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STOCK TUBE

Filed Jan. 14, 1953

FIG. 1.

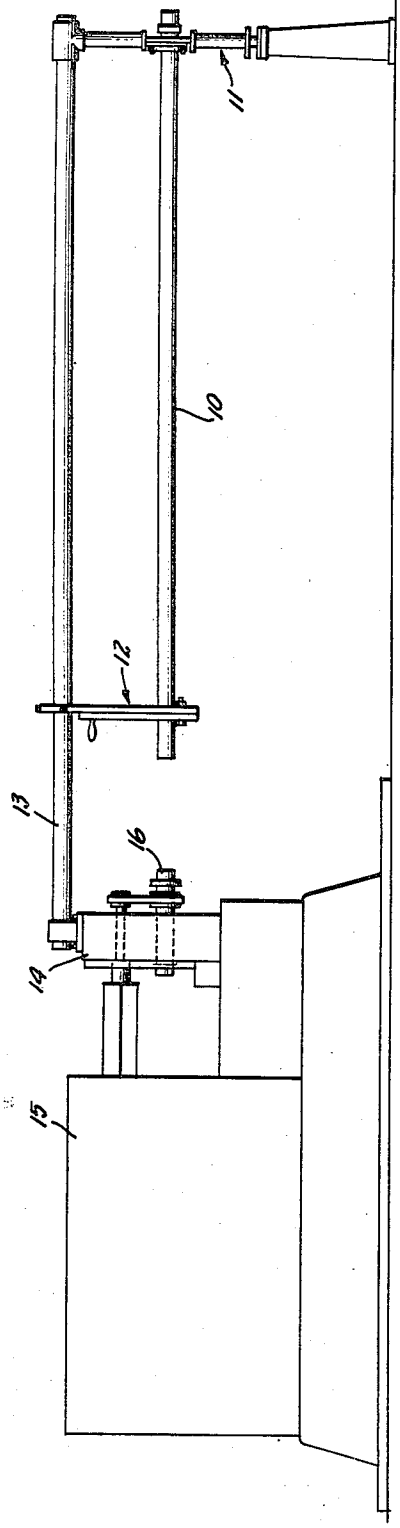


FIG. 2.

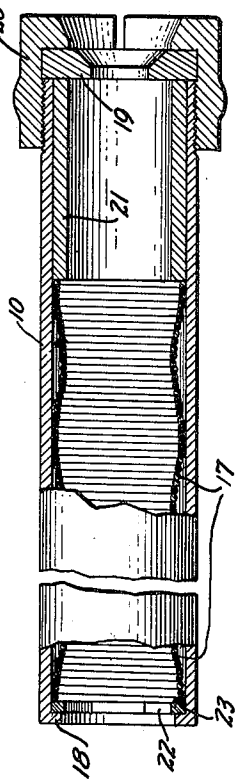
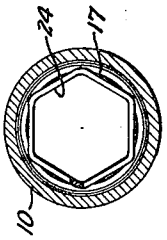


FIG. 3.



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STOCK TUBE

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8 Claims. (Cl. 203—92)

Our invention relates to means for supporting the otherwise unsupported end of a rotating piece of stock, as in a stock tube aligned with the spindle axis of an automatic lathe.

In feeding large lengths of stock into an automatic lathe, the free end of the stock is often improperly supported, or the stock itself may have an inherent warp. Under high-speed rotational conditions, this may be the cause of stock whip, with dangerous effects to operators and to the stock-supporting means and to the stock itself. For example, in the manufacture of nuts and bolts having heads of non-circular contour, it may be advantageous to use appropriately contoured stock, such as hexagonal stock; and in the presence of stock whip, the final product may be marred by scoring or by knocked-off corners.

It is, accordingly, an object of the invention to provide an improved device of the character indicated.

It is another object to provide improved stock-supporting means having an inherent ability to dampen the eccentric oscillations characteristic of stock whip.

