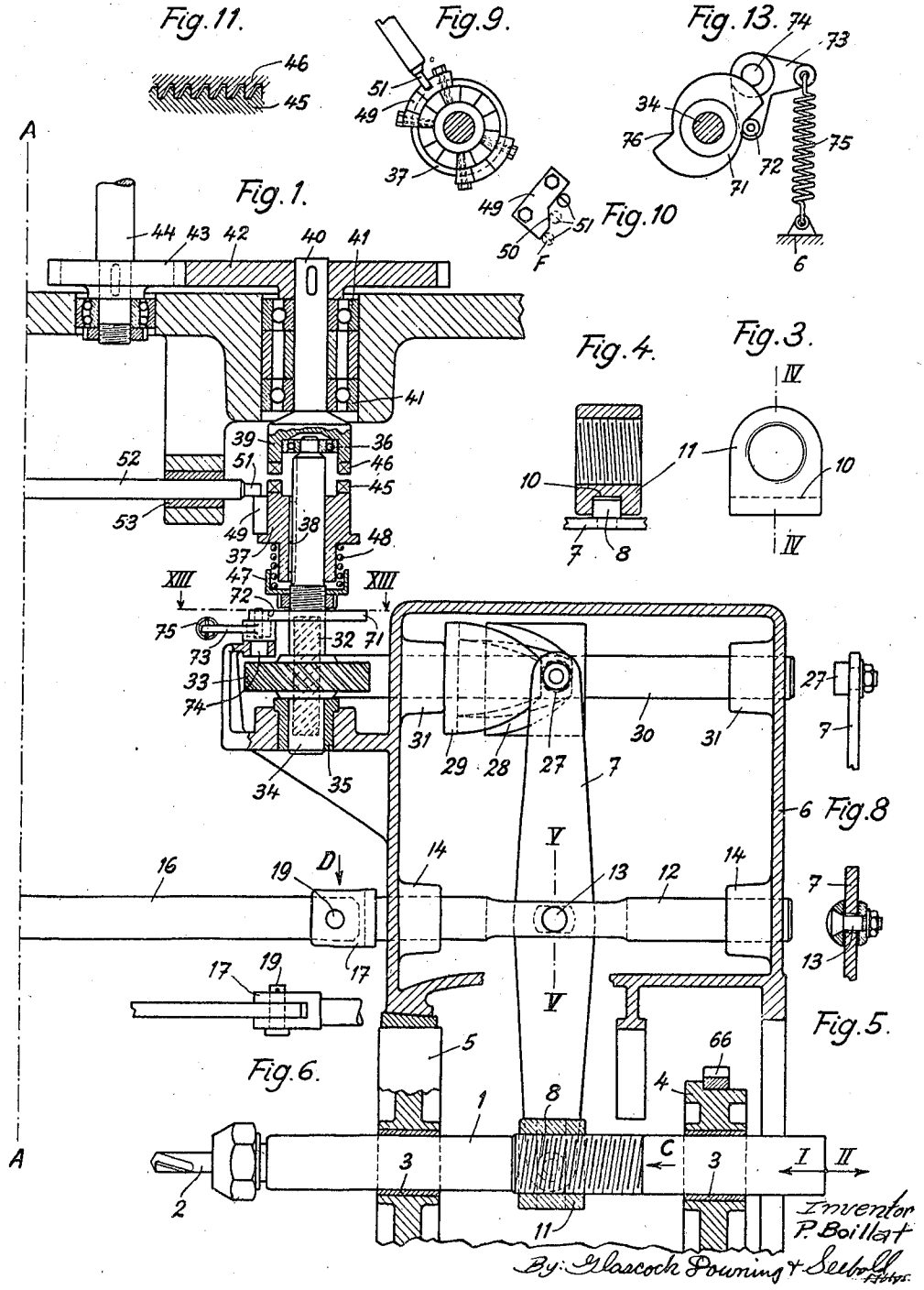
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Fig. 7.

