Nov. 22, 1960 W. F. OCENASEK 2,960,893

HIGH-SPEED, SENSITIVE DRILLING ATTACHMENT

Filed July 25, 1957 3 Sheets-Sheet 1

Fig. 1.

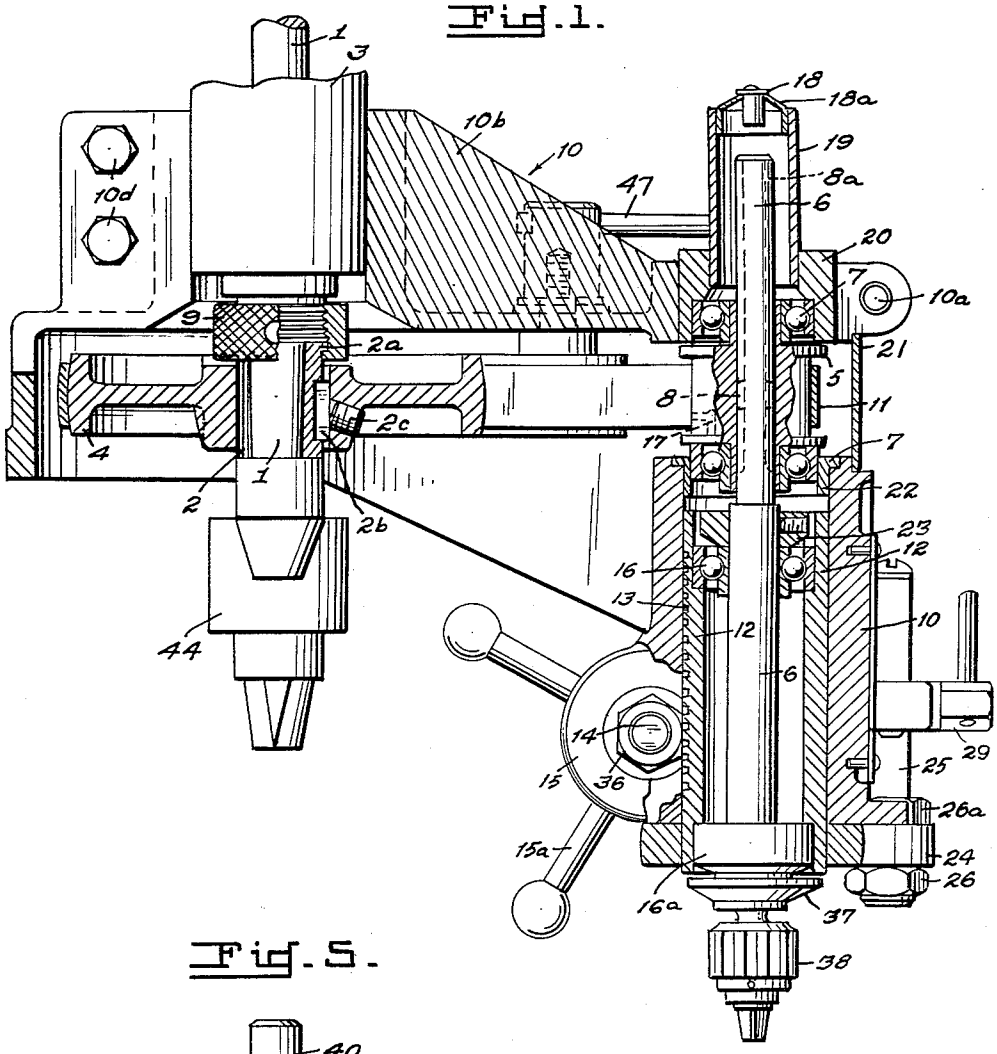
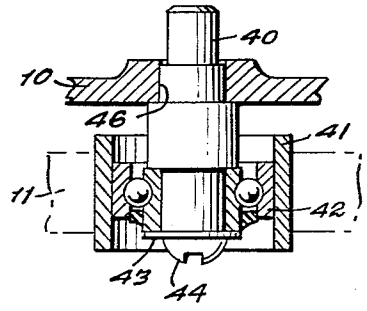


Fig. 5.



INVENTOR.
William F. Ocenasek
BY
Otto John Munz.
ATTORNEY

Nov. 22, 1960 W. F. OCENASEK 2,960,893

HIGH-SPEED, SENSITIVE DRILLING ATTACHMENT

Filed July 25, 1957 3 Sheets-Sheet 2

Fig. 2.

