Oct. 31, 1939. R. ECKARDT 2,178,114

STOCK REEL MECHANISM FOR AUTOMATIC MULTIPLE SPINDLE SCREW MACHINES

Filed May 7, 1938 2 Sheets-Sheet 1

Fig. 1.

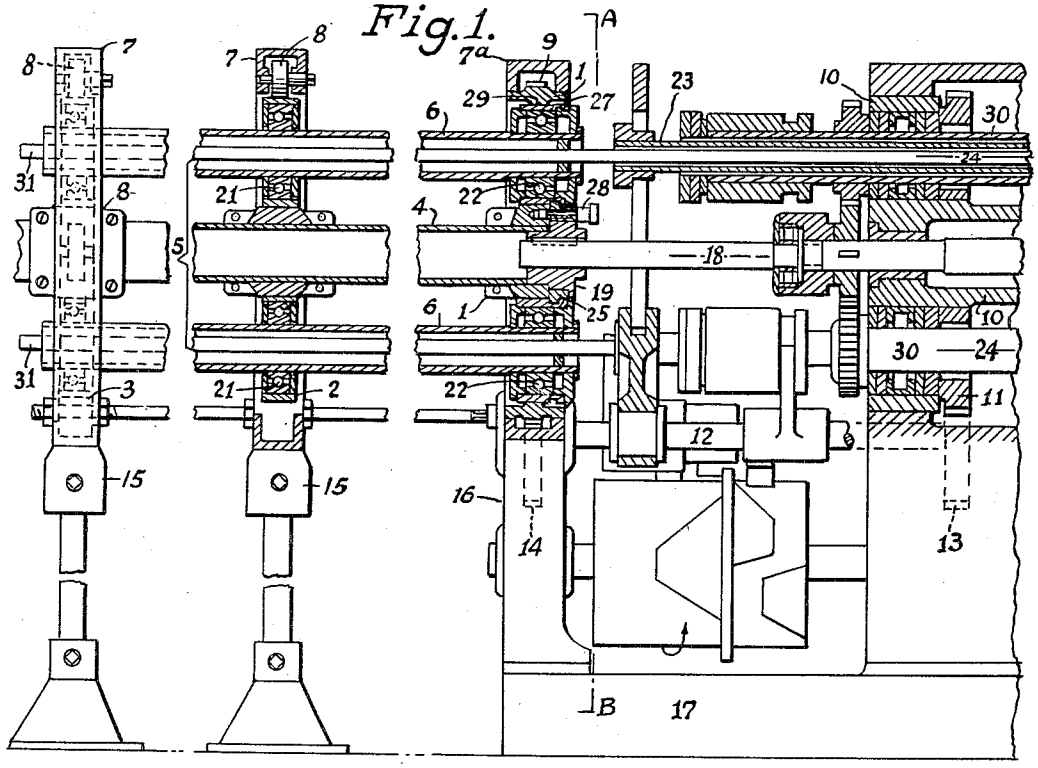
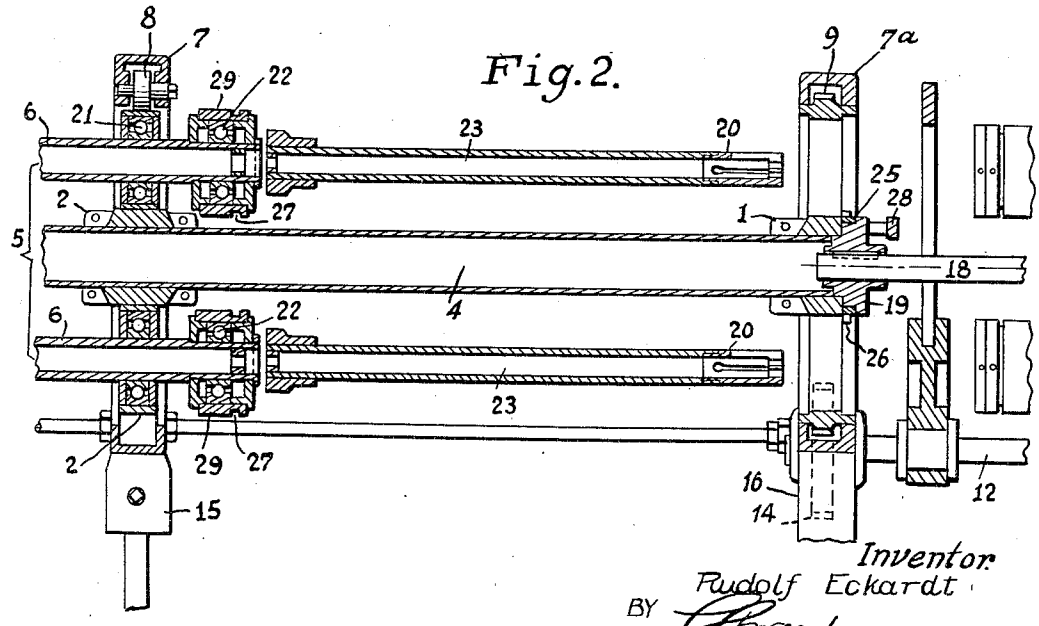


