Nov. 24, 1959 A. BECHLER 2,913,807

DRILLING AND TAPPING ATTACHMENT ON AUTOMATIC LATHE

Filed Nov. 19, 1957 2 Sheets-Sheet 1

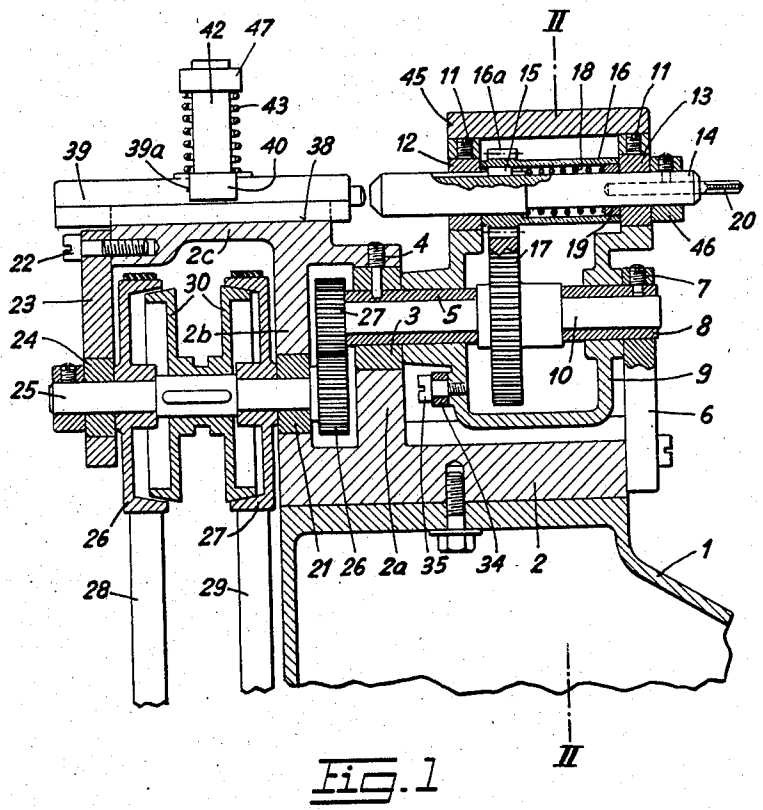


Fig. 1

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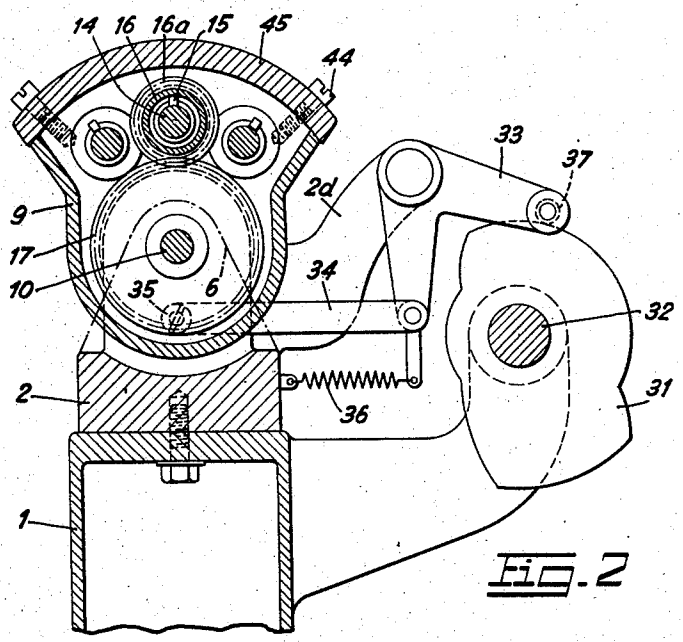