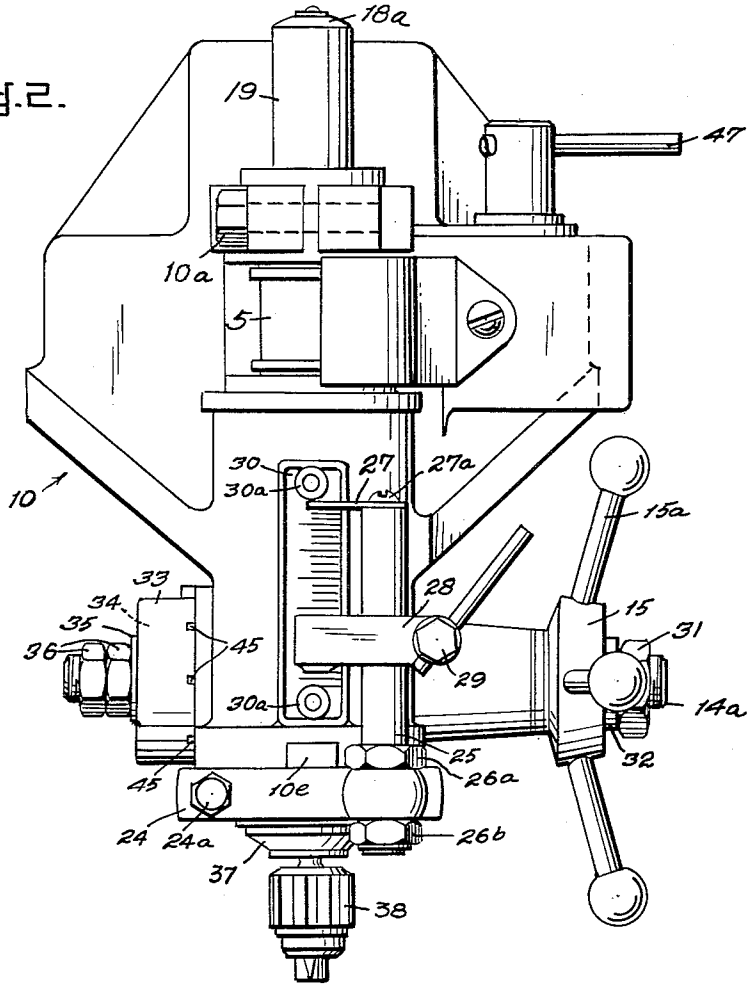
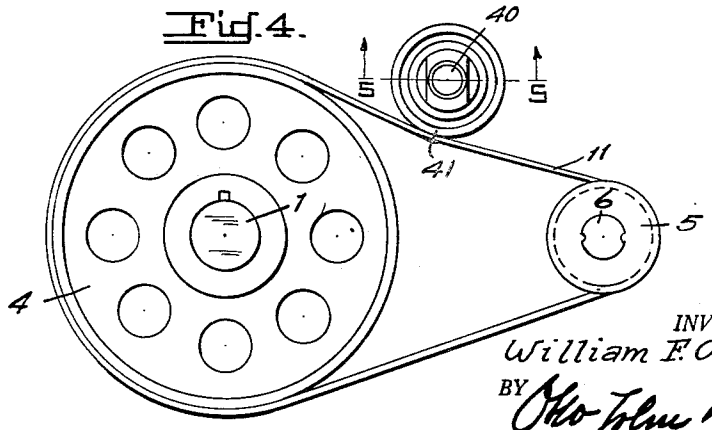


Fig. 4.



