Dec. 23, 1941. G. W. IRWIN 2,267,238

DRILL PRESS DRIVING MECHANISM

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FIG. 1.

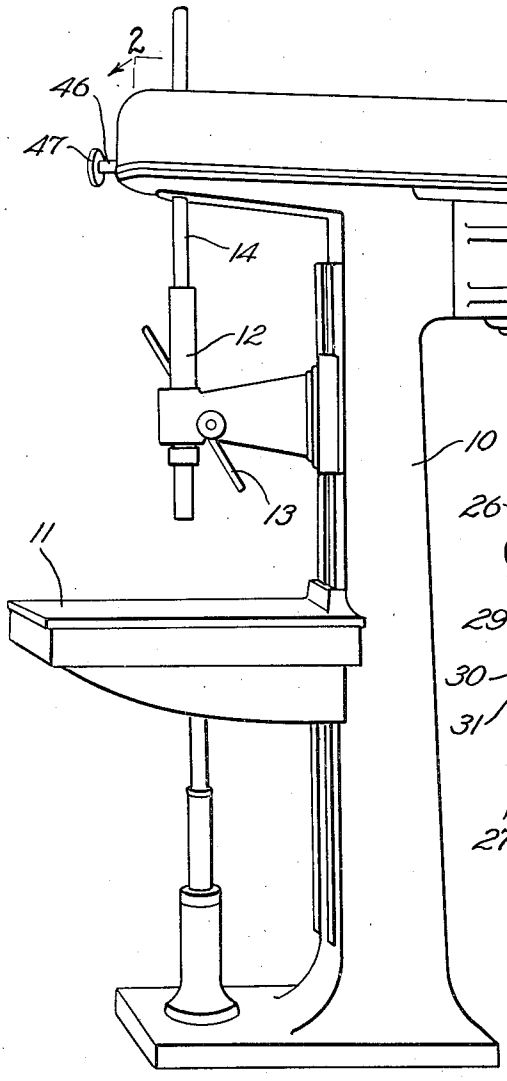
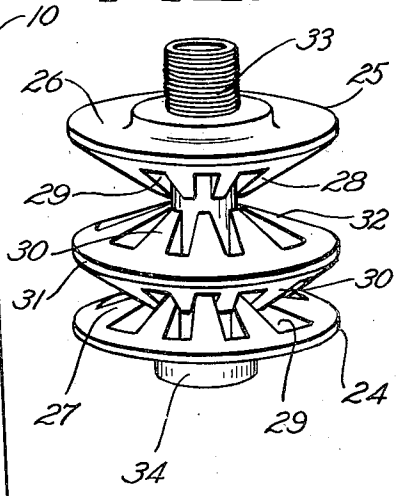


FIG. 3



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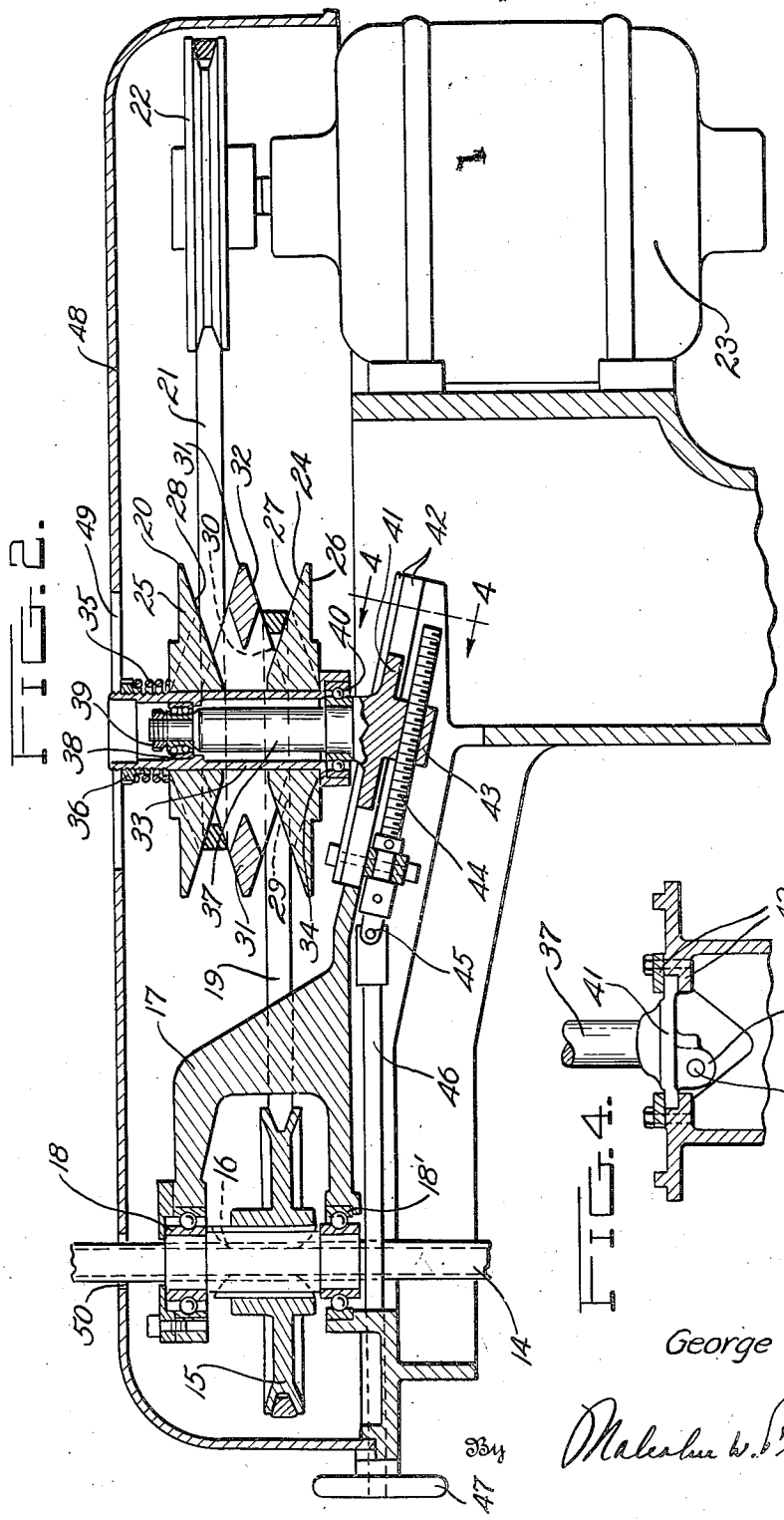