It is another object to provide an improved stock-supporting means for stock of non-circular contour.

It is a general object to meet the above objects with a relatively simple mechanism which may be readily fabricated, and which need require no additional space when applied to a conventional stock reel.

Other objects and various further features of novelty and invention will be pointed out or will occur to those skilled in the art, from a reading of the following specification in conjunction with the accompanying drawings. In said drawings, which show, for illustrative purposes only, preferred forms of the invention:

Fig. 1 is a view in elevation showing conventional stock-supporting means, for the support of stock to be consumed by an automatic machine tool such as a turret lathe;

Fig. 2 is an enlarged fragmentary view in elevation, partly broken and in vertical section; and

Fig. 3 is a cross-sectional view of a stock tube as employed in Fig. 2 but illustrating an internal modification.

Briefly stated, our invention contemplates improved means for supporting the otherwise unsupported end of a rotating piece of stock so as to prevent stock whip. The supporting means may comprise an elongated helix of resilient wire which may be confined by the bore of a stock tube or other conventional means of stock support. The helix preferably undulates between an outer radial limit, defined by the confinement of the bore of the stock tube, and an inner radial limit, which may be substantially or even less than the maximum diametral extent of the stock to be supported thereby. Means are provided for assuring that upon rotation of the stock the helix will be carried for rotation at the same time, so that there is never any relative rotation between the stock and the wire. In one form, this means comprises a locating collar or bearing effectively keyed to the stock and to the wire and journalled in the stock tube. In another form, the wire itself may be crimped at one or more necked-down locations to provide an inner non-circular or keying contour at such locations, so as nonrotatably to engage the stock.

Referring to Fig. 1 of the drawings, our invention is shown in application to the internal formation of a stock tube **10** mounted between supports **11—12** of a stock reel, which may be secured by a frame member **13** to the outboard frame **14** of an automatic turret lathe **15**. The lathe may include a spindle **16** having a rotating internally fed collet and aligned with the axis of the stock tube **10**; this machine may be of the type disclosed in greater detail in the copending patent application of Montgomery et al., Serial No. 196,108, filed November 17, 1950, and now Patent No. 2,680,281. The front support of the stock reel may be of a type to facilitate ready loading, as described in our co-pending patent application filed on even date herewith.

In the form of the invention illustrated in Fig. 2, we provide within the stock tube **10** an undulating helix **17** of resilient wire. The helix **17** may be limited or confined at one end by an inturned flange **18** having a bore exceeding the maximum diametral extent of the stock to be accomodated therein and at the other end by further flange means, such as a washer **19** removably confined by a retaining cap **20** and extending radially inwardly of the outer limit of the stock. If desired, a special collar or sleeve **21** may transmit the abutment location afforded by flange means **14** to a position forward of the back end of the stock tube.

As indicated generally above, the radial limits of the helix **17** preferably undulate as a function of axial length within the stock tube **10**. At one radial limit of this undulation, the bore of the stock tube **10** will be determining; the other radial limit may be substantially equal to and is preferably less than the maximum diametral extent of the stock. It is preferred that the outer radial limit of the helical undulations shall substantially conform with the bore diameter of the stock tube **10**, so that the minimum frictional resistance will arise between the wire **17** and the stock tube **10** when the wire is rotated with the stock tube.

The stock preferably positively drives the helix for rotation therewith and, of course, if the stock is circular, reliance must be had on the friction existing between the reduced or necked-down portions of the helix and the periphery of the stock. In the event that the stock is non-circular, as, for example, hexagonal stock, we prefer to employ rotatable keying means such as the ring **22** having an inner contour or bore conforming (with a slight clearance) to the external contour of the stock. The ring **22** is shown to have a hexagonal bore for the assumed case of hexagonal stock. The ring **22** is preferably loosely accommodated within the stock tube **10** so as to rotate freely therein and may be spot welded, as suggested at **23**, to the wire **17** or otherwise angularly located with respect thereto in order to assure a non-rotatable relation between the stock and the wire **17**.

