Dec. 9, 1952 H. C. WARNER 2,620,698

GEARING AND LOCKING MEANS

Filed Feb. 17, 1948 2 SHEETS—SHEET 1

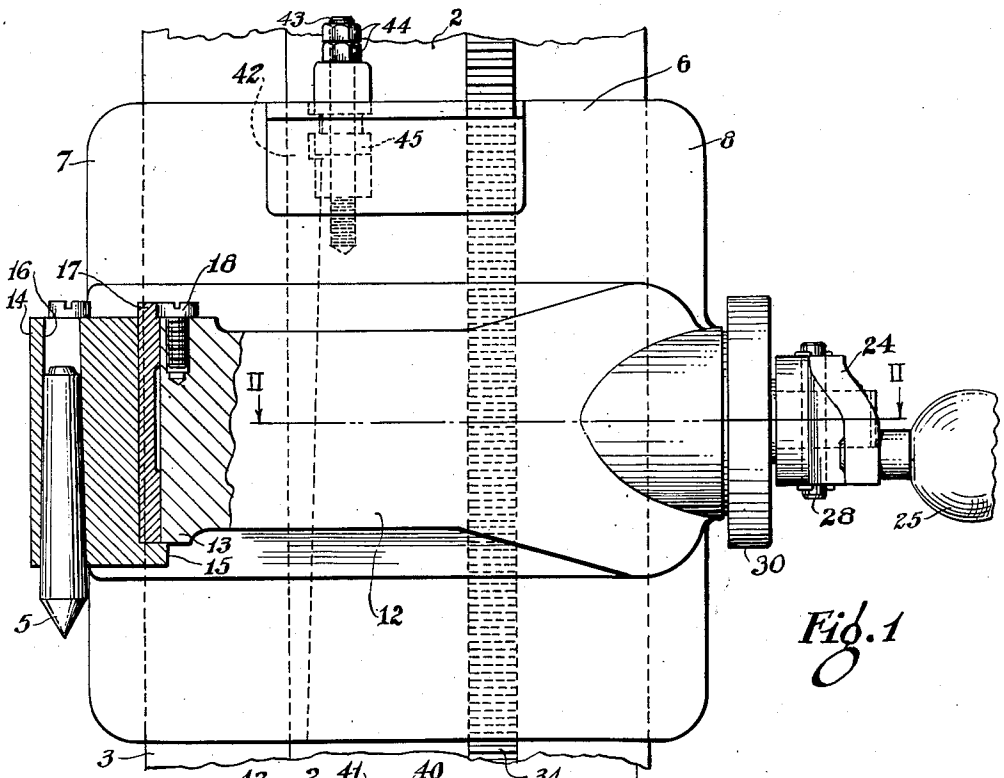


Fig. 1

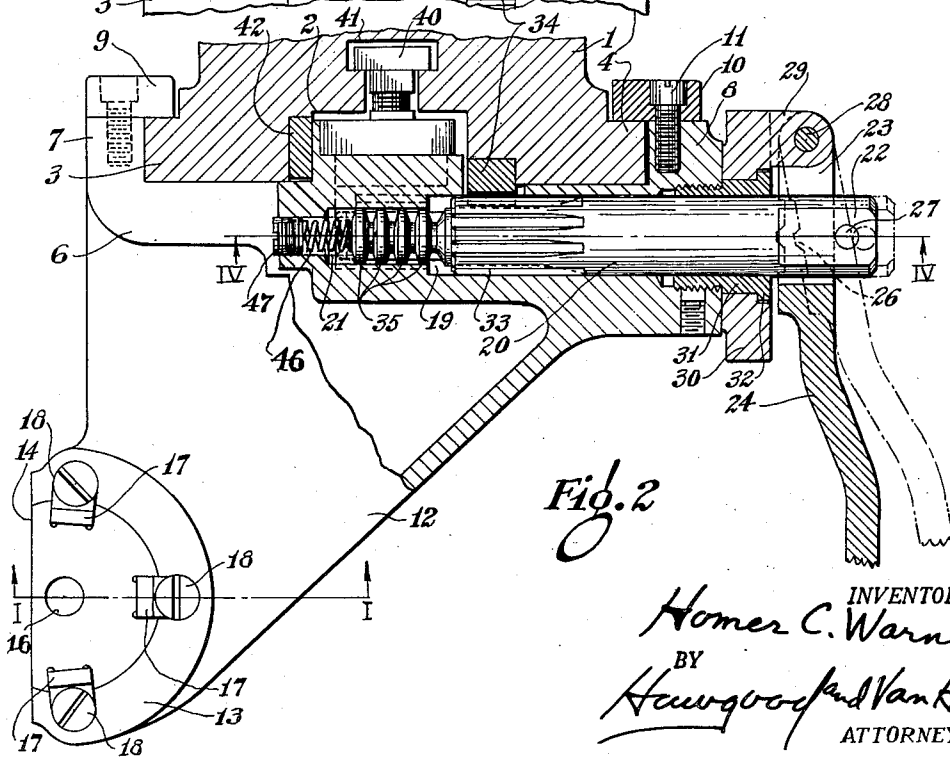


Fig. 2

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GEARING AND LOCKING MEANS

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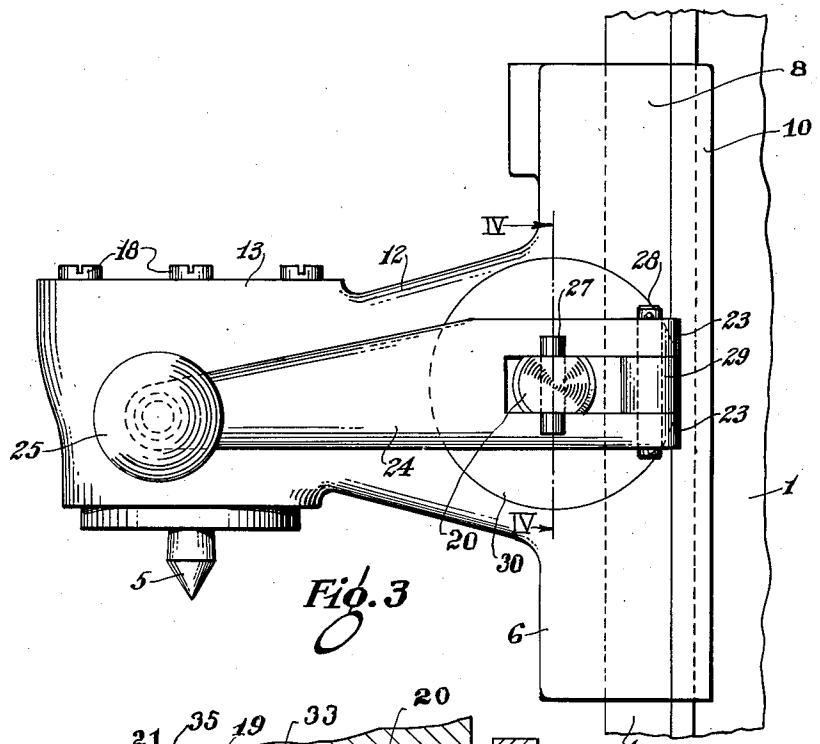


Fig. 3

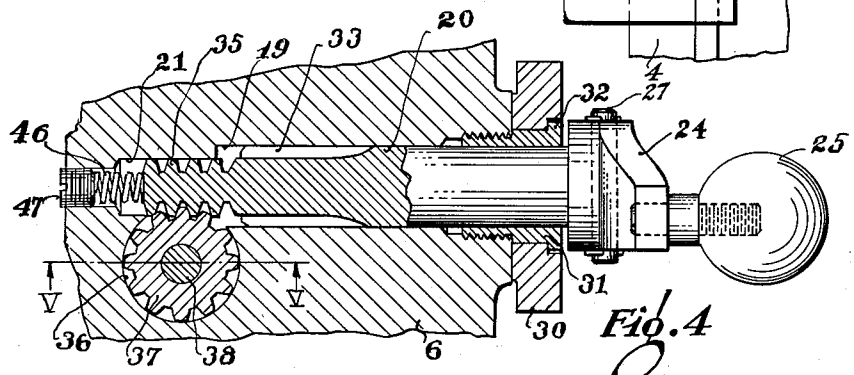


Fig. 4

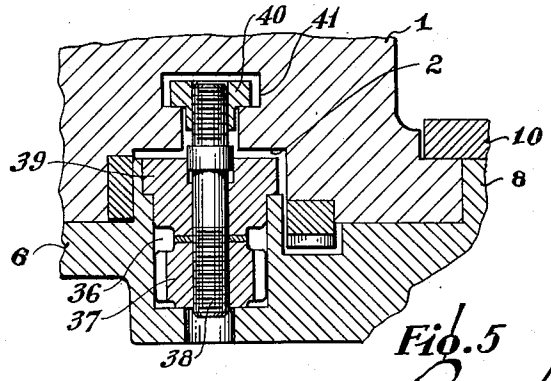


Fig. 5

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UNITED STATES PATENT OFFICE

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GEARING AND LOCKING MEANS

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6 Claims. (Cl. 82—21)

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This invention relates to machine tools and particularly to the portions thereof which hold the work or other elements.

An object of the invention is to provide an improved holding means which may be operated very easily.

Another object of the invention is to provide an improved holding means which will accurately and tightly hold an arbor or the like in a desired position.

Another object of the invention is to provide an improved holding means which will be composed of few and simple parts.

