July 10, 1934. W. G. HOELSCHER 1,966,409

TAILSTOCK FOR LATHES

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Fig. 1.

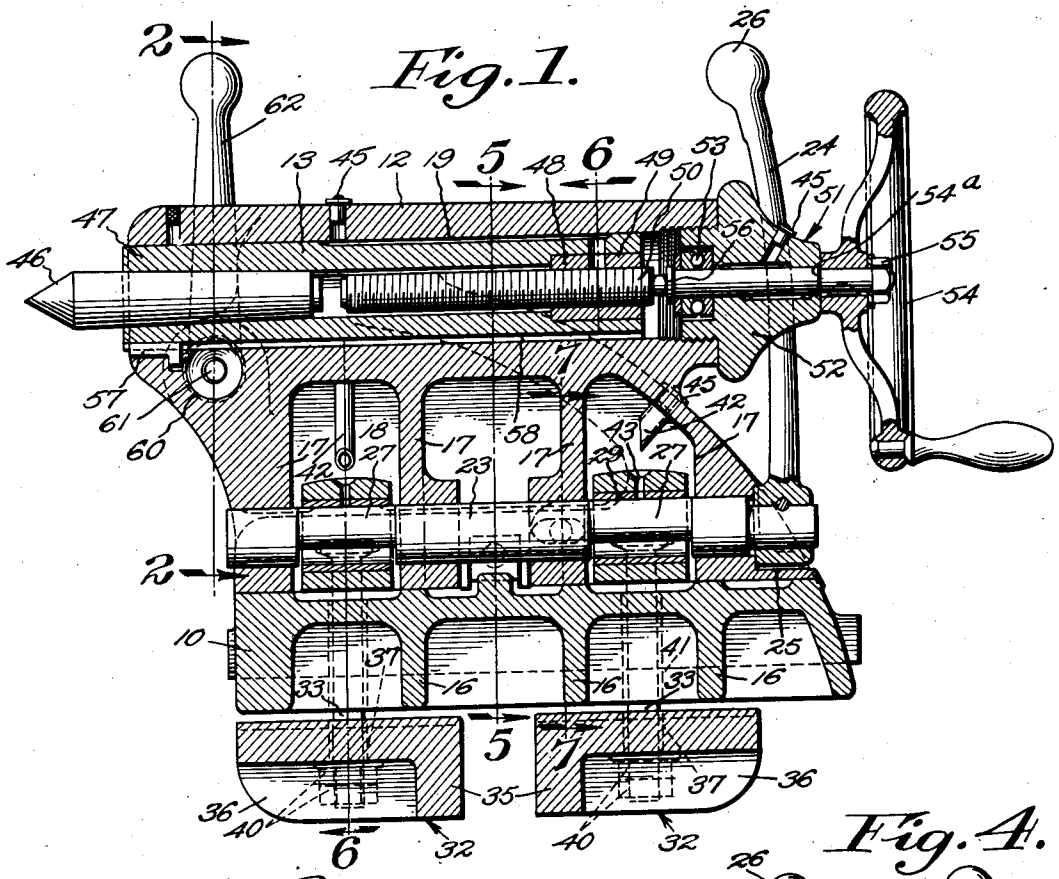

Fig. 2.

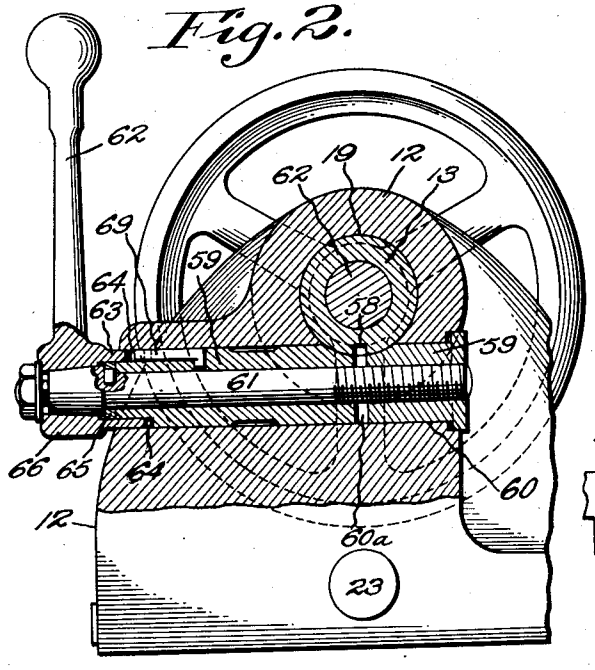

Fig. 4.