Fig. 2

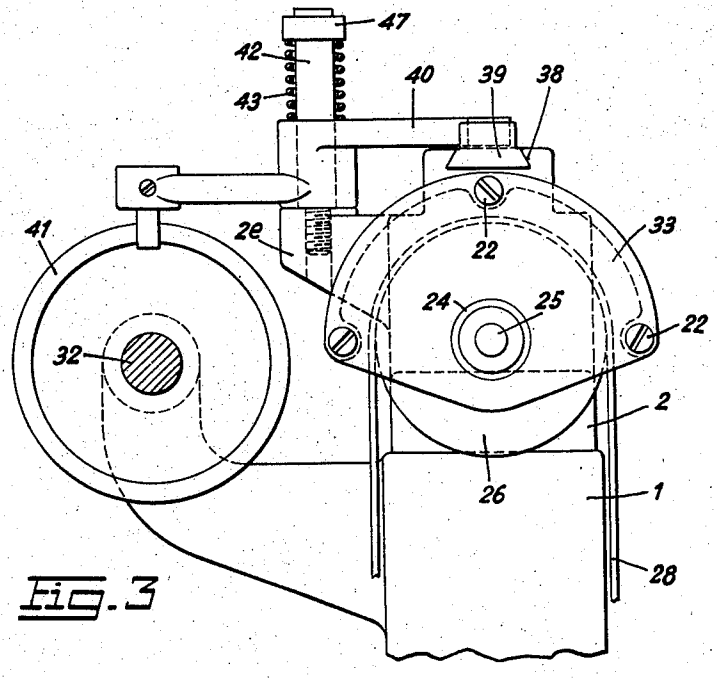


Fig. 3

United States Patent Office 2,913,807 Patented Nov. 24, 1959

2,913,807

DRILLING AND TAPPING ATTACHMENT ON AUTOMATIC LATHE

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Application November 19, 1957, Serial No. 697,379

Claims priority, application Switzerland June 25, 1957

2 Claims. (Cl. 29—41)

My present invention relates to a drilling and tapping attachment on an automatic lathe, in which a gang of working spindles are mounted on a swing rest in a rotary and longitudinally movable relation and are rotatable by means of a jack shaft which is coaxial with the swivel axis of said rest.

In such attachments, space is very limited so that in known constructions, in which on the jack-shaft rear portion are mounted two pulleys rotating in opposite sense and a clutching device for clutching the jack shaft to one or the other of said pulleys, the space in the rear of said spindles is blocked. The means for longitudinally moving the working spindle which is in the operative position, thus have to engage same laterally and, therefore, exert an eccentric force. In view of the play which never can be entirely avoided, there readily arise changes in position and vibrations which render it impossible to satisfy the steadily growing requirements as to accuracy and quiet run.

My invention aims to overcome said disadvantages of known constructions by mounting a drive shaft, which is superposed to said jack shaft and parallel thereto, rotatably about a stationary axis, on a bearing bracket affixed to the lathe bed and carrying the swing rest, said axis being situated beyond said jack shaft with respect to the work spindle which is in operative position, and further by providing, on a portion of said bracket situated above the drive shaft, a guide track for a ram disposed in the continuation of said spindle, said ram acting directly on to the latter's rear end which projects from the swing rest, for the purpose of moving said spindle. I attain this and related objects by the arrangement shown, in one form and by way of example, in the drawing, in which:

Fig. 1 is a longitudinal section,

Fig. 2 shows a cross-section on the line II—II of Fig. 1, and

Fig. 3 is a side view.

A bearing bracket **2** is affixed to the rear portion **1** of the bed of an automatic lathe. In a crosswall **2***a* of said bracket is fixedly seated a bushing **5** by means of an intermediate ring **3** and a threaded pin **4**. Another bushing **8** is seated by means of a threaded pin **7** in a plate **6** secured to the front face of bracket **2**. On these two bushings **5**, **8** of which the common axis is parallel to the main axis of the lathe, a swing rest **9** and a jack shaft **10** are mounted rotatable but otherwise immovable. In three pairs of bores of rest **9**, which are equidistant from the axis of the bushings **5** and **8**, i.e. from the pivotal axis of said rest, bushings **12** and **13** are located by means of threaded pins **11**. In each bushing pair is mounted a working spindle **14** in rotatable and longitudinally movable relation but is prevented by a slide key **15** from rotation in a sleeve **16** which surrounds the spindle and is axially locked between the respective bearing bushings. Sleeve **16** has a rim gear **16***a* which in any position of swing of rest **9** meshes with a spur gear **17** fixed to jack shaft **10**. Between spindle **14** and sleeve **16** is inserted a compression spring **18** which is supported on a ring **19** fixed to the sleeve front portion and acts against a shoulder on the spindle to force same rearwardly.

In one or the other sleeve **16**, rim gear **16***a* could be omitted, and as known the appurtenant working spindle could be secured against rotation for example by an extension of pin **11** engaged in the spindle keyway. Such gearless working spindle would be provided with a common drill, while the rotating working spindles mostly carry a tap such as **20**.