FIG. 2.

FIG. 4.

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DRILL PRESS DRIVING MECHANISM

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Application June 23, 1939, Serial No. 280,824

2 Claims. (Cl. 74—230.17)

This invention relates to drill presses, but more particularly to a variable speed drive for a drill press, and an object is to produce a simple and efficient drive of the above character which has almost infinitely variable speed, which is manually controllable in accordance with the demands of service.

Another object is to produce a new and improved controlling device for a variable speed drive of the above character.

A further object is to produce a variable speed drive having the new and improved features of construction, arrangement and operation hereinafter more fully described, and which is shown by way of illustration, but not of limitation, on the accompanying drawings, in which:

Figure 1 is a perspective view of a side of a drill press embodying the invention;

Figure 2 is an enlarged sectional view substantially on the line 2—2 of Figure 1;

Figure 3 is a composite perspective view of the sheave assembly through which power is transmitted, showing the parts in perspective; and

Figure 4 is a transverse sectional view on the line 4—4 of Figure 2.

The illustrated embodiment of the invention comprises a drill press of the usual type having an upright frame 10 provided with a work-supporting platten 11 and a vertically disposed quill 12, which is adapted to be moved toward and away from the platten 11 by a handle 13. Operably associated with the quill is an operating shaft 14. The shaft 14 is rotatable and also mounted for longitudinal movement, as will hereinafter appear. Mounted on the shaft 14 is a sheave 15 having a peripheral groove shaped to receive the usual V-belt. The hub of the sheave 15 has a suitable splined connection 16 with the tool operating shaft 14. Enclosing the sheave 15 is a yoke 17, which forms a part of the machine frame 10, and carried by opposite arms of the yoke are anti-friction thrust bearings 18 and 18'. A V-belt 19 is trained about the sheave 15 at one end, and the opposite end operatively engages a sheave assembly or unit 20. Also operatively engaging the sheave unit 20 is one end of a second V-belt 21, the opposite end of which is trained about a sheave 22 also having a V-shaped peripheral groove. The sheave 22 is connected to be driven by an electric motor 23, which is adapted to operate at substantially uniform speed.

The sheave assembly 20 comprises a pair of axially spaced discs or sheave members 24 and 25. Each sheave member has a relatively flat outer face 26, but the inner face of the member 24 is formed with an upwardly extending frusto-conical surface 27, and the sheave member 25 has on its under face a downwardly extending frusto-conical surface 28. Each of the sheave members 24 and 25 is formed on its inner face with a plurality of radially extending grooves 29 to receive outwardly extending portions 30 of an intermediate or floating sheave part 31. The sheave part 31 is formed on its upper and lower faces with oppositely extending frusto-conical surfaces 32, the angularity of the under face corresponding substantially to that of the under face 28 of the sheave part 25, and the upper face of the member 31 corresponding in angularity substantially to that of the upper face 27 of the sheave part 24.

