PUBLISHED

MAY 4, 1943.

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DEVICE FOR ACTUATING AN AUTOMATIC LATHE, ESPECIALLY A SPAR BENCH

Filed Sept. 26, 1940

Serial No. 358,561

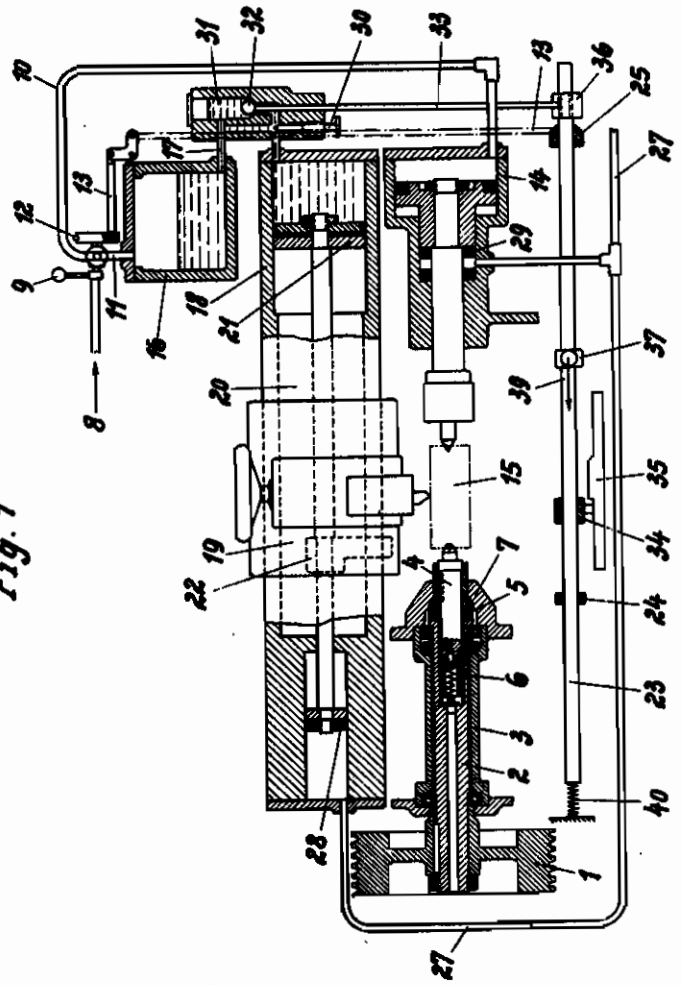

Fig. 1

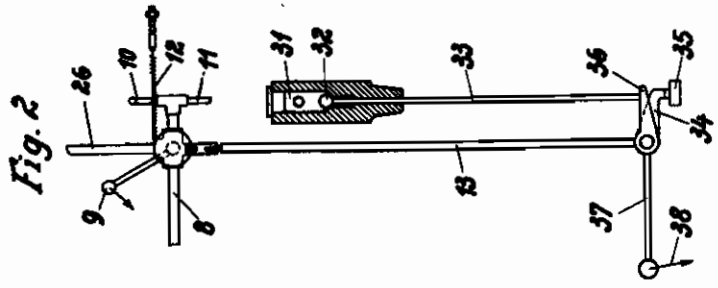

Fig. 2

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Published May 4, 1943 Serial No. 358,561

ALIEN PROPERTY CUSTODIAN

DEVICE FOR ACTUATING AN AUTOMATIC LATHE, ESPECIALLY A SPAR BENCH

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Application filed September 26, 1940

This invention relates to a device for the operation of an automatic lathe, especially a spar bench in which the tool carrier or the saddle slides on a round guide, that is of a spar bench, in which the gripping- and feeding arrangements are controlled or actuated pneumatically-hydraulically.

In the new automatic lathes a driving spindle or the like is employed, which revolves in known manner in a spindle sleeve and terminates in a clutch which engages with the tool catching device arranged separate from the spindle, for instance a rosebit catch head or the like, when the same is moved into the spindle sleeve. A spring or similar elastic element is interposed between the spindle and the rosebit head and compressed at the coupling and detends as soon as the pressure from the outer side ceases. Braking faces serve to stop the catch head or the like as quickly as possible.

The novelty of this known arrangement consists therein, that the engaging or disengaging takes place automatically at the putting-in or taking-out of the work.