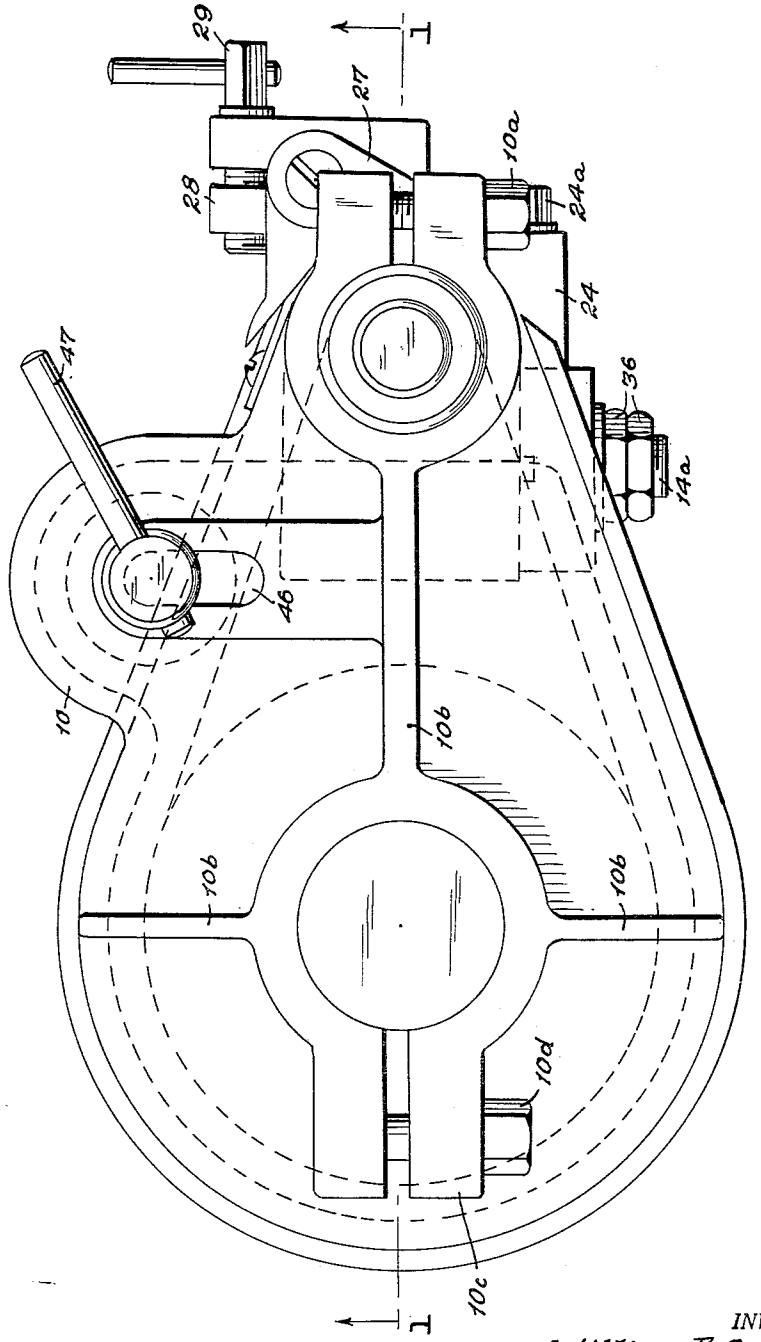
INVENTOR.
William F. Ocenasek
BY Otto John Munz
ATTORNEY

Nov. 22, 1960 W. F. OCENASEK 2,960,893

HIGH-SPEED, SENSITIVE DRILLING ATTACHMENT

Filed July 25, 1957 3 Sheets-Sheet 3

Fig. 3.



INVENTOR.
William F. Ocenasek
BY Otto John Munz.
ATTORNEY

United States Patent Office 2,960,893
Patented Nov. 22, 1960

2,960,893

HIGH-SPEED, SENSITIVE DRILLING ATTACHMENT

William Ferdinand Ocenasek, 880 NE. 113th St., Miami 38, Fla.

Filed July 25, 1957, Ser. No. 674,178

4 Claims. (Cl. 77—55)

This invention relates to a high-speed sensitive drilling attachment to conventional large drill-presses.

In the prior art when a piece of work necessitated the drilling of large holes, over 3/16", and of holes of smaller diameter on an assembly line, the drilling of the small holes was always a problem. The assembly line had to be interrupted, the work piece had to be taken out, to a small drill press, and after the completion of the drilling of the small holes, the piece was returned into the assembly with a resulting loss of time and effort, upsetting progress and schedules. The conventional drill presses for drilling small holes, under 3/16", tend to be inaccurate, and are impractical for drilling soft metals. The conventional small drill presses do not have the speed nor the vibration-free operation, necessary for precise small hole drilling and they do not have the sensitivity for drilling very small holes.

The primary object of the invention is to provide an attachment for small drills to a conventional drill press.

Another object of the invention is a high-speed attachment of such a type, which decreases vibrations in the drilling operations for the purpose of accurately drilling precise small holes.

Yet another object of this invention is to provide an attachment of the type described which extends the range of the drilling chuck, and makes it possible to locate it on the arc of a pre-determined radius from the main drill spindle.