Fig. 2.



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Fig. 4

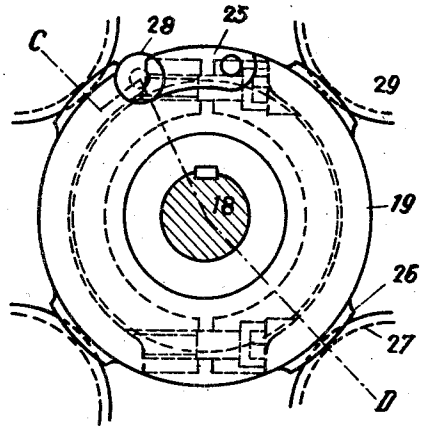
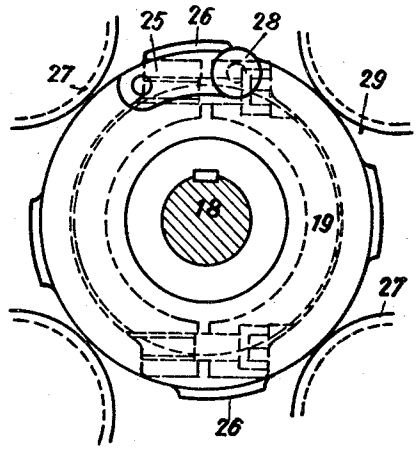


Fig. 5



A-B

Fig. 3

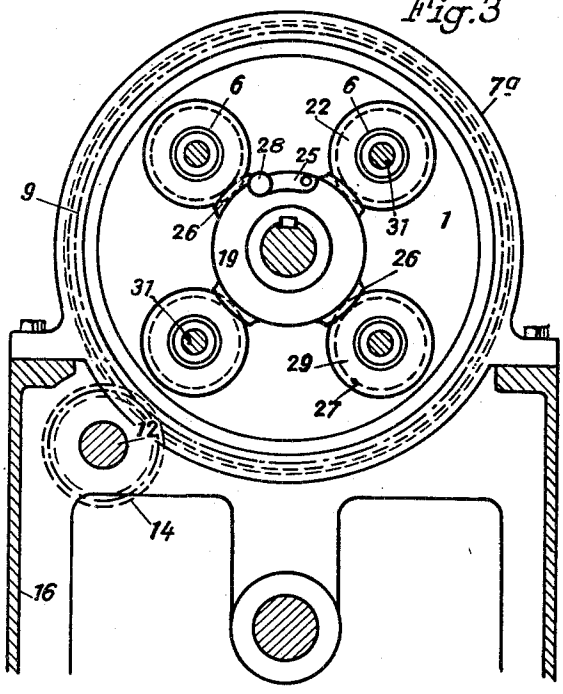
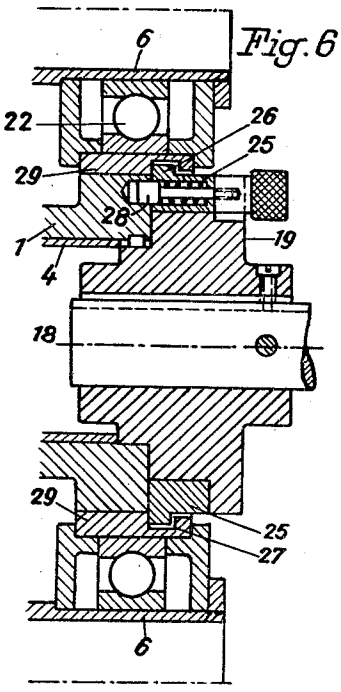


Fig. 6



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STOCK REEL MECHANISM FOR AUTOMATIC MULTIPLE SPINDLE SCREW MACHINES

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Application May 7, 1938, Serial No. 206,559
In Germany August 9, 1937

15 Claims. (Cl. 29—37)

The invention relates to a stock reel mechanism for automatic multiple spindle screw machines and an object of the invention being the provision of means which will allow an easy withdrawal of the feed tubes together with their collets from the work spindles of the spindle carrier so that the insertion of the new stock rods is facilitated.