Another object of the invention is to provide an improved holding means which will be effectively locked in position.

Another object of the invention is to provide an improved holding means which will be extremely rugged in construction.

Another object of the invention is to provide an improved holding means which will provide a single easy operating control for both its moving and locking means.

Another object of the invention is to provide an improved holding means which may be easily and economically manufactured.

Other objects will hereinafter appear.

The invention will be better understood from the description of one practical embodiment thereof, illustrated in the accompanying drawings, in which:

Figure 1 is a side elevational view, parts being broken away and shown in section, of the invention as applied to a center holding device or tailstock, such as is used upon hobbing machines for holding a shaft or arbor carrying a gear to be hobbed.

Figure 2 is a plan view, partially in section, taken on the line II—II of Figure 1.

Figure 3 is a front elevational view of the tailstock of Figures 1 and 2, and

Figures 4 and 5 are fragmentary sectional views taken, respectively, on the lines IV—IV and V—V of preceding figures.

In the drawings, a fragment of a machine frame is shown at 1, this frame being provided with a recess or groove 2 between rectangular ways 3 and 4 formed integrally therewith. In the type of machine chosen for illustrative purposes, these ways are arranged vertically, the tailstock being used to support the upper end of a vertical shaft or spindle on which the work gear is carried, this spindle being supported between a dead center 5 and the headstock of a machine (not illustrated) by which the work is rotated.

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The general type of machine chosen for illustrative purposes is any of the vertical hobbing machines, such as those manufactured by The Lees-Bradner Company and embodying inventions of some of the following United States patents: 2,024,810; 2,075,489; 2,316,267; and 2,364,932.

Mounted upon the ways 3 and 4 is the tailstock, which includes a main carriage or framework, illustrated as a casting having a vertical flange 6 abutting the forward face of ways 3 and 4, and side flanges 7 and 8, which embrace and slide upon the outer sides of ways 3 and 4 respectively, the flange 6 being held against the front of the ways by bars 9 and 10 clamped to the flanges 7 and 8, respectively, as by machine screws 11.

Projecting from the flange 6 and formed unitarily therewith is shown hollow arm 12, terminating in a hub sector 13, in which is received a sector shaped block 14 of generally cylindrical shape but having a lower marginal flange 15 which underlies a part of the bottom of hub 13.

The block 14 has a tapered vertical perforation 16 which fits and receives the tapered shank of the center 5.

Key-like gibs 17 are fitted into key ways in the hub 13, and block 14 is very accurately and positively retained in position.

Extending through flange 8 and into the interior of the tailstock frame is a generally horizontal bore 19, in which is mounted the actuating shaft indicated generally at 20.

This shaft may both rotate and reciprocate within the bore 19, and within the smaller diameter extension 21 of said bore.

The shaft has flattened sides on its outer end, indicated at 22, which are embraced between the furcations 23 of the operating lever 24 and so, in effect, splined thereto, the lever being provided at its outer end with a handle 25.

The inner sides of the furcations 23 are formed with bosses 26 which bear upon the shoulders produced at the inner ends of the flattened sides 22 of the shaft, while these bosses are held in this position by a pin 27 which extends over a part of each of the furcations and is fixed into the end of shaft 20, and so lets the lever pivot relative the shaft axis.

The end of lever 24 remote from the handle 25 is pivoted or fulcrumed upon a pin 28 passing through the ends of both furcations 23 and through a lug 29 formed integrally with a supporting ring 30.

The supporting ring 30 is journalled upon a

bushing 31 threaded into an enlarged or counterbored end of recesses 19, the bushing having a marginal flange 32 fitting in an annular groove in ring 30 to hold this tightly against the outer surface of flange 6.

Shaft 20, adjacent the inner end of recess 19, has formed into it a pinion gear 33 which meshes with a rack 34 fixed to the machine frame 1 and disposed vertically throughout the range of allowable motion of the tailstock.

Thus it will be seen that any rotation of shaft 20 causes pinion 33 to roll up or down rack 34, as the case may be, moving the tailstock up and down proportionately to the rotation of handle 25.

Inwardly of pinion 33, shaft 20 has formed therein a plurality of annular grooves leaving a series of annular lands or ribs 35, which, in any longitudinal section, are substantially the form of the teeth of a rack.

Rotatably carried in a recess 26 in flange 6 is a spur gear 37 provided with an axial thread in which is threaded a draw or clamping bolt 38, so that the gear constitutes a nut for the bolt.

The pinion 37 is held in place within the recess by a plug 39 secured in the outer end of this recess.

The draw bolt has its end remote from the pinion 37 threaded into T-shaped anchor 40 which is positioned for sliding motion in a T-shaped slot 41 formed in frame 1 at the bottom of recess 2.

The mechanical advantage of the lever and the gear-nut 37, together with that of the bolt thread, provides a very tight and efficient lock while requiring relatively little effort in its actuation.