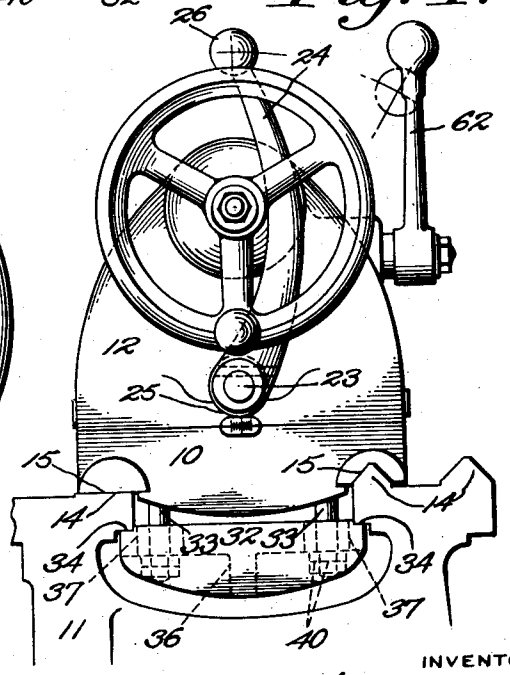

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Fig. 5.

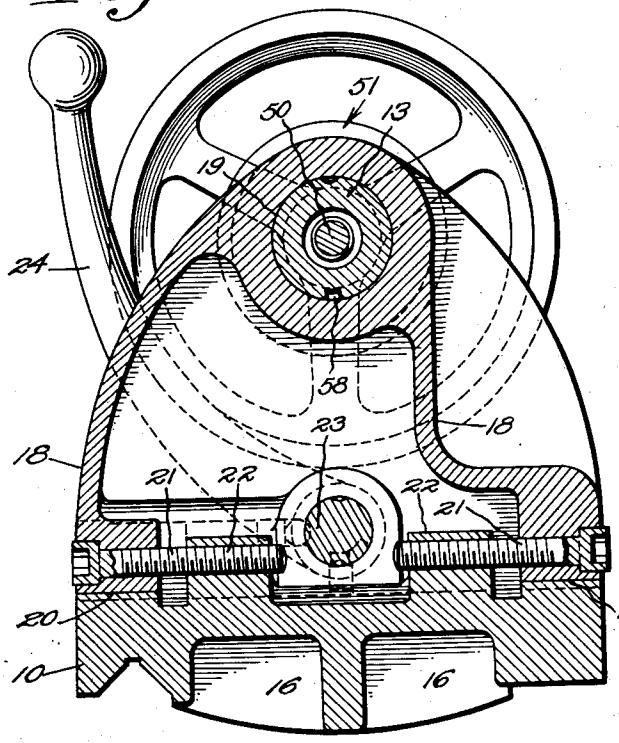


Fig. 3.

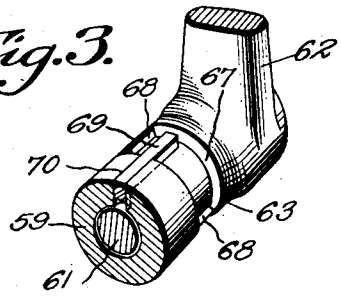


Fig. 6.

