March 23, 1948. D. W. STROM 2,438,236

LEAD SCREW NUT CONSTRUCTION FOR LATHES AND THE LIKE

Filed June 11, 1945 2 Sheets-Sheet 1

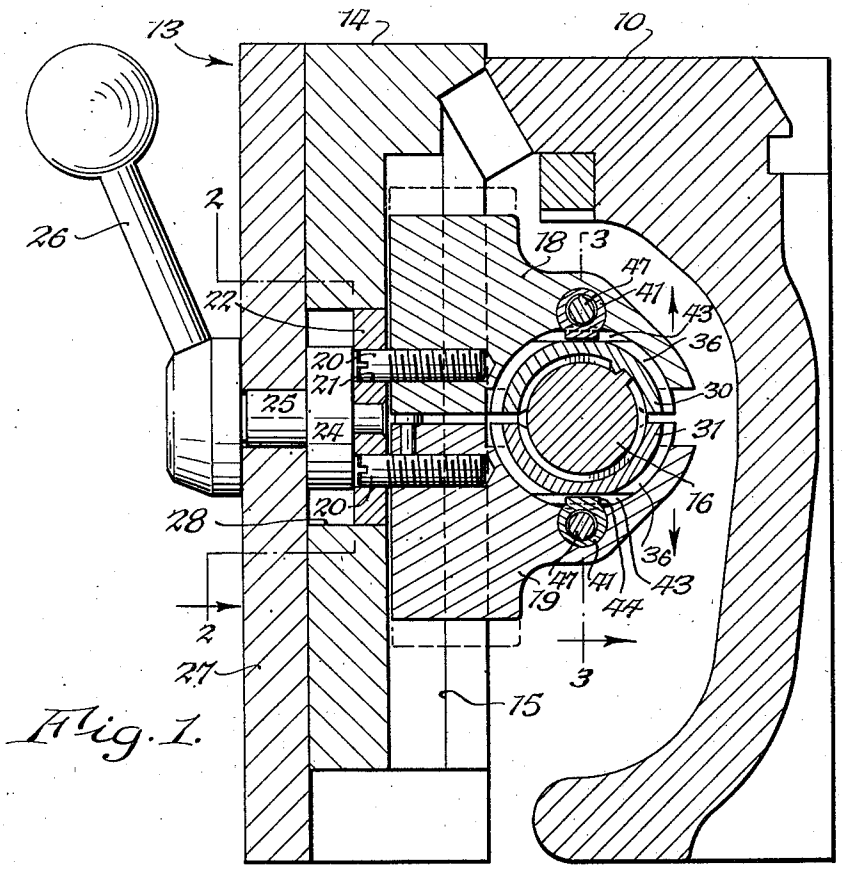

Fig. 1.

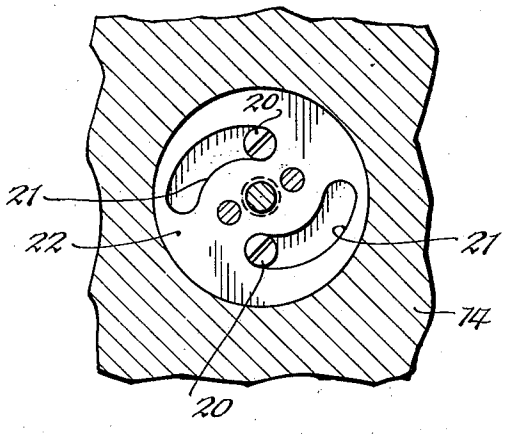

Fig. 2.

INVENTOR.
David W. Strom,
BY
Parker, Prochnow & Farmer,
Attorneys

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Filed June 11, 1945 2 Sheets-Sheet 2

Fig. 3.