A further object of the present invention is to provide an improved stock reel mechanism which is indexed with the work spindle carrier, the present improvement being applicable to the machine shown and described in the United States patent of Alfred E. Drissner No. 2,011,712 in which the stock reel cage is located in the rear of the work spindle carrier and positively indexed from a common indexing shaft by a gear transmission together with the work spindle carrier.

Heretofore, in the stock reel mechanisms of this kind it has been the practice for the purpose of interchanging the feed collets to draw back or push aside the whole device including its stanchions or supports in order to make room for withdrawing the feed tubes. This is, however, a difficult, cumbersome and time-absorbing work for setting up the automatic multiple spindle screw machine and causes a reduction of the working capacity.

Furthermore, the inserting of the stock rods through the stock rod tubes as well as the feed tubes and the collets is often very complicated for the reason that the stock rods cannot always be inserted by hand alone because of the length of the stock reel cage; especially, if shorter stock rods are to be inserted this can only be done by means of bolts and a hammer.

According to the invention the stock rod tubes may be withdrawn independently of one another in a direction opposite to that of the feed of the stock rods. Thus it is possible to easily withdraw the feed tubes together with their feed collets from the work spindles of the spindle carrier and to easily interchange the feed collects without having to adjust or remove the stock reel mechanism itself. Furthermore, compared with the known stock reel mechanisms an easier insertion of the new stock rods may take place for the reason that the latter, if the stock rod tubes are withdrawn, may be gripped by hand and pushed through the resilient feed collets without any knocking action. The free space between the reel discs of the stock reel cage resulting from the withdrawal of the stock rod tubes makes it possible to easily grip the stock rods to be inserted and to push them forwards by hand.

According to the invention the several stock rod tubes arranged within the stock reel cage are mounted independently of one another and are longitudinally slidable in guide discs for the said reel cage. Anti-friction bearings which are preferably formed as anti-friction roller bearings are mounted in the guide discs of the said reel cage and the anti-friction roller bearings mounted in the front guide disc of the reel are fixedly connected with the stock rod tubes and secured in their working position in the reel disc by a locking mechanism.

In the drawings accompanying and forming a part of this specification,

Fig. 1 is a vertical longitudinal section through the stock reel mechanism in operative position.

Fig. 2 illustrates the same longitudinal section when the machine is idle and the stock rod tubes are withdrawn.

Fig. 3 is a cross-section on the line A—B of Fig. 1, the locking cam disc being in operative position.

Fig. 4 illustrates in a face view the locking cam disc in an enlarged scale.

Fig. 5 is a view similar to Fig. 4 of the locking cam disc in its releasing position, and

Fig. 6 is a section on the line C—D of Fig. 4.

The stock reel mechanism consists fundamentally of three or more reel discs 1, 2, 3 which are rigidly connected with one another by a central tube 4 and in which, according to the number of spindles of the respective automatic multiple spindle machine, four or more stock rod tubes 6 are rotatably mounted in anti-friction roller bearings 21, 22. The unit consisting of the reel discs 1, 2, 3, the central tube 4 and the several stock rod tubes 6 will be referred to in the following as the stock reel cage. The said reel cage is mounted with its discs 2 and 3 in several two-part bearing brackets 7 on supporting rollers 8. However the front reel disc 1 running in the front bearing bracket 7a comprises a rim gear wheel 9 by means of which the entire stock reel cage 5 is indexed from a gear 11 of the work spindle carrier 10 by means of a shaft 12 and two toothed gears 13, 14 in one-to-one driving relation to rotate in unison. The bearing brackets 7 rest on the stanchions or supports 15 which are adjustable in the height. The front bearing bracket 7a is however mounted on a projection 16 of the machine bed 17 or is fixed to the machine in another manner. The central tube 4 and consequently the whole stock reel cage 5 lies in alignment with the axis 18 of the indexible spindle carrier 10. By the gear transmission 11—9 between the spindle carrier 10 and

the stock reel cage 5 a retardation of the stock rod ends with respect to the work spindles 30 and a warping or bending of a comparatively long stock reel cage 5 is avoided.