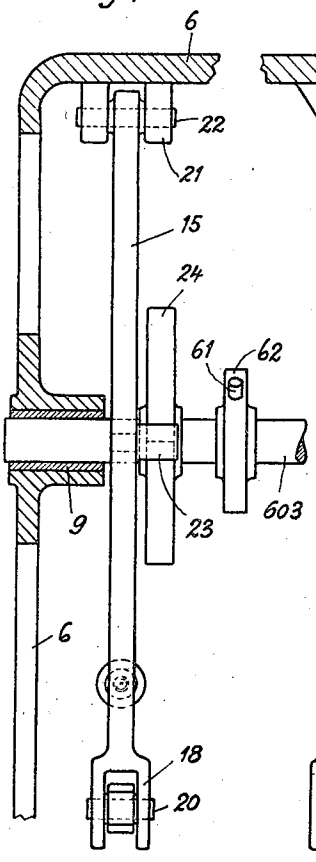


Fig. 2.

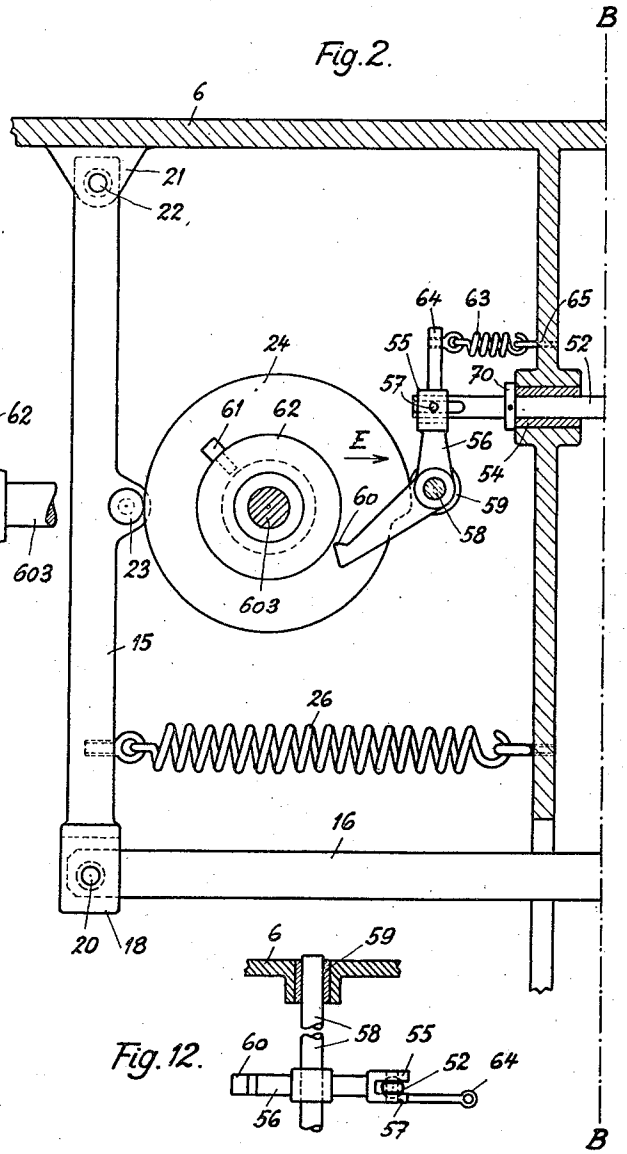


Fig. 12.

Inventor
P. Boillat

By: Glascock Downing & Seebold
Attys.

Patented June 16, 1942 2,286,457

UNITED STATES PATENT OFFICE

2,286,457

AUTOMATIC LATHE

Philippe Boillat, Tavannes, Switzerland, assignor to the firm Tavennes Machines Co. S. A., Tavennes, Switzerland, a joint-stock company of Switzerland

Application October 24, 1940, Serial No. 362,664
In Great Britain October 30, 1939

6 Claims. (Cl. 29—39)

This invention relates to automatic lathes.

In the usual types of automatic lathes the same cams drive the tools during the productive and the unproductive period. In order to diminish the latter; also called the dead time, the cams rotating at a lower speed during the productive period must, therefore, be accelerated and afterwards retarded. This fact has great disadvantages, as is well known to experts.

I use another principle in which two series of cams are provided, one for the productive and the other for the unproductive motion of the tools. The first series is driven at a constant speed, while the cams of the other series produce an unproductive motion with a speed higher than that of the productive motion. The unproductive movement is preferably intermittent.

