

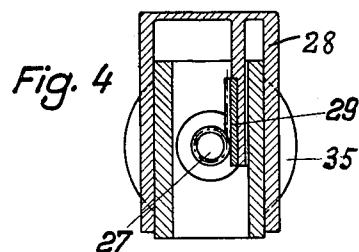
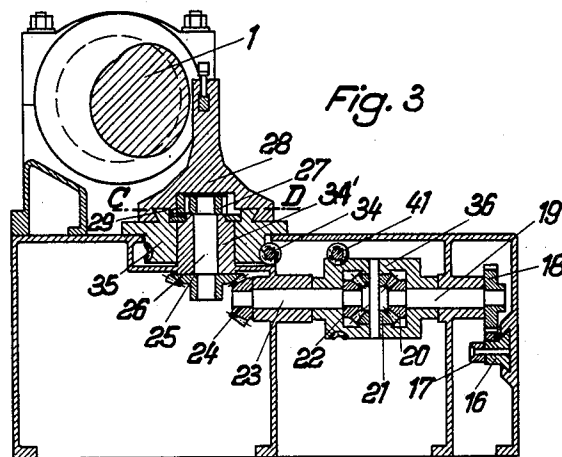
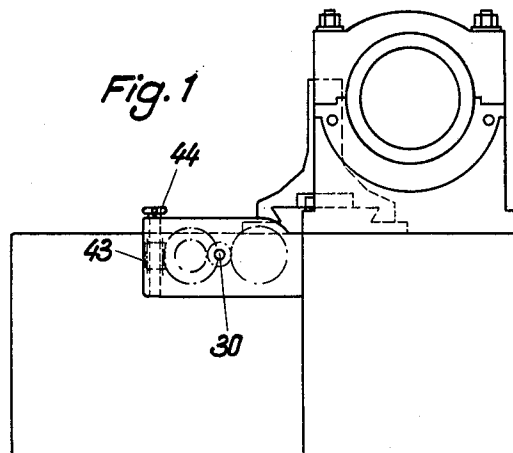
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2 Sheets-Sheet 1



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2 Sheets-Sheet 2

Fig. 2

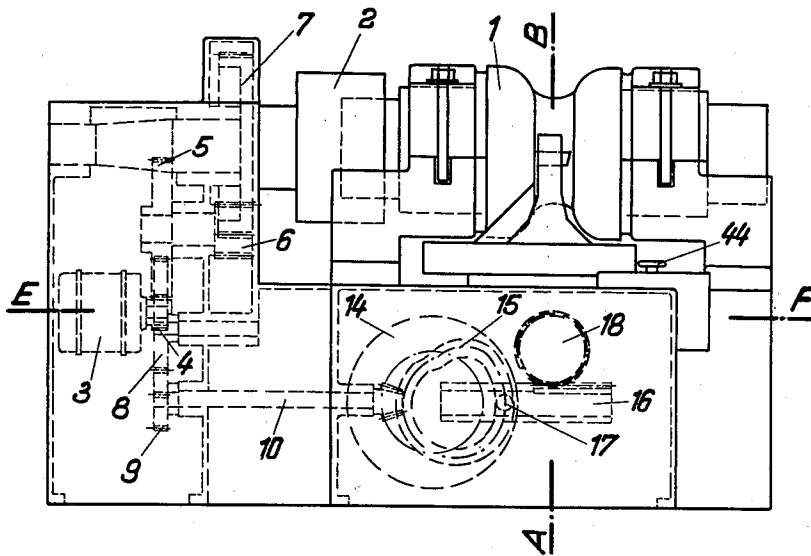
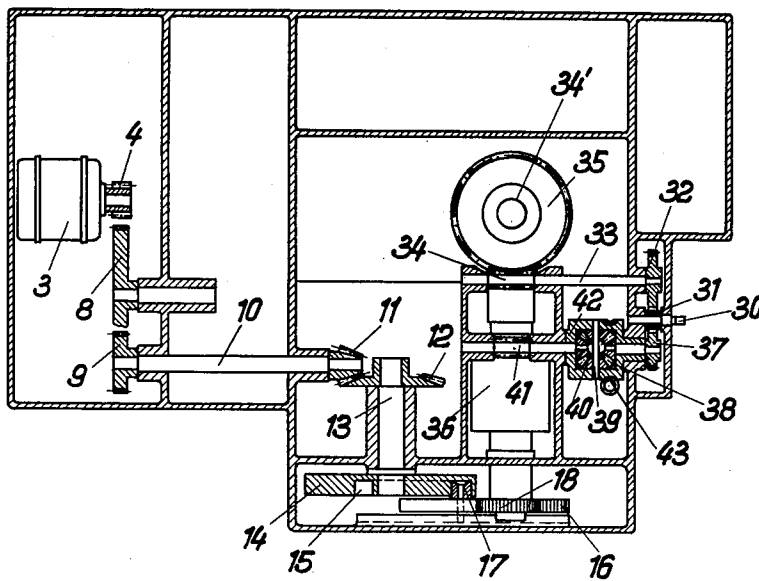