The stock rod tubes 6 are guided in anti-friction roller bearings 21 of the reel discs 2 and 3 with so much clearance that they may easily be shifted in an axial direction. However in the front reel disc 1 the roller bearings 22 are fixedly arranged on the stock rod tubes 6, so that on removing a stock rod tube 6 its roller bearing 22 will be taken with it and drawn out of the reel disc 1. In order to be able to withdraw the stock rod tubes 6 in the direction of the longitudinal axis 24 of the respective work spindles when interchanging the feed collets 20 (Fig. 2) on the feed tubes 23 and to enable the withdrawing of the said feed tubes 23, a locking cam disc 25 is arranged between the reel disc 1 and a flange 19 mounted coaxially with the central tube 4, which locking cam disc is provided with as many locking cams 26 as the machine has work spindles 30. During the operation and while the feed tubes 23 are in the work spindles, these locking cams 26 engage with grooves 27 in the roller bearings 22. By a locking bolt 28 the locking cam disc 25 is held in working position to the grooves 27, so that a withdrawing or sliding back of the stock rod tubes 6 during the operation cannot take place. If the locking bolt 28 is withdrawn from the locking cam disc 25, the latter may be revolved so far on the central flange 19 supporting the reel disc 1 that the locking cams 26 emerge from the grooves 27 and thus the outer bearing rings 29 of the roller bearings 22 are released in order to enable the withdrawal of the stock rod tubes 6 and to produce a sufficient free space between the work spindles 30 and the stock rod tubes so that an interchanging of the feed collets 20 in the feed tubes 23 may be effected (Fig. 2) without a lateral shifting of the whole stock reel cage 5 out of its position being necessary.

In order to prevent that the outer bearing rings 29 of the roller bearings 22 do not take part in the possible revolutions of the stock rod tubes 6, they are secured in the reel disc 1 against rotation.

The operation is as follows:

In operation of the automatic multiple spindle screw machine the four or more stock rods 31 taken with the chucks or clamping devices of the work spindles 30 are guided in the stock rod tubes 6. If the stock rods 31 hit against the inner wall or the guiding rings of the stock rod tubes 6, the latter rotate in their ball or roller bearings 21, 22, so that they rotate with the stock rods 31 absolutely easily and with the least exertion of power.

When indexing the spindle carrier 10 with the work spindles 30 the stock reel cage 5 moves with all stock rod tubes 6 in exactly the same measure of time with the spindle carrier 10 for the reason that the latter is positively connected with the reel disc 1 by means of the gear 11, the transmission shaft 12 with the toothed gears 13—14 and the rim gear wheel 9.

The interchanging of the feed collets 20 for another thickness of the stock rods 31 takes place when the machine is at rest by that first the locking bolt 28 is drawn out of the reel disc 1 and the locking cam disc 25 is revolved so far on the flange 19 until the locking cams 26 of the locking cam disc 25 come to lie outside the grooves 27 of the rings 29. Thereby the outer rings 29 of the roller bearings 22 in the front reel disc 1 are released so that these may be drawn separately out of the reel disc 1 with the stock rod tubes 6. As the stock rod tubes 6 are arranged in the roller bearings 21 of the reel discs 2 and 3 with clearance, they may be drawn back up to the reel disc 2 on removal from the bearing places of the reel disc 1. As further the stanchions 15 for the stock reel cage 5 and thus also the reel discs 2 and 3 have a considerable distance from one another, the stock rod tubes 6 are also guided in a greatly withdrawn condition absolutely securely, horizontally and concurrently.

The bearing places of the roller bearings 22 in the front reel disc 1 are preferably constructed in such a manner that after withdrawal of the stock rod tubes 6 together with the roller bearings 22 arranged thereon there is sufficient room for removing the feed tubes 23 with the collets 20 and the re-insertion of the feed tubes with the interchanged collets may easily be effected. In other words, greater clearance is obtained to facilitate the withdrawal of the collet with such enlarged end as it may have which would otherwise not be possible if the bearings were fixed to the reel disc.