My invention has as its aim to provide an advantageous constructive development of the said principle which allows of the reduction of the number of the structural parts to a minimum.

Other objects and features will be apparent as the following description proceeds, reference being had to the accompanying drawings in which—

Fig. 1 is a section of a part of the mechanism, showing a rocking member, a supporting member and a cylinder comprising a cam path engaging a fulcrum piece on said rocking member and a disengaging coupling adapted to drive said cylinder intermittently;

Fig. 2 is a section corresponding to that of Fig. 1, but of the other elements of the mechanism, such as a continuously driven cam disc for reciprocating the supporting member carrying the rocking member, and a control means for controlling the disengaging coupling.

Fig. 3 is a side view of the guide member shown in the direction of arrow C in Fig. 1.

Fig. 4 is a section taken on line IV—IV of Fig. 3.

Fig. 5 is a section taken on line V—V of Fig. 1.

Fig. 6 is a view in the direction of arrow D in Fig. 1.

Fig. 7 is a side view of the cam disc shown in Fig. 2 and of the lever cooperating with said disc.

Fig. 8 is a side view of a part of the rocking member.

Fig. 9 is a front view of the driven half of the coupling shown in Fig. 1.

Fig. 10 shows a plate carrying an inclined surface of the disengaging coupling.

Fig. 11 is a developed projection of the teeth of the coupling, engaging one another.

Fig. 12 shows a lever of the coupling-controlling means, seen in the direction of arrow E in Fig. 2.

Fig. 13 is a section taken on line XIII—XIII of Fig. 1.

The slidably arranged holder 1 of the tool 2 is mounted on the bearings 3. These bearings are, for instance, attached to the discs 4 and 5 of a rotatable tool box of a well-known structure. This tool box may be rotatably mounted on the frame 6 in a known manner, not shown in the drawing. The tool 2 is non-rotating. It might also be a rotating one. The rotating motion can then be transmitted to the tool holder with the aid of gear wheels in a manner well known to those skilled in the art. A rocking member formed as a rocking lever 7 is adapted to reciprocate the tool holder. For this purpose a pin 8 (or even a roller) is provided at one end of lever 7. This pin 8 enters the groove 10 of a guide member 11 (Figs. 3 and 4) threaded to the holder 1. The lever 7 is pivotally mounted on the rod 12 by means of the bolt 13 (Fig. 5). The rod 12 is arranged with allowance for sliding on the bearings 14, fixed to the frame 6. This rod 12 is connected with a rocking lever 15 by means of rod 16. This latter is pivotally fixed to the forked ends 17, 18 of the rod 12 and lever 15, respectively, by means of the bolts 19, 20 (Figs. 6 and 7). Rocking lever 15 is pivotally mounted, e. g. on frame 6 by means of the brackets 21 and the bolt 22. This rocking lever 15 carries a pin 23, or even a roller, adapted to cooperate with a cam disc 24 mounted on the camshaft 603 which, in its turn, is mounted on bearings 9 of the frame 6. Spring 26, attached to lever 15 and to a stationary point of the machine, presses the pin 23 against the cam disc 24. The camshaft 603 is, for instance, driven, by gear wheels and a motor not shown, at a constant speed, which only depends on the amount of production desired. In a preferred embodiment this camshaft carries all the cam discs continuously rotating at a constant speed. A pin 27, or a roller, is fixed to the other end of the lever 7 (Fig. 8). This pin 27 engages the cam path 28 of the cylinder 29 secured to shaft 30 mounted on the frame 6 by means of the bearings 31. The cylinder 29 with its cam path 28 is adapted to rotate intermittently at such a speed so as to move the tool 2 quicker than is done by the cam disc 24. The driving mechanism for the periodical motion of the cylinder 29 may be as follows:

Helical gear 32 mounted on shaft 30 meshes helical gear 33 whose shaft 34 is journaled on the bearings 35 and 36. The half 37 of a toothed

coupling is slidably attached to the shaft 34 by means of the key 38. The other half 39 of the coupling is mounted on the shaft 40 journaled on the bearings 41. Shaft 40 carries gear wheel 42 meshing gear wheel 43 on the shaft 44 to which a constant speed is transmitted from a motor not shown by insertion of gearings not shown. Each half of the coupling has a toothed rim comprising teeth 45, 46, respectively, cooperating with one another (Fig. 11) when the coupling is shrown in. A collar 47 is threaded to the shaft 34 and a spring 48 is provided between collar 47 and half 37, tending to throw the teeth 45 and 46 into gear with one another by shifting the half 37. Two plates 49 with an inclined surface 50 (Fig. 10) are screwed to the half 37. The upper face of these plates 40, comprising the surface 50 is adapted to cooperate with the stop 51 forming one end of the rod 52 mounted, with allowance for sliding, on the bearings 53, 54.