In Fig. 3, we do not rely upon a special ring **22** having a bore contoured in accordance with stock contour but, rather, we specially form the necked-down or reduced portions of the wire **17** with an appropriate non-circular or keying contour, as suggested at **24**. In this embodiment, it will be understood that the stock may be non-rotatably engaged to the wire at as many specific locations as there are necked-down crimpings, thus minimizing any inadvertent binding or wrapping of the wire to one or the other of the relatively rotating elements.

It will be seen that we have described a relatively simple means adaptable to existing stock-supporting mechanisms, for resisting stock whip and for avoiding such damage to the stock or to the machine as arises from stock whip. In use, we prefer that the stock tube

be internally lubricated so as to minimize friction between the wire **17** and the wall or bore of the tube **10**; end flanges **18—19** will serve as retaining means for the lubricant, and rotation of the wire **17** upon stock rotation will serve as a means for uniformly distributing the lubricant around the wall of the stock tube. The fact that each turn of the helix **17** is adjacent to another turn of different radius means that adjacent turns will be characterized by different natural mechanically resonant frequencies, so that the helix or wire **17** itself may be said to have broad band-pass characteristics; this band-pass may include the stock-whip resonant frequencies for all stock lengths that will be accommodated within the tube **10**, so that there may be substantially reduced tendency to establishment of sustained stock-whip oscillation.

While we have described the invention in detail for the preferred forms shown, it will be understood that modifications may be made within the scope of the invention as defined in the claims which follow.

We claim:

1. Means for supporting the free end of stock rotatably carried by an automatic lathe or the like machine, comprising an elongated tube and a coil of wire wound within said tube and mounted for rotation therein, said coil of wire being characterized by a helical progression of radius varying as a function of length along the axis of said tube, said radius varying between an outer limit determined by the confinement of the bore of said tube and an inner limit of diametral proportions no greater than at least the maximum diametral extent of stock to be accommodated therein whereby the stock may carry said coil of wire for rotation so that lubricant within said tube may be dispersed and distributed by movement of said coil over the inner wall of said tube and so that coil-to-tube frictional drag may be kept to a minimum, further whereby the stock may not be marred as it is rotated within and fed through said tube.

2. Stock-supporting means according to claim 1, in which said helical progression undulates periodically as a function of length between said limits of radius.

3. Stock-supporting means according to claim 1, in which the turns of said helix are tightly wound in close adjacency.

4. Stock-supporting means for supporting the otherwise free end of rotating stock, comprising an elongated tube with inwardly directed retaining-flange means at both ends, an undulating helix of resilient wire limited axially by said flange means and having an unstressed minimum radius less than the minimum radius of one of said flanges, said wire helix being mounted for rotation within said tube whereby stock inserted past one of said flange means may nevertheless engage and radially outwardly stress spaced portions of said helix, so that said wire helix may be carried for rotation with an inserted piece of stock.

5. Stock-supporting means according to claim 4, in which said tube rotatably carries a stock-engaging member having a bore of non-circular contour, whereby said stock-engaging member may rotate with the stock and provide a bearing in said tube.

6. Stock-supporting means for rotatably supporting the otherwise unsupported end of a piece of stock of non-circular external cross-sectional contour, comprising an elongated tube having a bore exceeding the maximum diametral extent of the stock, a helix of resilient wire rotatably carried within said tube and of radius undulating between an outer limit defined by the bore of said tube and an unstressed inner limit less than the maximum diametral extent of said stock, and non-circular means carried with said coil of wire for keyed rotation with the stock, whereby the wire may be driven in rotation upon rotation of the stock.

7. Stock-supporting means according to claim 6, in which said non-circular means is a ring journalled in said tube and engaged for rotation with said wire and having a non-circular stock-engaging bore.

8. Stock-supporting means according to claim 6, in which said non-circular means comprises a non-circular stock-engaging crimping in a turn of said wire.

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