After the interchanging of the feed collets 20 and after the insertion of the feed tubes 23 into the work spindles 30, the new stock rods 31 are freely pushed through the withdrawn stock rod tubes 6 and are then pushed between these and the front guide bracket 7a by hand through the feed collet 20 within the work spindles 30 without any trouble and force. Thereupon the stock rod tubes 6 are again brought into their working position by that they are re-inserted with the roller bearing 22 into the bores of the front reel disc 1. The locking cam disc 25 is turned back to its locking position, and by the automatic engaging of the locking bolt 28 with the reel disc 1, a sliding back or shifting of the stock rod tubes 6 longitudinally is avoided.

What I claim is:

1. A stock reel mechanism for automatic multiple spindle screw machines having a rotatable work spindle carrier provided with work spindles and comprising a reel for supporting stock rods fed to the work spindle carrier and located in the rear of the spindle carrier, the said reel comprising guide discs and a number of stock rod tubes longitudinally slidable in the said guide discs independently of one another and means for indexing the reel from the work spindle carrier.

2. A stock reel mechanism for automatic multiple spindle screw machines having a rotatable work spindle carrier provided with work spindles and comprising a reel for supporting stock rods fed to the work spindle carrier and located in the rear of the spindle carrier, the said reel comprising guide discs and a number of rotatable stock rod tubes longitudinally slidable in the said guide discs independently of one another and mounted in anti-friction roller bearings of the guide discs and means for indexing the reel from the work spindle carrier.

3. A stock reel mechanism for automatic multiple spindle screw machines having a rotatable work spindle carrier provided with work spindles and comprising a reel for supporting stock rods fed to the work spindle carrier, the said reel comprising guide discs having a front disc and a number of stock rod tubes longitudinally slidable independently of one another and mounted in anti-friction roller bearings of the guide discs, the anti-friction roller bearings arranged in the

front disc being fixedly connected to the stock rod tubes whereby the tubes and said last bearings may be longitudinally slidable to effect greater clearance for removal of the collet tubes without movement of the guide discs, and means for indexing the reel from the work spindle carrier.

4. A stock reel mechanism for automatic multiple spindle screw machines having a rotatable work spindle carrier provided with work spindles and comprising a reel for supporting stock rods fed to the work spindle carrier, the said reel comprising guide discs, having a front disc, an intermediate disc and a rear disc, and a number of stock rod tubes arranged with clearance in the said intermediate disc and rear disc, so as to be shiftable in axial direction in the said discs, and mounted in anti-friction roller bearings of the guide discs, the anti-friction roller bearings arranged in the front disc being fixedly connected to the stock rod tubes whereby the tubes and said fixed bearings may be axially shifted to effect greater clearance for removal of the collet tubes without movement of the guide discs, and means for indexing the reel from the work spindle carrier.

5. A stock reel mechanism for automatic multiple spindle screw machines having a rotatable work spindle carrier provided with work spindles and comprising a reel for supporting stock rods fed to the work spindle carrier, the said reel comprising guide discs having a rear disc mounted on a stanchion, an intermediate disc mounted on another stanchion and a front disc mounted on a projection of the base of the machine, and a number of stock rod tubes arranged with clearance in the said intermediate disc and rear disc and mounted in anti-friction roller bearings of the guide discs, the anti-friction roller bearings arranged in the front disc being fixedly connected to the stock rod tubes whereby the tubes and said fixed bearings may be axially shifted to effect greater clearance for removal of the collet tubes without movement of the guide discs, and means for indexing the reel from the work spindle carrier.

6. A stock reel mechanism for automatic multiple spindle screw machines having a rotatable work spindle carrier provided with work spindles and comprising a reel for supporting stock rods fed to the work spindle carrier, the said reel comprising guide discs having a front disc and a number of stock rod tubes longitudinally slidable independently of one another and mounted in anti-friction roller bearings of the guide discs, the anti-friction roller bearings arranged in the front disc being fixedly connected to the stock rod tubes whereby the tubes and said last bearings may be longitudinally slidable to effect greater clearance for removal of the collet tubes without movement of the guide discs, and means for locking the said stock rod tubes in the front disc.