From the above, it will be seen that if shaft 20 be reciprocated, ribs 35 engaging pinion 37, act in the manner of a rack rotating this pinion and either clamping or loosening anchor 40 against the inner end of slot 41, depending on the direction of rotation and the hand of the threads on draw bolt 38.

It will also be understood that reciprocation of shaft 20 without rotation does not move the tailstock in any direction, but merely clamps or unclamps the anchor 40, as the case may be.

Similarly, rotation of the shaft without translation does not effect the clamping or unclamping, but merely rolls pinion 33 along rack 34 moving the tailstock up and down, depending on the direction of the rotation.

Thus a very simple control and lock is provided by the single handle 25, as moving this handle in or out operates the locking mechanism while rotation of it about the axis of shaft 20 moves the tailstock.

A tapered gib 42 is positioned between the inner side of recess 2 and the projecting part of flange 6, this gib being adjustable by means of a stud 43 threaded into flange 6 and lock nuts 44, there being a cylindrical collar 45 fixed to the stud and engaging a notch in the gib.

A spring 46, held by a threaded plug 47, moves the shaft 20 in the direction to clamp the anchor 40 whenever the operator releases handle 25, thus preventing any accidental dropping of the tailstock.

While I have described the illustrated embodiment of my invention in some particularity, obviously many others will readily occur to those skilled in this art, and I do not therefore limit myself to the precise details shown and described herein, but claim as my invention all embodiments, variations and modifications coming within the scope of the appended claims.

I claim:

1. Moving and locking means for use in conjunction with two relatively movable elements which comprises a shaft supported for both reciprocatory and rotary motion, gearing driven by rotary motion of the shaft, gearing driven by reciprocatory motion of the shaft, gearing driven by one of said gearing in response to a movement of said shaft, and locking means driven by said gearing driven by reciprocatory motion of the shaft, said locking means including a member movable to bind against one of said relatively movable elements.

2. Moving and locking means for use in conjunction with two relatively movable elements which comprises a shaft, a series of gear teeth fixed to the shaft and extending axially thereof, a second series of gear teeth fixed to the shaft and extending circumferentially thereof, gearing operated by one of said sets of gear teeth moving the elements relatively, an axially movable member, and gearing operated by the other set of gear teeth for moving said axially movable member in one direction to thereby lock the elements in fixed relative position.

3. Moving and locking means for use in conjunction with two relatively movable elements comprising a shaft rotatable about its axis and reciprocable along said axis, a handle splined to the shaft and having pivotal connections with the shaft and one of said movable elements, a series of gear teeth fixed with relation to the shaft and extending parallel to the axis thereof, a second series of gear teeth annularly arranged about the shaft, a rack engaging the first set of gear teeth having connections causing relative movement of the movable elements, a gear engaging the annular series of gear teeth, and lock means controlled by said gear.

4. Moving and locking means for use in conjunction with two relatively movable elements comprising a shaft rotatable about its axis and reciprocable along said axis, a handle splined to the shaft and having pivotal connections with the shaft and one of said movable elements, a series of gear teeth fixed with relation to the shaft and extending parallel to the axis thereof, a second series of gear teeth annularly arranged about the shaft, a rack engaging the first set of gear teeth having connections causing relative movement of the movable elements, a gear engaging the annular series of gear teeth and threaded lock means controlled by said gear.

5. Moving and locking means for use in conjunction with two relatively movable elements which comprises a shaft journaled in one of said elements and axially movable with respect thereto, a handle splined to said shaft and pivotally connected thereto and to the element, axially extending grooves in said shaft forming a series of gear teeth, a rack meshing with said gear teeth and carried by the other of said elements whereby rotation of the shaft causes relative movement of the elements, a series of circumferential grooves formed in the shaft and constituting annularly disposed rack teeth, a pinion meshing with said rack teeth, and a lock between said elements operated by said pinion.

6. Moving and locking means for use in conjunction with two relatively movable elements which comprises a shaft journaled in one of said elements and axially movable with respect thereto, a handle splined to said shaft and pivotally connected thereto and to said element, axially extending grooves in said shaft forming a series of gear teeth, a rack meshing with said gear

teeth and carried by the other of said elements whereby rotation of the shaft causes relative movement of the elements, a series of circumferential grooves formed in the shaft and constituting annularly disposed rack teeth, a pinion meshing with said rack teeth and a threaded clamp bolt between said elements operated by said pinion.

HOMER C. WARNER.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,172,437	Crothers	Feb. 22, 1916
1,441,192	Wood et al.	Jan. 2, 1923
2,211,788	Lucht	Aug. 10, 1939
2,368,877	Purrin	Feb. 6, 1945
2,403,581	Casella	July 9, 1946
2,453,656	Bullard, III	Nov. 9, 1948