Fig. 5



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This invention relates to lathes, and relates more particularly to lathes for the shaping of non-circular bodies and particularly of grooved rolls for use in mills of the pilgrim step type. Still more particularly, it relates to a mechanism for lathes of this type to adjust the cutting depth.

In the known lathes of this type the adjustment of the cutting depth is attained by means of a worm gear spindle which is supported in the uppermost slide of the lathe support, the internal thread of said spindle being directly located in the displaceably mounted tool holder.

In order to prevent an unintentional displacement of the tool holder caused, for instance, by vibrations occurring during the lathe operation, the tool holder must be fixed by set screws or like means. Since in the operation of these lathes the upper slide is rotated together with the tool holder through 180° the spindle and the clamping device are rendered inaccessible in the initial and the end positions of the slide by the supporting stands, which are located above the slide. Consequently, with the customary lathes the cutting depth can only be adjusted in such a manner that first the entire upper slide is retracted, thereupon the slide driving rotary member is moved into a suitable position for the operation of the tool holder, thereupon the tool holder is again returned to its initial position and finally, the upper slide is returned to the center of the grooved roll. This large number of operations causes a considerable consumption of time and work, which raises the operating costs and reduces the operative economy of the lathes.

It is accordingly among the objects of this invention to eliminate this disadvantage and to greatly improve the working efficiency of the lathe.

With these and further objects in view, which will become apparent as this description progresses, the invention will now be described with reference to the accompanying drawings illustrating a particularly advantageous embodiment thereof. In the drawings,

Fig. 1 is a side elevational view of a lathe in accordance with the invention;

Fig. 2 is a front elevational view thereof;

Fig. 3 is a vertical sectional view taken on line A—B of Fig. 2;

Fig. 4 is a horizontal sectional view taken on line C—D of Fig. 3; and

Fig. 5 is a horizontal sectional view taken on line E—F of Fig. 2.

As apparent from the drawings, a disc 2, Fig. 2, which rotates the grooved pilgrim-step roll 1, is driven by a motor 3 through the intermediary of gear pairs 4, 5 and 6, 7. A further gear 8 (Fig. 5) is in mesh with the gear 5; the gear 8 drives a cam 14 that is supported on a shaft 13, through the intermediary of a gear 9 that meshes with the gear 8, a shaft 10 and a bevel gear drive 11, 12; the gear 12 is secured to the shaft 13. The cam 14 is provided with a groove 15; a roller 17, which is connected to a rack-slide 16, is guided in the groove 15; the roller 17 imparts to the rack-slide 16, that is displaceably lo-

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cated in suitable guides of the machine frame, a reciprocable motion. The reciprocative movements of the rack-slide 16 are transmitted through a gear 18 to a shaft 19 (Fig. 3), which is located in the machine frame, and from here over pinions 20, 21, 22 and a shaft 23 to a pair of bevel gears 24, 25. The forces are thence transmitted over a shaft 26 to a pinion 27 (Figs. 3 and 4) which meshes with a rack 29 that is fixed upon a tool holder slide 28.

The rotary feed movement of the tool holder 28 may be imparted by a spindle 30 (Figs. 1 and 5), which may be rotated by a hand wheel not shown, and is transmitted from the spindle 30 through gears 31 and 32, and a shaft 33 to a worm 34, that is keyed to the shaft 33, which drives a rotatable platform 35, the latter being provided with a corresponding worm gearing and journaled on a pin 34' of the machine frame. The platform 35 is provided with guiding means, such as dovetail members for displaceably supporting the tool holder slide 28.