Each of the sheave parts 24, 25 and 31 is formed with an aperture adapted to align with each other to receive a tubular upright 33, which is shouldered at the lower end as indicated at 34, and against the outer surface of the shoulder 34 rests the lower sheave member 24. The parts are held in assembled relation by a coiled spring 35, which bears against the outer face of the upper sheave member 25. A nut 36 is in screw-threaded engagement with the tube 33 and forms an abutment for the opposite end of the spring 35.

Projecting inside of the tubular upright 33 is a post 37, the upper end of which is reduced to receive an anti-friction ball bearing unit 38, which is held in place by a nut 39. Disposed within the shouldered portion 34 at the lower end of the tube 33 is an anti-friction ball bearing unit 40.

It will be observed that the belt 21 leading from the motor driven sheave 22 engages between the lower face of the sheave member 25 and the upper face of the intermediate member 31. The endless belt 19, which is connected to the sheave 15, engages the under face of the intermediate sheave member 31 and the upper face of the lower sheave member 25. It will thus be apparent that the drive from the motor 23 is through the sheave assembly 20, and thence to the tool operating shaft 14.

By moving the sheave assembly 20 to the right or to the left of Figure 2, it will be apparent to those skilled in this art that the V-belts assume smaller or larger operating pitch diameters through the action of the sheave faces on the assembly 20.

As will hereinafter appear, adjustment of the sheave assembly 20 causes the V-belts to assume smaller or larger operating pitch diameters

through the action of the variable sheave faces. Inasmuch as the sheave assembly 20 is under spring tension imposed by the coil spring 35 when the assembly is moved in one direction or the other toward or away from the motor driven sheave 22, the V-belts 19 and 21 are caused automatically to move in one case closer to the axis of the sheave assembly, and in the other case farther from the axis of the sheave assembly. This results in enabling the tool operating shaft 14 to be rotated at any desired speed, although the motor 23 operates continuously at uniform speed.

As shown, the post 37 is integral with the carriage 41, which slides in guideways 42. The guideways 42 are inclined, and, as shown, the carriage 41 forms with the axis of the post 37 an acute angle. Thus, the sheave assembly 20 is moved angularly in a downward direction when moved toward the motor driven sheave 22, and upwardly in an inclined direction when moved away from the motor driven sheave 22. Movement of the sheave assembly in an inclined direction, as above mentioned, compensates for the angularity of the sheave faces in the assembly 20, thereby to maintain the belts 19 and 21 in a substantially horizontal plane and militates against the ends thereof being moved downwardly or upwardly with relation to the sheaves 15 and 22. Thus the inclination of the guideways 42 is so chosen that such angularity is compensated for.

The carriage 41 is formed with a lug 43, which is in screw-threaded engagement with a rod 44 having a universal joint connection 45 with an operating shaft 46. On the outside of the machine and secured to the rod 46 is a hand wheel or crank 47, which may be rotated in one direction or the other to effect the desired adjustment of the sheave assembly 20 to the right or to the left for the above described purposes. Fitting over the driving mechanism is a cover 48 formed with an elongate opening 49, into which extends the upper end of the tubular upright 33, and also an opening 50 through which the tool operating shaft 14 extends.

Numerous changes in details of construction, arrangement and choice of materials may be effected without departing from the spirit of the invention, especially as defined in the appended claims.

What I claim is:

1. A driving mechanism for a drill press having a frame, and a sheave carrying tool shaft carried by the frame, said driving mechanism comprising a motor carried by the frame and having a sheave, a vertical tubular member interposed between the said sheaves and having a shoulder, a sheave unit mounted on said tubular member and seated at its bottom on said shoulder, a spring surrounding the vertical tubular member and seated against the top of the unit, abutment means carried by the vertical tubular member and engaged with the outer end of the spring, a post having its upper portion disposed within the vertical tubular member and having a rigid lug connected to its lower end, said lug being provided with a threaded bore disposed at an incline to the longitudinal axis of the post, a rod threaded through the bore of the lug, an operating shaft having means for manually rotating same, a universal joint connection between the rod and the shaft, endless belts trained over the sheaves and over the sheave unit, a pair of oppositely disposed spaced inclined guideways carried by the frame and between which the lug is movable, and laterally extending flanges carried by the post and having an inclination parallel to that of the axis of the bore of the lug and engaged with the respective guideways.

2. A driving mechanism for a drill press in accordance with claim 1, wherein the frame of the press has a cover plate extending over the top of the frame, wherein the cover plate is formed with a longitudinal opening receiving therein the upper end of the vertical tubular member and wherein the manual means of the operating shaft is disposed exteriorly of the cover and adjacent the front of the latter.

GEORGE W. IRWIN.