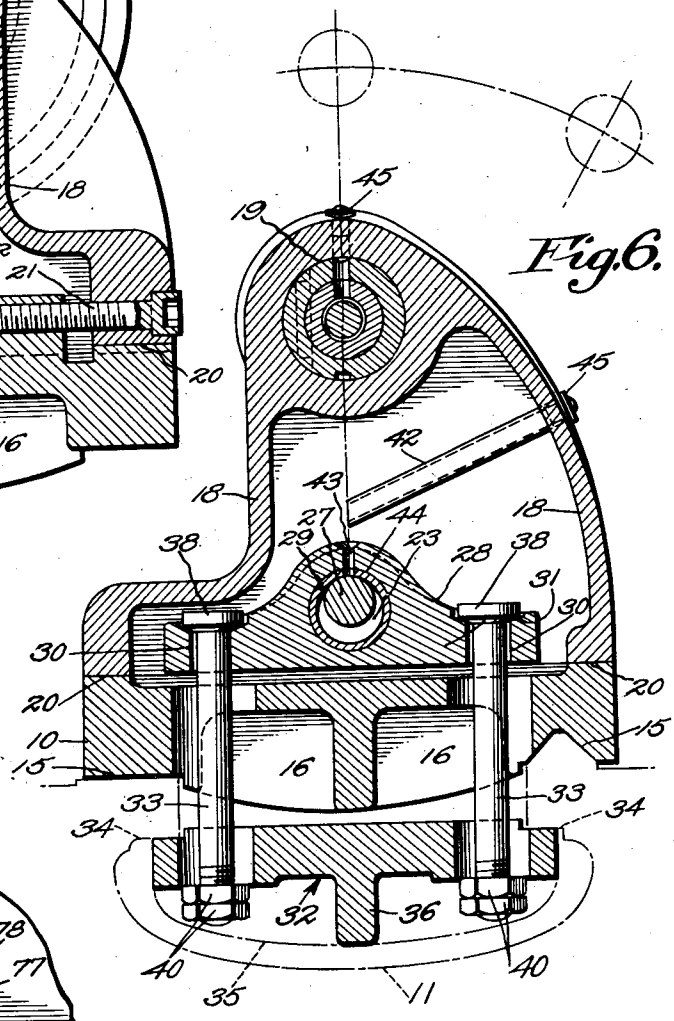
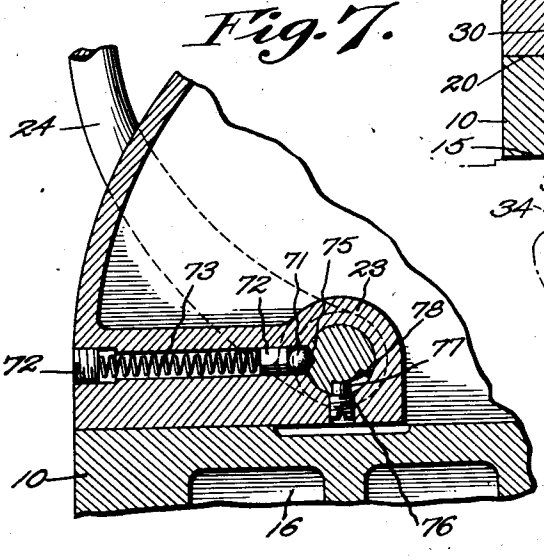


Fig. 7.



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TAILSTOCK FOR LATHES

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Application August 17, 1932, Serial No. 629,162

11 Claims. (Cl. 82—31)

This invention relates to machine tools and is particularly directed to an improved tailstock for lathes.

It is an object of this invention to provide an improved clamping means for the tailstock for rigidly fixing the same on the lathe bed, which clamping means efficiently fixes the tailstock by pressure applied to the bed at a plurality of points by means of a single easily and rapidly operable lever with the pressure applied to the clamping elements rendered uniform by the proper arrangement of balanced or equalizing connections from the lever to the clamping elements.

It is a further object of this invention to provide an improved clamping means for setting the spindle adjustment mechanism, in which the operating lever is maintained against displacement from a normal range of movement.

Other objects and further advantages will be more fully apparent from a description of the accompanying drawings, in which:

Figure 1 is a longitudinal sectional view of the improved tailstock illustrating the same apart from the lathe.

Figure 2 is a sectional view taken on line 2—2, Figure 1, detailing the clamping means for fixing the spindle of the tailstock in set position.

Figure 3 is a sectional perspective view illustrating the lever movement limiting device of the spindle clamping means.

Figure 4 is an end view of the tailstock showing it on the ways of the lathe.

Figure 5 is a sectional view taken on line 5—5, Figure 1, illustrating the two-piece construction of the tailstock and the adjustment means between the parts for laterally adjusting the tailstock spindle in relation to the headstock spindle.

Figure 6 is a sectional view taken on line 6—6, Figure 1, illustrating one of the balanced or equalized clamping units for fixing the tailstock to the lathe bed ways.

Figure 7 is a sectional view taken on line 7—7, Figure 1, detailing the detent means associated with the clamping means for the tailstock for positioning the same.