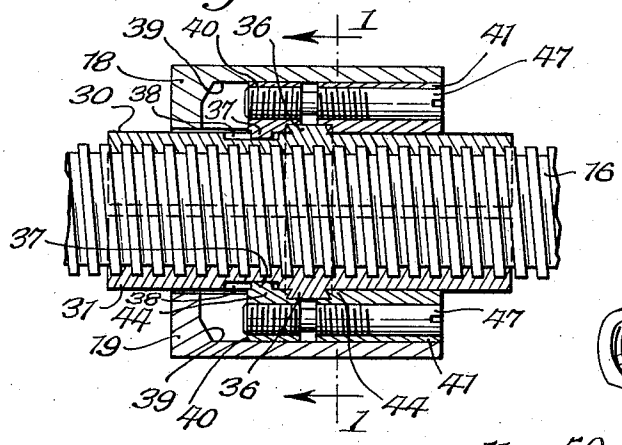


Fig. 6.

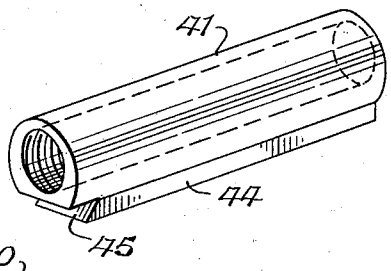


Fig. 4.

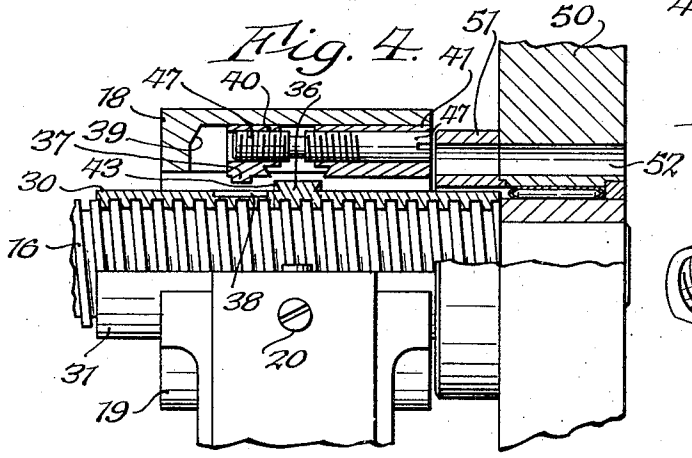
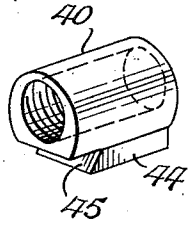


Fig. 7.



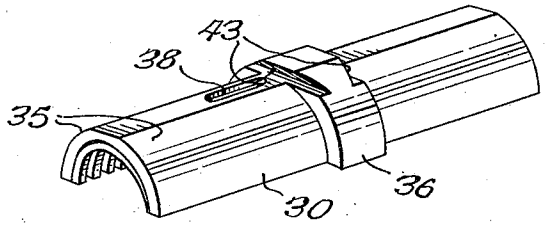


Fig. 5.

INVENTOR.
David W. Strom,
BY
Parker, Prochnow & Farmer,
Attorneys

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UNITED STATES PATENT OFFICE

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LEAD SCREW NUT CONSTRUCTION FOR LATHES AND THE LIKE

David W. Strom, Elmira, N. Y., assignor to Hardinge Brothers, Inc., Elmira, N. Y.

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15 Claims. (Cl. 74—424.8)

1

This invention relates to improvements in lead screw nuts for use on machines, such for example as lathes.

In machines employing lead screws as heretofore constructed, the two half nuts which are movable into and out of engagement with a lead screw have generally been made integral with the jaws or parts which move toward and from the lead screw. If these nuts become worn or broken so that they must be replaced, it is a difficult operation to remove them and provide new half nuts, and since highly skilled mechanics are required to apply these half nuts to a machine of this type, it has heretofore been common practice to send the machine back to the manufacturer for applying new lead screw half nuts thereto.

One of the objects of this invention is to provide a lead screw nut construction by means of which the half nuts which cooperate with the lead screw are readily removable and replaceable from a machine on which they are used. A further object of this invention is to provide a pair of half nuts which are so constructed that they may easily be positioned in correct relation to the jaws which move toward and from the lead screw and to the lead screw itself. It is also an object of this invention to provide improved attaching and positioning means by means of which the half nuts may be accurately positioned with reference to the lead screw and may be securely attached to the movable jaws. Other objects and advantages of this invention will appear from the following description and claims.