Still another object of the present invention is to provide a small-drill attachment to a conventional large drill press, which attachment permits working on a larger piece of material, than could be normally accommodated on a conventional large drill press.

Another object of the invention is to provide an attachment of the type described, which is easily mountable and easily removable without loss of time, and which permits selective drilling of larger holes by the main drill press and small holes by the attachment, without additional expensive equipment, interruptions, and consequent loss of time.

Yet another object of the invention is to provide a sensitive control of the pressure exerted against the work piece by the drill.

Another object of the invention is to provide an attachment as described enabling the operator to utilize a driving pulley and a driven pulley of a relative ratio permitting a speed up to 20,000 r.p.m. and more.

Other objects and many of the attendant advantages of this invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings in which like reference numerals designate like parts throughout the figures thereof and wherein:

Figure 1 shows a vertical cross-sectional view through the center plane of a preferred embodiment of the invention in place on a drill press.

Figure 2 illustrates a front view of the assembly.

Figure 3 shows a plan view of the drive only.

Figure 4 is a plan view of belt tensioning arrangement, forming a part of the invention.

Figure 5 is a vertical cross-sectional view through the central plane of belt idler unit, shown in Figure 4.

Referring now to the drawings, wherein like reference characters designate like or corresponding parts throughout the several views, there is shown in Figure 1 a conventional drill press spindle shown designated as 1.

The attachment of the present invention is mounted on a conventional drill press, such as described in applicant's prior U.S. Patent No. 2,072,646, and is not self-supporting. The entire main drill press is not shown, but only the portion of the main spindle 1 and spindle quill 3 required for the mounting. The main spindle 1 is threaded on the lower end and is provided with a locking nut 9. The chuck of the conventional drill press is replaced by a light drive-pulley 4. The bore of the driving pulley, in this instance, is provided with a bushing, which has a tapered slot for a key 2*b*. The bushing has a shoulder 2*a*, which is clamped to the main spindle by locking nut 9. A key retaining screw, 2*c*, serves to retain key 2*b*. While the bushing in Figure 1 is shown tapered, different types of bushings will be used for adapting the attachment to drill presses with different sizes of main spindles. The bore of the driving pulley is of a constant diameter so that merely changing the bushing 2 makes this attachment interchangeable with any conventional drill press. The spindle quill of the drill press is shown as 3. The surface of the outer rim of the drive-pulley is curved into an oblong top to maintain a flat belt 11 centered on pulley 4. The belt should be flexible, preferably of a rubberized fabric, to eliminate vibrations.

The pulley 5 drives the attachment-drill press spindle 6. It is supported in ball bearings 7, mounted in frame 10. For simplification of production the mounting of the bearings 7 in frame 10 is accomplished by means of bushings 20, upper, and 22, lower. The housings of the ball bearings are press-fitted onto the pulley unit 5 and into the bushings, thus leaving the spindle 6 free to slide vertically through the inner boring of the pulley unit. The upper ball-bearing bushing 20 is held firmly in place in frame 10 by means, such as a clamp locking bolt or screw 10*a*. Rotation of the spindle by the pulley-unit is accomplished by means such as splines, or a pair of keys 8, mounted in the pulley-unit and in conjunction with long key ways 8*a*, machined in the spindle, as shown.

The upper portion of the frame of the attachment is shown in Figure 3 reinforced by three mutually perpendicular ribs 10*b* on top of the frame 10. For a fourth rib, which would complete the reinforcing, the clamp 10*c* is substituted. The attachment is fastened to the main spindle quill 3 by means of this clamp 10*c*, which is tightened by locking bolts 10*d*. The clamping arrangement of the attachment enables the operator to position it at any desired angle in the horizontal plane and vertically along the quill of the main drill press.

The center of the attachment-spindle 6 is spaced preferably 5" from the center of the main drill-press spindle. Since the attachment can be fastened at any horizontal angle about the main quill, the center of the attachment-spindle can be located, in such an instance, on the arc of a radius of 5 inches from the center of the main spindle.