The tailstock herein illustrated is designed for general utility and is inclusive of an arrangement of parts and means for rapid attachment of the tailstock in any desirable set position. The tailstock generally described includes a two-piece body, one part of which is a main support or base 10 adapted to be clamped to the bed 11 of the lathe, the other part 12 being a spindle carrying adjustable element.

A spindle 13 is mounted in the upper part 12 and is disposed in parallelism with the ways 14 of the lathe for alignment with the spindle of the headstock (not shown). An adjustment means is provided between the two parts of the tailstock for lateral adjustment of the upper part on the lower part. Means are included associated with both parts for clamping the entire unit to the ways of the lathe. The spindle 13 includes provision for longitudinal adjustment and a clamping means is disclosed for setting the spindle after adjustment is made.

The base piece 10 includes ways 15 cooperating with the ways 14 of the lathe bed, one of which is plane and the other of which is of V-type. This base element 10 is fabricated of hollow structure reinforced by suitable ribs 16. The upper piece or element 12 is also of hollow design including cross ribs 17 and longitudinal ribs 18 reinforcing the same including a longitudinal bore 19 at its upper end in which the spindle 13 is mounted. This upper element rests on plane surfaces 20 disposed crosswise of the parts and providing slide bearings and is laterally joined to the lower element by means of screws 21 loosely entered through the side ribs 18 of the upper element and screwed into adjacent lugs 22 extending upwardly from the base element within the spindle carrying element. By appropriately actuating these screws, it is possible to change the lateral position of the spindle carrying element relative to its base, and thereby to effect lateral adjustment of the tailstock spindle center relative to the headstock spindle center.

For the purpose of rigidly and easily clamping the tailstock to the ways of the lathe the following described arrangement of clamping mechanism is disclosed:

A pair of clamp sets or units are provided, actuated by a common means and a manipulating lever. The common means consists of a shaft 23 mounted longitudinally of the tailstock within the upper element 12 in parallelism with the spindle and ways of the lathe, this shaft being journalled in the cross ribs 17 of the element of which there are two besides the respective end walls. A manipulating lever 24 is fixed to the rear end of this shaft exteriorly of the tailstock seated within a recess 25, this lever extending upwardly.

Inasmuch as the spindle and clamping means centers are in the same vertical plane, the manipulating lever 24 is curved so as to clear the extending end of the spindle and to have its handle 26 disposed conveniently accessible centrally above the tailstock. Between each cross rib 17

and each end wall of the tailstock, the clamp actuating shaft 23 includes counterturned portions 27 eccentric to the axis of the shaft. Upon each of these eccentric portions a single-tree or balanced lever 28 is provided. Each lever 28 includes an enlarged bore portion loosely traversed by the eccentric portion of the shaft and including a bearing sleeve 29, the respective outer ends of the lever having vertical bores 30 with countersunk portions 31 at the top thereof.

A clamping bar 32 is hung from each balanced lever 28 by means of clamping bolts 33, the clamping bar being disposed beneath the ways of the lathe bed and adapted to engage undercut shoulders 34 formed at the underside of the ways. Each clamping bar includes at its underside an end rib 35 at adjacent ends and longitudinal ribs 36 and has laterally disposed slots 37 through which the clamping bolts 33 are disposed. The clamping bolts include heads 38 having inclined undersides 39 lying in the countersunk portions of the upper bores and the lower ends of these bolts have nuts 40 screw-threaded thereon adjustably supporting the clamping bars. Laterally disposed slots 41 in the base element 10 provide ample clearance for the mounting of the clamping bolts therethrough, so that lateral adjustment of the spindle carrying element on the base 10 will not be interfered with by the connections between the clamping parts.

Inasmuch as the clamping action takes place between the cam shaft 23 and clamping bars 32 with the base element 10 interposed, the two parts of the tailstock are rigidly and jointly clamped to the bed of the lathe.

Oil is delivered to the respective balanced levers 28 by means of conduits 42 fastened through the sides of the tailstock body and disposed at an inclination downwardly terminating just above vertical oil holes 43 leading to the internal journal bores 44 of the balanced levers, these conduits including displaceable oil covers 45 at their outer ends.