The pneumatic-hydraulic drive is constructed as follows: A kind of two-way cock is provided, which at the engaging in one direction liberates from the feed conduit for compressed air or for a suitable other medium under pressure a conduit leading to the head stock cylinder and another conduit leading to a container filled with oil. The operating lever for the two-way cock is, in this engaging position, under spring tension but bolted, for instance by means of a pin or the like engaging in a corresponding recess of the operating lever.

In this manner the saddle begins to move simultaneously with the gripping of the work and the starting of the circulating movement.

The oil container is connected by a conduit with the shifting cylinder for the saddle or tool carrier so that immediately after the admission of the compressed air the forward feed of the headstock point and of the saddle starts. The saddle guides the tool with or without stencil along the work clamped in any suitable manner, for instance between the centres, until the turning proceeding is terminated. At the height of this point an adjustable stop is preferably arranged, against which the saddle runs directly or indirectly. The stop acts then, with interposition of suitable means, on the engaging lever for the admission of compressed air so that this lever closes and the admission of compressed air is interrupted. The stop is preferably arranged on a rod guided on the bed of the lathe and extending parallel to the axis of the tool carrier, this rod being shiftable in axial direction for a short distance. The saddle runs against the stop and takes the same along for a short distance and therewith also the rod. This rod has preferably a conical face at a suitable point on which the rods rest which hold the engaging lever in the locked position, these rods sliding off the conical face when the rod carries out a movement in axial direction. The locking element for the engaging lever for compressed air suddenly jumps out of the locking position and the lever returns into the initial position under the action of the spring or the like which has been put under tension at the engaging. The admission of compressed air to the oil container and to the cylinder for the headstock is thus interrupted and the compressed air which is still in the container and in the cylinder escapes. The headstock and the saddle are connected directly or indirectly with other cylinder pistons, which are permanently under the pressure of compressed air and then effect the return of the two cylinder pistons.

The proceeding is therefore such, that the work to be worked is held against the point of the headstock and that then the admission of compressed air is engaged. The work is then tightly clamped against the catch head or the like and is rotated as soon as this catch head has been coupled with the driving spindle. The saddle moves at the same time and is guided, if necessary, along a shaped bar and also with oscillating movement on the spar, i. e. on the round guide, until the work has been turned. At this moment the forward movement is interrupted, the saddle and the headstock move back, the work is liberated and drops off, whereas the catch head is instantaneously braked and brought to standstill.

One single feed movement is therefore necessary actually for one work, and all other movements are carried out automatically, so that not only quite considerable cutting efficiencies are possible, but also the intervals between the treating of works following the one on the other are considerably shortened.

For regulating the feeding speed of the saddle a regulating cone or the like may be mounted in the connecting pipe between oil container and saddle feeding-cylinder, said cone liberating according to the adjusting a larger or smaller passage cross-section for the oil.

If besides this automatically acting, uniform saddle feed a jump-like movement of the saddle has to take place, for instance to treat on one and the same work successively separate points, so that the saddle does no longer move at the normal feed along the point of the work which has not to be treated but more rapidly, an additional valve or the like may be provided in the oil conduit, or even an additional conduit might be provided, so that suddenly a large passage cross-section for the oil to the saddle feeding cylinder is liberated. With this object in view any desired feed elements may be employed. If

the stop for releasing the closing movement of the lever controlling the compressed air admission is arranged on a control rod extending parallel, for instance to the spar axis, it is simplest to provide at a point of this rod a transverse lever, on which rests another rod extending transversely to the lever, said latter rod being connected with the additional valve or the like. When this lever is oscillated, the additional valve opens and the saddle jumps forward. Also the oscillating is preferably automatic, and in the simplest manner effected thereby that, on the control rod a sleeve or the like is carried along when the saddle moves, projections on this sleeve sliding over a copy or former bar and effecting an oscillating movement of the control rod, so that the transverse lever or the like which is provided is also oscillated and uncovers the large passage cross-section for the oil discharge. This engaging of the larger passage cross-section for the oil may be effected by hand, for instance with the aid of a hand lever fixed on the control rod, said lever when oscillating oscillates by depressing also the control rod and with the same the lever extending transversely to the rod for opening or closing the additional valve.

In order that the forward movement of the saddle and of the headstock point may be stopped at any moment by hand, the hand lever, which is provided for opening and closing the additional valve or the like, can also be used for closing the additional valve for compressed air. This is effected simply by lateral shifting of the control rod by the distance by which otherwise the saddle would carry along the stop. The control rod is spring-supported, so that after the disengaging of the lateral movement carried out by the saddle or by hand it returns again into the initial position and with it also the conical surface on which the locking rods for the engaging lever for the compressed air can rest, so that the locking mechanism can operate again.