This feature permits a conventional drill press to accommodate a larger piece of work than would be possible without the attachment. Also drilling of holes in various locations between 3 and 13 inches from the pedestal of the conventional main drill having the drill spaced 8" from its pedestal, may be accomplished without relocating the work piece. The quill 12 of the attachment-drill has a rack 13 and pinion 14. The teeth of the rack have a fine pitch. The pinion is manually operated

by a hand wheel **15** and by handles **15***a*. The quill **12** slides within frame **10** vertically. With the quill **12** again are located two high-speed ball-bearings **16** and **16***a*, which are press-fitted on the enlarged lower end of spindle **6**. Lubricating means **17** are provided. The lubrication of the top ball-bearings **7** is provided through oil cap **18**. An upper spindle cover is shown as **19**. The oil cup is placed in the terminal opening **18***a*. A protective belt cover **21** surrounds the assembly. A retaining collar **23** holds ball bearing **16** in place.

Referring to Figure 2, stop depth gauge collar **24** is fastened to the quill **12** and a stop depth gauge locking bolt **24***a* is provided. The depth gauge column **25** is used to adjust the depth of drilling in a fixed position. The depth gauge column retaining nuts are shown as **26***a* and **26***b*. Plate **27**, fastened to the top of the column serves as a depth indicating pointer. A screw **27***a* holds the pointer to the depth gauge column. The depth to which the attachment will operate is controlled by the position of the depth limiting clamp **28**. This clamp is adjusted in position on the column **25** and locked to the column by the locking handle **29**. Since the column **25** is attached to the quill **12**, it must move with the said quill when the wheel **15** is rotated. When the depth limiting clamp strikes the projection **10***e* on the frame, the downward motion of the quill **12** is stopped. The vertical distance which the quill moved is indicated by the pointer on a depth gauge indicator plate **30**, which is fastened to frame **10** by rivets **30***a*. The depth gauge unit is shown in Figures 1, 2 and 3, and has the function of limiting the depth of penetration of the drill. Handwheel **15** is mounted on pinion shaft **14***a* and is held in place by washer **32** and locking nut **31**.

Torsion-spring **34** is fastened to the pinion **14** for the purpose of balancing the weight of the quill, spindle, and chuck, and for automatically returning the quill **12** to its uppermost position. A torsion-spring housing **33** is provided for protection and for adjustment of the torsion-spring. A washer **35** with nuts **36** secures the pinion shaft and torsion spring in position.

One end of the torsion-spring is fastened to the pinion shaft **14** and its other end is attached to the spring housing **33**. Tension of the spring is controlled by turning the spring housing like a knob. Projecting keys **45** on frame **10** engage corresponding slots in the spring housing. See Fig. 2. Thus the torsion spring tension can be set and changed at will and the housing locked in position by loosening nuts **36** and re-tightening after adjustment of the housing.

The function of the belt idler unit, shown in Figures 1, 3, 4, and 5 is to control the tension of the flat belt **11**. The flat belt prevents creation of excessive heat. The belt idler unit runs on idler shaft **40** which is inserted in slot **46** provided in frame **10**. The idler shaft **40** has two flat sides in way of the slot and parallel to the sides of the slot so that the shaft may be translated in and along slot **46** but cannot rotate herein. The tensioning is accomplished manually by moving the belt idler unit with handle **47**. A pulley ring **41** is pressed over the ball bearing housing **42** and thus provides a wider surface for engaging the driving belt. The ball-bearing housing **42** is pressed onto the idler shaft **40**. A washer **43** in conjunction with screw **44** helps to retain the ball-bearing housing on the idler shaft.

A flinger **37** is provided to prevent dirt, metal chips or other impurities from entering quill **12** and from damaging ball bearings. The chuck of the drill-press-attachment is shown at **38**.

The high speed spindle **6** and all high speed parts are to be balanced after assembly.

From the above description and drawings, additional alternative improvements will become obvious to those skilled in the art:

Optionally, a drill chuck shown as **44**, may be added to a bushing of the driving pulley and the attachment of the present invention may be kept on the main drill continuously. Thus large and small holes may be drilled at will without making changes to the attachment. The attachment may be provided with means to fold it by including a hinge and clamp arrangement for a vertical folding motion. Thus it could be folded out of the way and provide space for use of the main drill without dismantling the attachment.

As a summary it is stressed that, contrary to all experiences of the prior art, this invention utilizes a conventional multiple low-speed drill press such as from ½" to 1", up to 5,000 r.p.m., more or less, as a driving unit of, and in combination with, a novel sensitive multiple-high-speed, minimum-weight and fine-mechanics drill press sensitive attachment of a small bore of 3/16" and less and with an r.p.m. of 20,000 more or less.