The spindle 13 is of sleeve structure longitudinally movable in its bore. A work point or nose 46 is fitted in a conical forward bore portion 47 of the spindle sleeve and a nut 48 is fixed in a rear counterturned portion 49 of the internal bore of the sleeve, this nut and sleeve being traversed by means of a screw 50 journalled in a bearing assembly 51 fixed to the rear end of the spindle carrying element. The bearing assembly consists of a body 52 providing a plain bearing for the plain end of the screw and screw-threaded into the bore of the spindle carrying element. An end thrust bearing 53 is disposed in this plain bearing element 52 and a hand wheel 54 is keyed on a count rturned end of the screw, providing for rotation of the screw and longitudinal movement of the spindle. The hand wheel 54 is fixed in place against longitudinal displacement by means of a nut 55 drawing the hand wheel hub against a shoulder 54a of the shaft. A shoulder 56 of the shaft is engaged against the end thrust bearing 53 and longitudinal movement of the screw is prevented by this shoulder 56 and the hand wheel. The spindle 13 is maintained against rotation by means of a spline key 57 fixed in the bore in which it is mounted, this key engaged in a longitudinal groove 58 of the spindle.

The spindle is clamped in the desired set position by a crosswise disposed clamping means. This spindle setting or clamping means specifically described comprises a pair of sleeves 59 mounted in a cross bore 60 which has its axis set below the axis of the spindle and at right angles thereto. These clamping sleeves 59 have their adjacent or inner ends milled on a radius conforming to the outside radius of the spindle and are thereby adapted to lie snugly and uniformly against the spindle with a clearance space 60a occurring between the ends of the sleeves.

The sleeves are slidably disposed and a draw rod 61 is disposed therethrough being screwed into one clamping sleeve and traversing the other. A lever 62 is fixed on the end of the draw bolt opposite to the screw-threaded end thereof, this lever having a hub 63 telescopically engaging over a counterturned portion 64 of the adjacent clamping sleeve. A thrust washer 65 is fixed on the rod between the head end or lever carrying end 66 of the rod lying against the inner shoulder thereof and against the adjacent end of the clamping sleeve.

The inner end of the telescoped portion of the hub of the lever is circumferentially notched as at 67 and the shoulders 68 thus formed are adapted to abut a key 69 (see Figure 3) fixed in a longitudinal key-way 70 of the adjacent clamping sleeve, the outer end of this key projecting beyond the counterturned shoulder 64 of the sleeve and disposed in the path of movement of the shoulders 68. These abutments limit the movement of the lever in clamping and unclamping direction of movement, permitting ample clearance on the clamping side so as to permit progressive increase in clamping movement as the parts wear.

A detent apparatus is provided for controlling the movements of the clamping shaft 23, whereby the actuation of the clamp elements is uniform. This detent apparatus is mounted in one of the cross ribs 17 of the spindle mounting element of the tailstock and is disposed laterally thereinto within a bore entering the cam shaft journal laterally. The detent consists of a ball 71 and plunger 72 urged against the ball by a spring 73 disposed under compression between the plunger and a plug 74 at the outer end of the bore, the ball engaging the periphery of the cam shaft.

A detent depression 75 is provided in the cam shaft and a set screw 76 is screwed into the journal of the cam shaft and includes an end 77 entered into a circumferentially disposed groove 78 in the shaft, the relation of the screw end to the groove 78 governing the rotative movement of the cam shaft. The detent depression is adapted to register with the detent when the cam or eccentric portions of the cam shaft are at the highest or full clamping position. The screw 76 limits rotative movement and controls swing of the lever, preventing undue displacement thereof beyond the operative positions.

The nuts at the bottoms of the clamping bolts are adjusted to set the clamping bars an appropriate distance from the balanced lever so as to obtain a clamping action under maximum pressure when the eccentrics are at the highest points positively locking the tailstock in work position.

Having described my invention, I claim:

1. A tailstock, comprising a body, a cam shaft journalled longitudinally in said body, a lever for rotating said cam shaft, balanced levers supported on said cam shaft toward the respective ends of the tailstock body, clamping bolts depending from the respective ends of the balanced levers, and a clamping bar supported by each pair of clamping bolts, said cam shaft including eccentric portions adapted to impart an elevating

movement to the balanced levers for drawing the clamping bars toward the tailstock body.

2. A tailstock, comprising a body, a balanced lever at each end of the body, supports mounting said levers in balanced positions, clamping bolts depending from the respective ends of the balanced levers, a clamping bar supported by each pair of clamping bolts, and a device for elevating said lever supports and imparting elevating movement to the balanced levers for drawing the clamping bars toward the tailstock body.