In the accompanying drawings, I have illustrated my invention as applied to a lathe, but it will be understood that this invention may be applied to any other type of machine in which a lead screw is employed. In these drawings:

Fig. 1 is a cross sectional elevation of a lathe apron having half nuts embodying this invention applied thereto, and the adjacent portion of the lathe bed, the section being taken in part on line 1—1, Fig. 3.

Fig. 2 is a fragmentary sectional elevation thereof on line 2—2, Fig. 1.

Fig. 3 is a sectional elevation thereof, on line 3—3, Fig. 1.

Fig. 4 is a fragmentary sectional elevation thereof similar to Fig. 3 and showing one of the half nuts in released position ready to be removed from or attached to its supporting jaw.

Fig. 5 is a perspective view of one of the half nuts.

Figs. 6 and 7 are perspective views of the gripping devices used or jaws employed for holding the half nuts in their operative positions.

In the drawings which illustrate by way of example one embodiment of this invention, 10 represents the bed of the lathe. The carriage which is usually slidable on the bed of the lathe is not

2

shown in the accompanying drawings, and 13 represents an apron which is secured to the carriage and extends downwardly from the carriage. This apron, in the construction shown, includes a guide member 14 which is provided with a vertical guideway 15 of any suitable or usual type on which the half nuts of lathes as heretofore constructed were movable vertically toward and from each other into and out of engagement with the lead screw 16 of the lathe. In my improved construction, I provide upper and lower jaw members 18 and 19 having guide portions formed to cooperate with the guideway 15 and which may be moved toward and from each other by any suitable means, such for example as heretofore commonly employed. For example, each jaw may be provided with posts or pins 20, the ends of which extend into eccentric slots 21 formed in a disk 22. This disk may be pinned or otherwise secured to a collar or enlargement 24 formed on the shaft 25, journalled in a plate 27 which is rigidly secured to the guideway member 14. A handle 26 is secured to the shaft 25 for turning the eccentrically slotted disk 22. The plate 27 secures the disk 22 and the collar 24 in a suitable circular aperture 28 formed in the guideway member 14. Any other means for moving the jaws 18 and 19 toward and from each other may be employed, if desired.

In place of forming the threads for engagement with the lead screw 16 on the semi-cylindrical faces of the jaw members 18 and 19, as was heretofore customary, I provide two or more nut segments, for example, a pair of such segments or half nuts 30 and 31 which are removably mounted in the jaw members 18 and 19 for accurate and correct engagement with the screw threads of the lead screw 16. Any suitable or desired means for accurately positioning and securing the half nuts on the jaw members may be provided. In the construction shown by way of example for positioning the half nuts on the jaws, I provide the half nuts with convex surfaces which are partly cylindrical and which are formed to seat against corresponding cylindrical concave or recessed surfaces on the jaws 18 and 19. The half nuts are also provided with projections or collars 36 extending circumferentially and outwardly beyond the cylindrical surfaces 35 and which are accurately formed to fit into corresponding recesses or grooves 36a formed in the jaws 18 and 19. The collars 36 and the grooves into which they fit position the half nuts lengthwise of the jaws 18 and 19 and, if desired, suitable means may be employed for accurately positioning the half nuts laterally of the jaws. For example, a key or projection 37 may be provided on each of the jaws 18 and 19, for example, on clamping members 40, slidably mounted on the jaws, which may fit into a keyway or slot 38, which is formed in each half nut. This key and its keyway, the collars 36 and their re-

cesses in the jaws, and the threads of the half nuts are so formed and located relatively to each other that by positioning the two half nuts on the jaws so that the projections 36 thereof fit into the corresponding grooves or recesses in the jaws 18 and 19, and the key 37 fits into the keyway 38, the half nuts will be correctly positioned with relation to the threads of the lead screw 16. The collars also transmit to said jaws and to the lathe carriage any forces resulting from the turning of the lead screw, and the key and keyway also serve to prevent rotary motion of the half nuts when the lead screw is turning. These collars 36 and the keys 37 also enable the two half nuts to be correctly positioned relatively to each other, so that any pair of half nuts made for a certain model or type of lathe will be interchangeable with other pairs of half nuts. Any other suitable means for accurately positioning the half nuts relatively to the jaws may be provided.