7. A stock reel mechanism for automatic multiple spindle screw machines having a rotatable work spindle carrier provided with work spindles and comprising a reel for supporting stock rods fed to the work spindle carrier, the said reel comprising guide discs having a front disc and a number of stock rod tubes arranged independently of one another and mounted in anti-friction roller bearings of the guide discs, the anti-friction roller bearings arranged in the front disc being fixedly connected to the stock rod tubes and means for locking the said stock rod tubes in the front disc comprising a locking cam disc provided with locking cams adapted to enter grooves in the roller bearings.

8. A stock reel mechanism for automatic multiple spindle screw machines having a rotatable work spindle carrier provided with work spindles and comprising a reel for supporting stock rods fed to the work spindle carrier, the said reel comprising guide discs having a front disc and a number of stock rod tubes arranged independently of one another and mounted in anti-friction roller bearings of the guide discs, the anti-friction roller bearings arranged in the front disc being fixedly connected to the stock rod tubes and means for locking the said stock rod tubes in the front disc comprising a locking cam disc provided with locking cams adapted to enter grooves in the roller bearings and a locking bolt for securing the said locking cam disc in the working position thereof.

9. A stock reel mechanism for automatic multiple spindle screw machines having a rotatable work spindle carrier provided with work spindles and comprising a reel for supporting stock rods fed to the work spindle carrier, the said reel comprising guide discs having a front disc and a number of stock rod tubes arranged independently of one another and mounted in anti-friction roller bearings of the guide discs, the anti-friction roller bearings arranged in the front disc being fixedly connected to the stock rod tubes and means for locking the said stock rod tubes in the front disc comprising a locking cam disc provided with locking cams adapted to enter grooves in the roller bearings and in a number equal to the number of the work spindles of the machine.

10. A stock reel mechanism for automatic multiple spindle screw machines having a rotatable work spindle carrier provided with work spindles and comprising a reel for supporting stock rods fed to the work spindle carrier, the said reel comprising guide discs having a front disc and a number of stock rod tubes arranged independently of one another and mounted in anti-friction roller bearings of the guide discs, the anti-friction roller bearings arranged in the front disc being fixedly connected to the stock rod tubes and means for locking the said stock rod tubes in the front disc comprising a locking cam disc provided with locking cams adapted to enter grooves in the roller bearings and a locking bolt for securing the said locking cam disc in the working position thereof, the said locking bolt being under spring action and engaging with a bore in the front reel disc.

11. An automatic multiple spindle screw machine having a rotatable work spindle carrier provided with rotating work spindles, a stock reel for supporting stock rods fed to the work spindles of the carrier and located in the rear of the work spindle carrier and comprising guiding means and a plurality of stock rod tubes longitudinally slidable in said guiding means and shiftable relative thereto without shifting said stock reel, means for securing each of the tubes against sliding movement, and means for indexing the reel from the work spindle carrier.

12. In a machine of the class described, the combination of a rotary work spindle, means for supporting a stock rod fed to the work spindle and located in the rear thereof and comprising guiding means and a stock rod tube longitudinally slidable in said guiding means and shiftable without the shifting of said supporting

means, and means for locking said tube against sliding movement.

13. A stock rod supporting means for a spindle carrier machine and located at the rear of the spindle carrier and comprising a stock rod tube, a plurality of longitudinally spaced means for supporting said tube, bearings located between said supporting means and the tube for rotatably supporting said tube, and means for securing the tube against longitudinal movement and effective to permit such movement without movement of the supporting means.

14. A stock rod supporting means for a spindle carrier machine and located at the rear of the spindle carrier and comprising a stock rod tube, a plurality of longitudinally spaced means for supporting said tube, bearings located between said supporting means and the tube for rotatably supporting said tube, and means for securing the tube against longitudinal movement and effective to permit such movement without movement of the supporting means and comprising bearings secured to the stock rod tube and means carried by one of said supporting means for locking the bearings thereto.

15. A stock rod supporting means for a spindle carrier machine and located at the rear of the spindle carrier and comprising a plurality of stock rod tubes, a plurality of longitudinally spaced stock reel discs for supporting said tubes, bearings located between said stock reel discs and the tubes for rotatably supporting said tubes, the bearings of the stock reel discs adjacent to the spindle carrier carried by and fixed to the stock rod tubes, and means carried by said stock reel discs for locking said last bearings in place, the other bearings having a clearance therebetween and the stock tubes whereby upon release of the locked bearings, the tubes and their fixed bearings may be longitudinally moved without movement of the stock reel discs.

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