection, the auxiliary head may be traversed along the arm by traversing the saddle and both may be...
secured to the arm by the clamping lever 7. When not in use, the auxiliary head 8 may be disconnected from the saddle and pushed to an idle position directly adjacent the column 1.

A tool spindle 11 is mounted vertically in the head 8 and, as shown in Figs. 1 and 2, is splined to a spiral gear 12 driven by a spiral gear 18 loose on the arm shaft 6. A clutch 14 operated by a hand lever 15 is provided for operatively connecting the arm shaft to the gear 13. Means comprising a lever 16, counterbalanced at 17 and pivoted to the head 8 by a link 18, is provided for feeding the spindle vertically, the lever being swivelly connected to the arm at 19 and provided with an operating hand rod 20.

The speed at which the auxiliary spindle 11 should be operated depends to a considerable degree upon the character of work the spindle is to perform. For tapping, the speed of the spindle 11 should be approximately one-fourth of the speed of spindle 3. When used for high speed work, as reaming, the speed of the spindle 11 should be greater instead of less than that of the spindle 3. For these and other reasons it may be desirable to use other forms of drive gearing than the spiral gears 12 and 13 shown in Figs. 1 and 2. Accordingly, in Figs. 3 and 4, I have shown the drive from the arm shaft to the spindle 11 as being through bevel and spur gears respectively, and in Fig. 5, as being through spur and bevel gears respectively. Also when performing tapping operations by the mechanism shown in Figs. 1 and 2, the reverse of the spindle 11 is accomplished by reversing the arm shaft 6 through the regular spindle reversing mechanism above referred to. However, in machines wherein the arm shaft is not reversible, it is necessary that other means be provided for reversing the tapping spindle. Such a means is shown as a part of the driving connection illustrated in Figs. 3 and 4. The mechanism shown in Figs. 3, 4 and 5 will now be described.

In Figs. 3 and 4 a pair of opposed bevel gears 21 are loosely mounted on the arm shaft 6. A double clutch 22 splined to the shaft 6 between the gears 21 is adapted to be shifted by a hand lever 23 to operatively connect either gear with the shaft. A third bevel gear 24 secured to a vertical shaft 25 is in mesh with both bevel gears 21. A spur gear 26 on the shaft 25 meshes with a spur gear 27 within which is splined the spindle 11. It will be clear that the spindle may be driven in one direction or the other by engaging the clutch 22 with one or the other of bevel gears 21.

In Fig. 5 a spur gear 28 loosely mounted on the arm shaft 6 is in mesh with a spur gear 29 on a stub shaft 30. Integral with or secured to the gear 29 is a bevel gear 31 in mesh with a bevel gear 32 within which is splined the spindle 11. A clutch 33 splined to the arm shaft may be shifted by a hand lever 34 into or out of engagement with the gear 28 to operatively connect the arm shaft with or disconnect the arm shaft from the gear 28 and spindle 11.

What I claim is:

1. A drilling machine comprising the combination of an arm provided with horizontal guideways thereon, a shaft extending longitudinally of the arm, a saddle supported by the guideways and movable therealong, a drill spindle mounted on the saddle and operatively connected to the shaft, an auxiliary head mounted to slide on the guideways at one side of the saddle, a spindle mounted in the auxiliary head, means operatively connecting the last named spindle to the shaft, and means for optionally securing the auxiliary head to the saddle.

2. A radial drill comprising the combination of a vertical column, an arm adjustably mounted thereon and provided with horizontal guideways, a shaft extending longitudinally of the arm, a saddle supported by the guideways and movable therealong, a drill spindle mounted on the saddle and operatively connected to the shaft, and an independent auxiliary head mounted to slide on the guideways at one side of the saddle, a spindle mounted in the auxiliary head and adapted to carry a tap or like tool, gearing for operatively connecting the auxiliary spindle with the shaft, and means for optionally securing the auxiliary head against sliding movement on the arm.

3. A radial drill comprising the combination of a vertical column, an arm adjustably mounted thereon and provided with horizontal guideways, a shaft extending longitudinally of the arm, a saddle supported by the guideways and movable therealong, a drill spindle mounted on the saddle and operatively connected to the shaft, an auxiliary head mounted to slide on the guideways at one side of the saddle, a spindle mounted in the auxiliary head and adapted to carry a tap or like tool, gearing for operatively connecting the auxiliary spindle with the shaft, and means for optionally securing the auxiliary head to the saddle.

4. A radial drill comprising the combination of a vertical column, an arm mounted thereon and provided with horizontal guideways, a shaft extending longitudinally of the arm, a saddle supported by the guideways and movable therealong, a drill spindle mounted on the saddle and operatively connected to the shaft, an independent auxiliary head mounted to slide on the guideways between the column and saddle, a spin-
dle mounted in the auxiliary head, means operatively connecting the last named spindle to the shaft, and means for optionally securing the auxiliary head against sliding movement on the arm.

5. A radial drill comprising the combination of a vertical column, an arm mounted thereon and provided with horizontal guideways, a shaft extending longitudinally of the arm, a saddle supported by the guideways and movable therealong, a drill spindle mounted on the saddle and operatively connected to the shaft, an auxiliary head mounted to slide on the guideways between the column and saddle, a spindle mounted in the auxiliary head, means operatively connecting the last named spindle to the shaft, and means for optionally securing the auxiliary head to the saddle.

6. A radial drill comprising the combination of a vertical column, an arm mounted thereon and provided with horizontal guideways, a shaft extending longitudinally of the arm, a saddle supported by the guideways and movable therealong, a drill spindle mounted on the saddle and operatively connected to the shaft, an independent auxiliary head mounted to slide on the guideways between the column and saddle, a spindle mounted in the auxiliary head, an operative connection comprising gearing and a clutch between the auxiliary spindle and shaft, means for feeding the auxiliary spindle longitudinally, and means for optionally securing the auxiliary head against sliding movement on the arm.

7. A drilling machine comprising the combination of an arm provided with horizontal guideways thereon, a shaft extending longitudinally of the arm, a saddle supported by the guideways and movable therealong, a drill spindle mounted on the saddle and operatively connected to the shaft, an independent auxiliary head mounted to slide on the guideways at one side of the saddle, a spindle mounted in the auxiliary head, an operative connection comprising gearing and a spindle reversing clutch between the auxiliary spindle and shaft, means for feeding the auxiliary spindle longitudinally, and means for optionally securing the auxiliary head against sliding movement on the arm.

8. A radial drill comprising the combination of a vertical column, an arm mounted thereon and provided with horizontal guideways, a shaft extending longitudinally of the arm, a saddle supported by the guideways and movable therealong, a drill spindle mounted on the saddle and operatively connected to the shaft, an independent auxiliary head mounted to slide on the guideways at one side of the saddle, a spindle mounted in the auxiliary head, an operative connection comprising gearing and a spindle reversing clutch between the auxiliary spindle and shaft, means for feeding the auxiliary spindle longitudinally, and means for optionally securing the auxiliary head to the saddle.

In testimony whereof, I hereto affix my signature.

WILLARD T. SEARS.