A rear crosswall **2***b* of bracket **2** is provided with a bore of which the axis is situated in the vertical plane of the bushings **5**, **8** but below the latter and in which is seated a bearing bushing **21**. To the rear face of a rearward tunnel-like extension **2***c* of rest **2** is secured by screws **22** a plate **23** in which is fixed a bearing bushing **24** coaxially to bushing **21**. In the bushings **21**, **24** is rotatable an axially immovable drive shaft **25** to the forward end of which is fixed a spur gear **26** which meshes with a spur gear **27** fixed to the rear end of jack shaft **10**. On shaft **25**, further, are mounted loosely rotatable two pulleys **25***a*, **25***b* which are driven in opposite senses by means of an electric motor, a gearing unit and two belts **28**, **29**. Between the latter is fastly mounted a clutch plate **30** on shaft **25**, which coacts mechanically or electromagnetically with either pulley.

Actuation of swing rest **9** for the purpose of aligning one or the other of the working spindles **14** with the lathe main axis is effected, in a manner known, by a cam **31**, which is fixedly mounted on a control cam shaft **32** of the lathe, through a bell crank **33** pivoted on an arm **2***d* of bracket **2**, and through a link **34** pivoted on a threaded pin **35** to rest **9**. A spring **36** tends to draw the follower **37** carried by bell crank **33** into abutment against cam **31**.

The tunnel-like portion **2***c* of bracket **2** is provided on top with a guide track **38** for a ram **39** aligned with the lathe main axis, i.e. with the working spindle **14** which at the time is in operative position. In a recess **39***a* is engaged the enlarged end of a two-arm lever **40** of which the other end abuts against the control face of a bell cam **41** fixedly mounted on shaft **32**. Lever **40** is pivoted on a vertical stud **42** to an arm **2***e* of bracket **2**. Between lever **40** and a set collar **47** fixed to the upper end of stud **42** is coiled a compression spring **43** against the action of which lever **40** is raisable. When lever **40** is in the raised position, ram **39** may be readily moved rearwardly out of track **38** so as to very materially facilitate the interchange of the spindles **14**. For such interchange, a cover **45** of swing rest **9** is removed by loosening screws **44**, and the working spindle which occupies the operating position is withdrawn rearwardly after loosening the screw of an appurtenant set collar **46**, whereupon another spindle **14** is inserted from the rear.

When the drilling and tapping attachment is in operation, the arrangement described of ram **39** affords the advantage that the force required for feeding the working spindle **14** is acting on to the latter along the axis of rotation thereof and has no radial component.

The particular arrangement of ram **39** has been rendered possible by arranging the drive elements **26**, **27** and **30** on a drive shaft **25** of which the axis is situated, with respect to the working spindle in the operative position, beyond, i.e. below, jack shaft **10**. Aside of the advantages mentioned, I attain further a very compact construction of the entire attachment.

What I claim is:

1. In an automatic lathe a drilling and tapping attachment having a rotatably mounted tool-holding, multiple-spindle carrier having a plurality of rotatable working spindles, and angularly rotatable for selectively positioning the working spindles separately and individually in

a common work position corresponding to a work station for effecting work on a workpiece, said carrier having an axis of rotation, a jack shaft coaxial with said axis and operably connected to at least one of said working spindles, the improvement which comprises, a bearing block pivotally mounting the carrier, a plunger disposed coaxially with said spindles when they are in said work position and movable axially into out of engagement with said spindles for moving the spindles in a direction corresponding to a direction for effecting work on said workpiece, a guide track slidably mounting said plunger in said coaxial position, said block having a portion supporting said guide track, a drive shaft, operably connected to the jack shaft disposed in fixed position and rotatably mounted on said block below said plunger at a distance therefrom, the pivotal axis of the carrier being disposed in a horizontal plane intermediate the plunger and the drive shaft.

2. In an automatic lathe a drilling and tapping attachment according to claim 1, including a post on said block, a two-arm lever pivotally mounted on said post for angular, upward and downward movement thereon, said plunger having a recess for releasably receiving one of said arms, a spring constantly biasing said lever downwardly into a position engaging the recess, a driven bell cam cooperative with the other arm of said lever for angularly displacing the lever to displace said plunger longitudinally.

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