While only a preferred embodiment of the invention has been shown in the annexed drawings and described in the specification above, it is contemplated to cover any variations, changes and modifications of the example of the invention herein chosen for the purposes of the disclosure, which do not constitute departures from the spirit and scope of the invention set forth in the appended claims.

What I claim is:

1. A high-speed drilling attachment to a conventional multiple-low-speed drill press functioning as a main drill and including a quil and a power-driven spindle journaled in the quill for rotation on a fixed axis comprising, in combination, a radial-arm frame including means integral therewith releasably clamping said frame to the quill of said main drill, the distal end of said frame having upper and lower spaced bores having a common axis parallel with and radially offset from said fixed axis, said upper bore being split, an upper bushing fitting said upper bore to be axially adjustably clamped therein and having a downwardly-facing counterbore, a lower bushing fitting the upper end of said lower bore, a quill axially translatably fitting said lower bore below said lower bushing, a spindle having a lower cylindrical portion journaled in said quill, and an upper splined portion of reduced diameter, upper and lower anti-friction bearings each including inner and outer races, the outer race of said upper bearing having a press fit within the counterbore of said upper bushing, the outer race of said lower bearing having a press fit in said lower bushing, a driven pulley having integral coaxial sleeves extending centrally from the respective sides thereof, each sleeve fitting and journaled in the inner race of a respective one of said bearings, said driven pulley having a maximum diameter less than said upper bore, and key means fixed with said pulley within the bore thereof and slidably fitting the splines of said spindle.

2. The combination as recited in claim 1, a driving pulley removably fixed to the lower end of the spindle of the main drill press, a flat belt connecting said pulleys, an idler pulley, and means mounting said idler pulley on said frame for engagement with said belt and for adjustment toward and from the common plane of said axes.

3. A high-speed drilling attachment to a conventional multiple-low-speed drill press functioning as a main drill and including a main quill and a power-driven spindle journaled in the main quill for rotation on a fixed axis and for axial translation as a unit with said main quill, comprising, in combination, a radial-arm frame having a split main bore sized to have a smooth fit about said main quill, clamping means carried by said frame to contract said main bore and releasably fix said frame with said main quill, there being a second bore in the distal end of said frame and comprising upper and lower axially-spaced portions, first and second bushings each fitting a respective portion of said second bore, upper and lower antifriction bearings having outer races press-fitting a respective one of said bushings to define a common axis

parallel with and radially offset from the axis of said power-driven spindle, an axially-apertured driven pulley between said bearings and having integral oppositely-disposed sleeve-like extensions fitting the inner race of each said bearing, respectively, a second quill fitting the lower portion of said second bore for axial translation therein, a second spindle journaled in said second quill and passing centrally through said pulley, a spline connection between said pulley and second spindle, and a driving pulley rigidly connected with said power-driven spindle coaxially thereof and in coplanar relation with said driven pulley.

4. A high-speed drilling attachment to a conventional multiple-low-speed drill press functioning as a main drill and including a main quill and a power-driven spindle journaled in the quill for rotation on a fixed axis comprising, in combination, a radial-arm frame having first and second laterally-spaced parallel bores, said first bore being split and smoothly fitting about said main quill, clamping means carried by said frame to contract said first bore and unitize said main quill and frame, said second bore being in the distal end of said frame and comprising upper and lower axially-aligned spaced portions first and second bushings each fitting a respective portion of said second bore, upper and lower anti-friction bearings

including outer races press-fitting a respective one of said bushings to define a common axis parallel with the axis of said power-driven spindle, an axially-apertured driven pulley between said bearings and having integral, oppositely-disposed sleeve-like extensions fitting the inner race of each said bearing, respectively, a second quill mounted within the lower portion of said second bore for axial translation therein, a second spindle having a main portion and an upper end portion of reduced diameter, bearings journaling the main portion of said spindle within said second quill for axial translation as a unit therewith, a spline connection between said driven pulley and the reduced upper end portion of said second spindle, a driving pulley rigidly connected with the lower end of said power-driven spindle, said pulleys being coplanar for direct belt connection.

References Cited in the file of this patent

UNITED STATES PATENTS

850,204	Baumeister	Apr. 16, 1907
1,416,777	Bayrer	May 23, 1922
2,072,646	Ocenasek	Mar. 2, 1937
2,396,733	Wiken et al.	Mar. 19, 1946