Any suitable means may be provided for securing the half nuts in their operative positions without removing the jaws from the machine, and these means are preferably arranged so that they can be actuated from an end of each of the jaws 18 and 19. In the construction shown for this purpose, by way of example, I provide a pair of clamping members 40 and 41, which are movable toward and from each other in suitable undercut guide recesses 39 provided in the jaws 18 and 19. The guide recesses or bores 39 may be cylindrical in cross section and extend inwardly from adjacent end faces of the jaws and parallel to the lead screw. These cylindrical guide recesses or holes in the jaws may be readily produced by drilling inwardly from an end face of each jaw before the half nut receiving face thereof is machined, the hole being formed in such location that when the half nut receiving face is machined, the metal surrounding a portion of a side of the cylindrical hole or guide recess 39 is removed, thus forming a connecting passage between a side of the guide recess or hole 39 of each jaw and the half nut receiving face of the jaw.

The clamping members 40 and 41 have partly cylindrical surfaces which are slidable in the guide apertures 39, and also have gripping members 44 extending through the connecting passage between the guide aperture 39 and the half nut receiving face of the jaw, these parts 44 being formed to grip a portion of a half nut, such for example as the collar 36 thereon.

In order to facilitate this gripping, the projection 36 of each half nut is provided at opposite sides thereof with undercut grooves 43 and the gripping projections 44 of the clamping members have undercut surfaces 45 formed to cooperate with the undercut grooves 43 of the half nut. Consequently, when the two clamping members are moved toward each other in the guide apertures 39 of the jaws, their undercut surfaces 45 engage the undercut parts 43 of the half nuts and by a wedging action draw the half nuts toward the jaws so as to firmly seat the cylindrical surfaces 35 of the half nuts against the corresponding surfaces of the jaws 18 and 19 and to force the collars 36 into the corresponding grooves of the jaw members.

Any suitable means may be provided to move the clamping members toward and from each other, and in the construction shown, I have provided each clamping member with a longitudinally extending threaded hole, the hole of one of the clamping members being provided with a right-handed thread and the hole of the other clamping member having a left-handed thread therein. Two clamping members may be moved toward and from each other by means of a screw 47, having right and left hand threads thereon, one of which engages each clamping member. Consequently, by turning the screw 47, the clamping members will be moved toward or from each other, and since the two clamping members are slidable independently of each other in their hole 39, it will be obvious that by turning the screw 47, the clamping members will move into gripping engagement with the undercut grooves 43 of the half nuts and will adjust themselves lengthwise of the guide hole 39 so as to draw the half nuts outwardly into engagement with the jaw members 18 and 19 without subjecting the half nuts to any longitudinal or endwise forces.

By means of the construction illustrated when a pair of half nuts becomes worn, it is only necessary to turn the screws 47 in a direction to move the clamping members 40 and 41 away from each other to disengage the undercut groove parts 43 of the half nuts. Since the half nuts are preferably made longer than the jaws, they can be held in engagement with the threads of the lead screw while the carriage and apron are moved lengthwise of the lead screw away from the half nuts. As soon as the jaws of the apron are clear of the half nuts, they can be removed from the lead screw and replaced by other half nuts, which can then be applied to the jaws by moving the apron of the lathe into position to enable the parts to fit together as described.

The removal and replacement of the half nuts may be facilitated by providing on the end plate 50 of the lathe bed, see Fig. 4, a ring 51. This ring has an internal diameter slightly larger than the external diameter of the parts of the half nuts which extend beyond the jaws 18 and 19. Holes 52 are provided in the end plate and ring which terminate at the clamping screws 47, so that a screw driver, pin wrench or other implement may be inserted through these holes to actuate the clamping screws and the jaws controlled thereby.