An embodiment of the invention is diagrammatically illustrated by way of example in the accompanying drawing, in which all standard parts such as uprights, driving engine, anchorings or the like are omitted.

Fig. 1 shows diagrammatically a spar bench in front elevation.

Fig. 2 is a right hand side view on the control elements provided at this side.

In both figures the driving pulley for the V-belt is designated by 1 and continually driven from a motor not shown. The pulley 1 revolves a driving spindle 2 which is journalled in a separate guide sleeve 3. A catch head bit 4 is revolved by the spindle 2 in known manner only when a clutch 5 between the elements 4 and 2 is engaged after inward shifting of the catch head 4 and tensioning of the spring 6, the braking faces 7 coming out of engagement. Compressed air is fed through a conduit 8 to a lever 9 which, when it is depressed in the direction of the arrow shown in Fig. 2 allows the admission of compressed air into the conduits 10 and 11. When the lever 9 is turned, a spring 12 shown in Fig. 2 is put under tension and a locking rod 13 engages in a bore of lever 9 so that this lever is securely held in the engaged position. The conduit 10 terminates in a cylinder 14 for feeding the headstock and moving the headstock point towards the work 15 to be treated, said work being securely clamped relative to the catch head 4, the clutch 5 being also engaged and the work rotated. The compressed air which thus flows at the same time into the pipe 10 and into the pipe 11 presses upon the oil in the container 16 from which container the oil under pressure flows through the conduit 17 into the portion of the spar 20 which is constructed as cylinder for the oscillatable saddle 19. The oil then presses upon a piston 21, on the rod of which the oscillatable saddle 19 is held by means of a catch 22 and thus moved along the work 15. On a control rod 23 which is guided in the uprights of the spar bench in a manner not shown in the drawing, an adjustable stop 24 is mounted against which the oscillatable sadddle 19 comes to bear at the moment when the turning proceeding is terminated and shifts the control rod 23 over a short distance. At this shifting movement the locking rod 13 for the lever 9 which controls the admission of compressed air slips off a conical piece 25 fixed on the control rod 23, so that the lever 9 automatically returns into the initial position under the pull exerted by the tensioned spring 12. The admission of compressed air from the conduit 8 is thus interrupted and the compressed air still contained in the oil container 16 and in the cylinder 14 escapes through pipe 29 into the atmosphere. The compressed air which is still contained in the conduit 27 acts then upon the pistons 20 in the spar 20 and upon the piston 29 in the head stock cylinder 14, so that the head stock as well as the oscillatable saddle return into their initial position. For regulating the feeding speed of the oscillatable saddle a valve cone 30, adapted to be adjusted from the outer side by means of screw threads, is provided in the conduit 17 and destined to adjust the normal passage cross-section for the through flow of the oil and therewith the oil quantity. A rapid feed is further provided for the oscillatable saddle 19 and enables a sudden jumping over of parts of the work 15 which have not to be treated. With this object in view an additional container 31 is provided in the conduit 17 and closed by a valve 32 so that, when this valve 32 is lifted by means of the rod 33, large quantities of oil flow into the cylinder 19 and thus effect a jump-like forward movement of the oscillatable saddle. The rod 33 and also the valve 32 may be automatically controlled in that a rod 34 connected with the oscillatable saddle 19 slides on the control rod 23 in being conducted along a ruler 35, so that an oscillating movement of the control rod 23 is effected. When the control rod 23 carries out an oscillating movement the lever 36 is lifted and with the same also the rod 33, so that the valve 32 opens and remains open until the oscillating movement is terminated, for instance by the slipping off of rod 34 from the ruler 35. The lifting and lowering of valve 32 may also be effected by means of the hand lever 37 fixed on the control rod 23 and simply thereby, that the hand lever 37 is depressed in the direction of the arrow 38 shown in Fig. 2. The same hand lever 37 may be used also for disengaging the lever 9 which controls the admission of compressed air. With this object in view the hand lever 37 has to be moved to the left in the direction of the arrow 39 shown in Fig. 1. The conical surface 25 is then also moved to the left, so that the locking rod 13 jumps out. The control rod 23 is under the influence of a spring 40, which returns this control rod 23 into the initial position and therewith prepares the locking rod 13 again for engaging into the lever controlling the admission of compressed air.

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