To this rod 52 the forked end 55 of the rocking lever 56 is pivotally fixed by means of a bolt 57 (Fig. 12). Lever 56 is pivotally mounted on the shaft 58 journaled on bearings 59 of the frame 6. The other end 60 of the rocking lever 56 is adapted to cooperate with a driver 61 attached to the disc 62 mounted on the camshaft 603. A spring 63 connecting an arm 64 attached to lever 56 with a stationary point 65 of the machine is provided to keep the stop 51 in engaging position. In order to avoid the end 60 of the lever 56 being constantly pressed against the disc 62 a washer 70 is secured to the rod 52, limiting the right-hand motion (Fig. 2) of this rod and thus of lever 56.

So that the rotation of cylinder 29 is stopped when the teeth 45 and 46 of the coupling are disengaged, a cam disc 71 is fixed to the shaft 34 (Fig. 13). This cam disc cooperates with a pin or roller 72 attached to one end of the rocking lever 73 mounted on shaft 74. A spring 75 fixed to the frame 6 and to the other end of lever 73 presses pin 72 against the cam disc 71. The hollows 76 of the cam disc 71 correspond to the position F of the stop 51 shown in Fig. 10. In this position the teeth are disengaged. The pressure with which pin 72 is pressed into the hollow 76 by means of the spring 75 thus suffices to stop shaft 34 and cylinder 29.

The elements shown in Fig. 1 lie preferably in the one end of the machine, while the elements shown in Fig. 2 are located in the opposite end of the machine. Rods 16 and 52 then pass through the middle part of the machine lying between the dotted lines A—A and B—B.

The action of the mechanism described is as follows: Supposing the tool has previously been brought into the position necessary to begin the working on the work piece. In this position the coupling is disengaged and the cam path carrier or cylinder 29 constituting an intermittently driven driving means stopped. Cam path carrier or cam disc 24 constituting another driving means rotating at a constant speed in an anti-clockwise direction imparts to the tool 2 a feed motion in the direction shown by arrow I in Fig. 1. Pin 27 is, in this case, the stationary pivot of lever 7. As soon as the feed motion is finished, the continuously driven control means consisting, in this example, of the driver 61 on the disc 62, swings lever 56 in an anti-clockwise direction against the effect of spring 63; rod 52 (Figs. 1 and 2) is moved to the left whereby stop 51 disengages one of the plates 49, so that the teeth 45 of the half 37, under the effect of spring 48, engage the teeth 46 of the half 39. Cylinder 29 is now rotated at such a speed that the return movement of the tool in the direction shown by arrow II (Fig. 1) is performed quicker than the feed motion so that the lost or unproductive time is reduced to the smallest amount possible. During this period, bolt 13 is the center of the motion of lever 7. When the return movement has to be stopped, the inclined surface 50 of the other plate 49 knocks against the stop 51 (in Fig. 10 stop 51 is shown in different positions), half 37 is pushed downwards (Fig. 1) against the effect of spring 48 and the teeth 45 are thus brought out of gear with the teeth 46 of half 39 and the cylinder 29 is stopped by means of the stopping device shown in Figs. 1 and 13. Half 37 has made half a revolution.

As soon as tool 2 is out of reach of the work piece the revolving tool box is rotated, for instance, with the aid of well known means acting on a toothed rim 66 (Fig. 1) on the disc 4, until another tool for the following stage of operation lies in front of the work piece. In the meantime, cam disc 24, lever 15 and rods 12 and 16 have reached their outgoing position for the feed motion of said following tool.