In the use of this device, if the half nuts are to be changed, the lathe carriage is moved into a position as shown in Fig. 4 in which the half nuts enter the ring 51. The gripping jaws 40 and 41 are then moved into releasing positions, whereupon the handle 26 is turned to separate the jaws so as to clear the half nuts. The parts are then in the position shown in Fig. 4. The lathe carriage is then moved to the left in Fig. 4 until it is clear of the half nuts and the lead screw is turned while the half nuts are held against turning so that the half nuts are moved out of the ring 51, whereupon they may be removed. Other half nuts are then placed on the lead screw and the procedure is reversed to secure the half nuts to the jaws 18 and 19. Any other means for removing and replacing the half nuts may be employed.

By means of this construction, it will be noted that no dismantling of the apron or other part of the lathe is necessary in order to replace the half nuts of the lead screw, and since the half nuts are machined accurately in such a manner that when they are fitted in the jaw members 18 and 19, the threads of the half nuts will accurately engage the threads of the lead screw, it will be obvious that the half nuts can be re-

moved and replaced from the machine without the aid of any skilled mechanics.

The term "half nut" is herein used to designate any nut segment, whether the same be a half nut or less than a half nut.

I claim as my invention:

1. In a machine having a lead screw, a pair of jaws movable toward and from said lead screw, and a pair of half nuts formed to be releasably secured to said jaws, that improvement which includes cooperating parts on said jaws and said half nuts for positioning said half nuts on said jaws and including collars on said half nuts and grooves in said jaws formed to receive said collars to hold said half nuts in correct relation to each other, to said jaws and to said lead screw, interengaging means on said jaws and said half nuts for holding said half nuts against movement about the axis of said lead screws, and gripping means for releasably securing said half nuts to said jaws.

2. In a machine having a lead screw, a pair of jaws movable toward and from said lead screw, and a pair of half nuts formed to be releasably secured to said jaws, that improvement which includes cooperating parts on said jaws and said half nuts for positioning said half nuts on said jaws and including collars on said half nuts and grooves in said jaws formed to receive said collars to hold said half nuts in correct relation to each other, to said jaws and to said lead screw, and gripping means slidably mounted on said jaws and engaging opposite faces of said collars for releasably securing said half nuts on said jaws.

3. A lead screw nut construction including a pair of jaws movable toward and from said lead screw and having grooves formed on the inner faces thereof, a pair of half nuts formed to be releasably secured to said jaws, cooperating parts on said jaws and said half nuts for positioning said half nuts on said jaws and including collars on said half nuts formed to extend into said grooves in said jaws to hold said half nuts in correct relation to each other, to said jaws and to said lead screw, undercut faces on said collars, and gripping means formed to engage said undercut faces to releasably secure said half nuts to said jaws.

4. A lead screw nut construction including a pair of jaws movable toward and from said lead screw, a pair of half nuts formed to be releasably secured to said jaws, cooperating parts on said jaws and said half nuts for positioning said half nuts on said jaws and including collars on said half nuts and grooves in said jaws formed to receive said collars to hold said half nuts in correct relation to each other, to said jaws and to said lead screw, undercut faces on said collars, and a pair of gripping members slidably mounted on said jaws and movable into engagement with said undercut faces for releasably securing said half nuts to said jaws and for drawing said half nuts toward said jaws.

5. In a lead screw nut construction for a machine having a pair of jaws movable toward and from said lead screw, that improvement which includes recesses in the faces of said jaws adjacent to said lead screw, a pair of half nuts formed to be seated in said recesses in said jaws in correct relation to each other and to said lead screw, and gripping means slidably mounted on the inner faces of said jaws for gripping said half nuts for releasably securing said half nuts to said jaws.

6. A lead screw nut construction including a pair of jaws movable toward and from the lead screw and having the faces thereof adjacent to said lead screw recessed, a pair of half nuts formed to be seated in the recesses of said jaws in operative relation to each other and to said lead screw, said jaws having undercut guide grooves extending substantially parallel to said lead screw, and gripping members slidable in said guide grooves for movement into and out of gripping engagement with said half nuts for holding said half nuts on said jaws.

7. A lead screw nut construction, including a pair of jaws movable toward and from said lead screw and having the faces thereof adjacent to said lead screw recessed, a pair of half nuts formed to be seated in the recesses of said jaws in operative relation to each other and to said lead screw, said jaws having undercut guide grooves extending substantially parallel to said lead screw, gripping members slidable in said guide grooves for movement into and out of gripping engagement with said half nuts for holding said half nuts on said jaws, and means operable from an end of each guide groove for moving said gripping members into and out of positions to grip said half nuts.