3. In a lathe, a bed including ways, a tailstock mounted on the ways of said bed, said tailstock including a body, a balanced lever at each end of the body, supports mounting said levers in balanced positions, clamping bolts depending from the respective ends of the balanced levers, a clamping bar, adapted to engage between and under the bed ways, supported by each pair of clamping bolts, and a device for elevating said lever supports and imparting elevating movement to the balanced levers for drawing the clamping bars against the undersides of the bed ways under uniform pressures.

4. A tailstock, comprising, a body, a balanced lever at each end of the body, vertically movable pivot supports for sustaining said levers in balanced position, clamping bolts depending from the respective ends of the balanced levers, a clamping bar supported by each pair of clamping bolts, and means for imparting a direct lifting action to said lever supports.

5. In a tailstock for a lathe, a body, a cam shaft longitudinally journalled in said body, said cam shaft including corresponding eccentric portions, a single-tree mounted upon each eccentric portion and including a centrally disposed bore traversed by the eccentric portion, a draw bolt depending from each end of each single-tree, a clamping bar supported on and between the draw bolts of each single-tree, and a handle on the end of said cam shaft for rotating the same.

6. In a tailstock for a lathe, a body, a cam shaft longitudinally journalled in said body, said cam shaft including an eccentric portion, a single-tree mounted upon said eccentric portion and including a centrally disposed bore traversed by said eccentric portion, a draw bolt depending from each end of said single-tree, a clamping bar supported by the draw bolts of said single-tree, a handle on the end of said cam shaft for rotating the same, a detent device for stabilizing said handle in clamping position with the eccentric portion fully elevated, and means for limiting rotative movement of said shaft to the necessary operative range.

7. In a tailstock for a lathe, a body, a cam shaft longitudinally journalled in said body, said cam shaft including an eccentrically disposed cylindrical portion, a single-tree mounted upon said cylindrical portion and including a bore of larger diameter than the cylindrical portion, a draw bolt depending from each end of the single-tree, a clamping bar supported on and between the draw bolts of said single-tree, and a handle on the end of said cam shaft for rotating the same.

8. A tailstock, comprising, a body, a spindle longitudinally adjustably mounted in said body, a clamping device comprising sleeve elements disposed on an axis at right angles to and below the axis of the spindle, a draw rod disposed through said clamping elements, said rod screwed into one of said elements, a handle on the end of the rod opposite to the screw-threaded end, the adjacent ends of the clamping elements milled to fit against and transversely engage the periphery of the spindle leaving a clearance space between the clamping elements, said clamping element adjacent to the handle leaving a counterturned outer end surface, an extension from the hub of said handle telescopically engaged over the end of the adjacent sleeve on the counterturned portion thereof, an abutment element projecting from the shoulder formed by the counterturned portion, the telescoping portion of the hub circumferentially notched and the ends of the notched portion providing abutment shoulders engaging the abutment on the sleeve, whereby movement of the handle in the respective directions is limited by the engagement of the abutments.

9. A tailstock, comprising, a body, a spindle longitudinally adjustably mounted in said body, a clamping device for clamping said spindle in its bore, said clamping device including a draw rod, a handle on the end of the rod, a stationary abutment element contained in said body, abutment shoulders formed on the handle engaging the abutment in the body, whereby movement of the handle in the respective directions is limited to an operative range by the engagement of the abutments.

10. In a tailstock, a sectional body consisting of a base element and a spindle carrying element, means for adjusting the latter element laterally on the base element, a single-tree, a support for said single-tree mounted in said upper element of the body, a lever for elevating said support, draw bolts respectively depending from each end of said single-tree, a clamping bar supported by said draw bolts, said base element having slots laterally disposed therein and traversed by said draw bolts, whereby the clamping bar may be drawn toward the tailstock body by elevation of the support and lateral adjustment of said upper element is uninterfered with.

11. In a lathe, a bed including ways, a tailstock comprising a sectional body consisting of a base element and a spindle carrying element mounted on said base element, means for adjusting said spindle carrying element laterally on said base element, a single-tree, a support for said single-tree mounted in said spindle carrying element of the body, a lever for elevating said support, draw bolts respectively depending from each end of said single-tree, and a clamping bar supported by said draw bolts, said draw bolts loosely traversing said base element, said clamping bar engaged under and between the ways of the bed, whereby elevation of the support draws the clamping bar against the underside of the ways for securing the tailstock in position.

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