The cam disc 24 illustrated in Fig. 2 has only one cam. It, therefore, imparts per revolution only one forward motion to the tool or, if several tools are provided, drives but one tool forward. The tool must, therefore, be returned only once per revolution of disc 24. The disengaging coupling must, therefore, be engaged only once per revolution of disc 24. Thus only one driver 61 must be provided on disc 62. Be it, however, presumed that, e. g. six tools should work during one revolution of disc 24, then six cams should be provided on said disc 24 and, therefore, six drivers 61 on disc 62. The disengaging coupling would then carry out 3 revolutions during one revolution of disc 24. The number of cams on disc 24 and the number of drivers 61 on disc 62 may thus vary according to the machining desired of the work piece. However, the principle of the apparatus shown remains quite the same for any variation desired.

In the example described it is presumed that the tool is working during its whole feed and that, therefore, it is only advanced by rod 12. However, in working certain pieces the tool works only during a fraction of the feed motion, the rest belongs to the lost time. It is clear that, independent of the direction of the sliding motion of the tool, the latter is driven by the rod 12 during the productive period and, during the unproductive period, by the cam path 28 of the cylinder 29. The form of the cam path 28 varies according to the kind of machining desired.

It is understood that the drawing is only intended to show the principle and that the invention is not limited to the described and illustrated arrangement, as various changes both with regard to the arrangement and to the details may be resorted to without departing from the principle of the invention or sacrificing any of its advantages.

What I claim is:

1. In an automatic lathe, a tool holder, a rocking member adapted to reciprocate said tool holder, a movable supporting member to which said rocking member is pivotally attached, a fulcrum on said rocking member, a driving means adapted to reciprocate said fulcrum, a disengaging coupling adapted to drive said driving means in-

termittently, a continuously driven driving means adapted to reciprocate said supporting member, and a continuously driven control means adapted to control the engaging and disengaging of said disengaging coupling.

2. In an automatic lathe, a tool holder, a rocking member adapted to reciprocate said tool holder, a movable supporting member to which said rocking member is pivotally attached a fulcrum on said rocking member, a driven carrier comprising a cam path adapted to reciprocate said fulcrum, a disengaging coupling adapted to drive said driven carrier intermittently, a continuously driven member comprising another cam path adapted to reciprocate said supporting member, and a continuously driven control means adapted to control the engaging and disengaging of said disengaging coupling.

3. In an automatic lathe, a tool holder, a rocking member adapted to reciprocate said tool holder, a movable supporting member to which said rocking member is pivotally attached, a fulcrum on said rocking member, a driven carrier comprising a cam path adapted to reciprocate said fulcrum, a disengaging coupling adapted to drive said driven carrier intermittently, a continuously driven camshaft, a member mounted on said camshaft and comprising another cam path adapted to reciprocate said supporting member, and a control means mounted on said camshaft and adapted to control the engaging and disengaging of said disengaging coupling.

4. In an automatic lathe, a tool holder, a rocking member adapted to reciprocate said tool holder, a movable supporting member to wihch said rocking member is pivotally attached, a fulcrum on said rocking member, a driving means adapted to reciprocate said fulcrum, a continuously driven driving means adapted to reciprocate said supporting member, a disengaging coupling comprising a toothed driving half and a toothed, slidably arranged driven half, a spring adapted to press said driven half against said driving half, an inclined surface on said driven half, ascending in the direction of rotation of said driven half, a continuously driven control means, a stop adapted to be operated by said control means and to engage or disengage said inclined surface in order to push said driven half against the effect of said spring or to allow said spring to press said driven half against said driving half.

5. In an automatic lathe, a tool holder, a rocking member adapted to transmit to said tool holder productive and unproductive longitudinal motions, a movable supporting member adapted to drive said rocking member during the productive period and to provide the pivotal axis of said rocking member during the unproductive period, and a driving means adapted to drive said rocking member during the unproductive period and to provide the pivotal axis of said rocking member during the productive period.

6. In an automatic lathe, a tool holder, a rocking member adapted to reciprocate said tool holder, a movable supporting member to which said rocking member is pivotally attached, a fulcrum on said rocking member, a driving means adapted to reciprocate said fulcrum, a disengaging coupling adapted to drive said driving means intermittently, and a continuously driven driving means adapted to reciprocate said supporting member.

PHILIPPE BOILLAT.