8. A lead screw nut construction, including a pair of jaws movable toward and from said lead screw and having the faces thereof adjacent to said lead screw recessed, a pair of half nuts formed to be seated in the recesses of said jaws in operative relation to each other and to said lead screw, said jaws having undercut guide grooves extending substantially parallel to said lead screw, a pair of gripping members slidable in each guide groove for movement into and out of gripping engagement with the adjacent half nut, and a screw engaging the two gripping members of a guide groove and extending into position to be actuated from an end of said guide groove.

9. In a lathe having a lead screw and a pair of jaws constructed for simultaneous movement toward and from the lead screw, that improvement which includes a pair of half nuts formed to be releasably secured to said jaws with the half nuts positioned to cooperate with the threads of the lead screw when the jaws are moved toward each other, said jaws and nuts being formed so that when said nuts are released from said jaws, they may move lengthwise of said lead screw clear of said jaws by relative rotation of said nuts and lead screw.

10. In a machine having a lead screw, a pair of jaws movable toward and from said lead screw and a pair of half nuts carried by said jaws, that improvement which includes recesses in the inner faces of said jaws intermediate of the ends thereof, projections on said half nuts formed to extend into said recesses, and gripping means mounted on said jaws movable into and out of engagement with said projections for securing said half nuts to said jaws.

11. In a machine having a lead screw, a pair of jaws movable toward and from said lead screw and a pair of half nuts carried by said jaws, that improvement which includes recesses in the inner faces of said jaws intermediate of the ends thereof, projections on said half nuts formed to extend into said recesses, and a pair of gripping members slidably mounted on each of said jaws for movement toward and from opposite sides of said projections for releasably securing said half nuts to said jaws.

12. A lead screw nut construction including a

pair of jaws movable toward and from the lead screw, a pair of half nuts formed to be seated on said jaws in operative relation to each other and to said lead screw, said jaws having undercut guide grooves extending substantially parallel to said lead screw, and gripping members slidable in said guide grooves for movement into and out of gripping engagement with said half nuts for holding said half nuts on said jaws.

13. A lead screw nut construction including a pair of jaws movable toward and from said lead screw, a pair of half nuts formed to be seated on said jaws in correct operative relation to each other and to said lead screw, said jaws being movable to only a sufficient extent to move said half nuts into and out of engagement with said lead screw, projections on said half nuts extending toward said jaws, and gripping means mounted on said jaws and movable into and out of gripping engagement with said projections on said half nuts, said half nuts, when released from said gripping means and when said jaws are moved away from said lead screw, being movable lengthwise of said lead screw while in engagement with the threads thereof, by relative rotation of said half nuts and said lead screw.

14. In a machine having a lead screw and a pair of jaws movable toward and from said lead screw, that improvement which includes a pair of half nuts releasably secured to said jaws and of substantially semi-cylindrical form and having their ends projecting beyond the ends of said jaws, a ring arranged about said lead screw and having an internal diameter slightly greater than the external diameter of said nuts when said nuts are in operative relation to said lead screw and into which the projecting ends of said half nuts

may enter, for supporting said half nuts with their threads in engagement with the threads of said lead screw when said half nuts are released from said jaws, said jaws being movable lengthwise of said lead screw out of engagement with said half nuts when said half nuts are held by said ring.

15. In a machine having a lead screw and an end plate in which one end of said lead screw is journalled, and a pair of jaws movable toward and from said lead screw, that improvement which includes a pair of half nuts releasably secured to said jaws and of substantially semi-cylindrical form and having their ends projecting beyond the ends of said jaws, a ring secured to said end plate and extending about said lead screw and having an internal diameter slightly greater than the external diameter of said nuts when said nuts are in operative relation to said lead screw and into which the projecting ends of said half nuts may enter, said ring supporting said half nuts with their threads engaging the threads of said lead screw when said half nuts are released from said jaws and when the ends of said half nuts are inserted in said ring.

DAVID W. STROM.

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