The pinion 27 which cooperates with the rack 29 receives, in addition to the movement imparted to it by the rack-slide 16, the same angular velocity that is imparted to the platform 35 by means of a differential gear arrangement consisting of the bevel gears 20, 21, 22 and the casing 36 thereof; the casing 36 furthermore is driven by the spindle 30 through the intermediary of the gears 31 and 37, and a differential arrangement including bevel gears 38, 39 and 40 and by a worm 41.

The adjustment of the cutting depth is effected by the differential gear arrangement consisting of the bevel gears 38, 39, 40 and a housing 42 thereof; for this purpose, there is provided a worm 43 (Figs. 1, 2, and 5) which meshes with a worm gearing on the exterior of the housing 42 and which may be rotated by a hand wheel 44; thereby in addition to the radial reciprocable movement, a further movement is imparted to the tool holder 28, by means of the worm 41, as impressed on the housing 42 by the worm 43.

The cutting depth is adjusted by turning the hand wheel 44, which in turn rotates the worm 43 and the housing of the differential gearing 38, 39, 40 and 42. The adjustment of the cutting depth is made by the operator once before the particular cutting thereon of the lathe. However, in order to complete an entire work piece 1, it may be necessary to have a succession of several cutting runs at the beginning of each of which the cutting depth may be adjusted by means of the hand wheel 44.

In the lathe forming the subject matter of the invention the driving members normally used for the feeding movement are simultaneously employed for the adjustment of the cutting depth; in this manner, the manufacturing costs of the lathe are kept at a low rate in spite of the above described great advantages.

The described differential gear arrangement provided with bevel wheels may be replaced by a planetary gear; moreover, the rack-slide 16 may be arranged to coast with the casing 36 and the feed drive to act upon the gear 18.

It will be apparent to those skilled in the art that the novel principles of the invention disclosed herein in connection with specific exemplifications thereof will suggest various other modifications and applications of the same. It is accordingly desired that in construing the breadth of the appended claims, they shall not be limited to the specific exemplifications of the invention described herein.

Having thus described the invention, what I claim as new and desire to be secured by Letters Patent, is as follows:

1. In a lathe for machining a rotatable work piece, a rotatable platform, a radially displaceable tool holder

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slide guided on said platform, a rack connected to said slide, a pinion meshing with said rack for reciprocally driving said tool holder slide, a movable cam, driving means operable for moving said cam at a speed proportional to the rotational speed of the work piece to synchronize the rotation of the work piece cyclically with the reciprocation of said slide, a follower for said cam operatively positioned for reciprocating said pinion to oscillate said slide throughout a predetermined stroke during each revolution of the work piece, transmission means intermediate the cam follower and the pinion comprising a first differential gearing arrangement, feeding means operable for simultaneously rotating said platform and superimposing on said first differential gearing arrangement an additional rotational movement, whereby said pinion may be rotated simultaneously with said platform, said feeding means including a second differential gearing arrangement, and a rotatable element in driving connection with said second differential gearing arrangement and operable to impress an additional movement thereon to be imparted to said pinion for adjusting the cutting depth for the tool relative to said work piece.

2. In a lathe as claimed in claim 1, said first differential gearing arrangement having a housing, said feeding means being in driving connection with said housing for rotating the same, thereby superimposing an additional rotational movement to the output of the first differential gearing arrangement, said second differential gearing arrangement having a casing, said rotational element being in driving connection with said casing.

3. A lathe for machining a rotatable work piece, hav-

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ing a rotatable platform, a tool holder slide radially displaceable and guided on the said platform, a toothed oscillatable rack connected to the said slide, an oppositely turnable pinion meshing with the said rack for oscillating the same and thereby the said slide, means for synchronizing the rotation of the work piece cyclically with the oscillations of the tool slide including a cam revolving synchronously with said work piece, a follower for said cam positioned for imparting to the tool holder slide a reciprocating movement throughout a predetermined stroke during each revolution of the work piece, transmission means interconnected between said cam follower and the said pinion and comprising a first differential gearing arrangement including a rotatable housing, feeding means for simultaneously rotating the said platform and the said housing, whereby the said pinion may be rotated synchronously with the said platform, said feeding means comprising a second differential gearing arrangement, and a rotatable element operable for impressing an additional rotational movement to said second differential gearing arrangement to be transmitted thereby to said pinion for adjusting the cutting depth of the tool relative to the work piece.

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