This invention relates to metal working machines of the class commonly known as automatic screw machines, and particularly to those of the multiple spindle type, the invention being concerned primarily with improvements in stock reels employed in connection with such machines.

One object of the invention is to provide a stock reel having longitudinally adjustable stock tubes normally locked in working relation to the spindles of the screw machine and individually releasable for adjustment away from their respective spindles. A further object is to provide a stock reel comprising a plurality of stock tubes and a pair of heads supporting them, with one of the heads mounted for longitudinal adjustment away from the screw machine and arranged for carrying with it all the stock tubes simultaneously to afford space for withdrawing the stock pushers and feed tubes from the spindles of the screw machine without disconnecting the reel from the machine or moving it bodily.

More specifically, it is an object of the invention to provide a stock reel which includes a shaft arranged for connection with the indexing head of the screw machine and itself supporting a pair of heads which, in turn, support the stock tubes of the reel, one of the heads being adjustable longitudinally on the shaft by means of interconnected gearing operable at will, and the stock tubes being detachably interlocked with the adjustable head so that they may be readily shifted out of normal working relation to the spindles of the machine to afford access to rods or bars of stock to be entered in the spindle.

Other objects and advantages will become apparent from the following detailed description taken in connection with the accompanying drawings, in which:

Fig. 1 is a front elevation of a stock reel embodying this invention, showing in dotted outline a fragmentary portion of one end of a screw machine to indicate the relation of the reel thereto.

Fig. 2 is an end elevation showing the stock reel and the rack member by which the outer end of the reel is supported.

Fig. 3 is a vertical section taken as indicated at line 3–3 on Fig. 1 and on a larger scale, showing details of construction of one head of the stock reel.

Fig. 4 is a staggered section taken substantially at the planes indicated by line 4–4 on Fig. 3.

Fig. 5 is a detail section taken as indicated at line 5–5 on Fig. 3.

Fig. 6 is a section taken at the plane indicated at line 6–6 on Fig. 2.

While there is shown in the drawings, and herein described in detail, a preferred form of the invention as embodied in a stock reel mechanism designed for use with a six-spindle automatic screw machine, it should be understood that the invention is not limited to the specific form or application disclosed, but that it is the intention to cover all modifications and alternative constructions falling within the spirit and scope of the invention, as expressed in the appended claims.

As shown in the drawings, the stock reel is supported at one end of the automatic screw machine by means of a pedestal, having a foot flange secured to the floor, and a pedestal mounted on a bracket which is formed or provided at the end of the screw machine bed, indicated in dotted outline at 1 in Fig. 1. The reel includes a drive shaft which may be understood as connected to the rotatable spindle carrier or indexing head of the screw machine by means of a flexible coupling of any suitable type, including a drive flange shown at 7. (A flexible coupling is preferred so as to compensate for any misalignment between the stock reel shaft and the machine shaft to which it is connected.) The shaft engages for rotation the circular head members 8 and 9 which are rotatably carried by cradles 10 and 11 respectively supported on the pedestals 1 and 3. The head members 8 and 9, in turn, carry a plurality of stock tubes 12 each dimensioned to receive loosely a rod or bar of the size and shape which is being employed in the screw machine for making a particular product. Each of the stock tubes 12 is held in alignment with one of the several hollow spindles of the machine (not shown), and the rod or bar contained in each tube 12 is fed at intervals therefrom into the aligned hollow spindle by feed mechanism embodied in the index head or carrier of the machine. Such mechanism may be of the same general type as that shown and described in Patent No. 1,825,749, dated October 6, 1931, although it happens that this patent illustrates a four-spindle machine, while the stock reel shown herein is designed for a machine having six spindles journaled in its indexing head or carrier.

It will be understood that each spindle of the screw machine includes a collet structure by which the stock is gripped with its end portion.
protruding in position to be worked upon by the various tools of the machine in forming it into the finished product, also a feeding mechanism consisting of a feed tube and detachable feed finger, the latter being changed for each size or shape of stock. When the rod or bar is first placed in the stock tube 12 and then entered in the hollow spindles of the machine which is aligned with the tube 12, it often requires considerable force to throw the end of the bar through the feed finger and the collet into position; and to enable the operator to do this in setting up a new supply of stock for the machine, he must have a substantial space between the machine and the reel. He must have room for grasping the rods which are to be inserted in the additional collets, and he must also have additional distance so that the rods can be backed up and then thrust with substantial force and momentum into the feed fingers and the collets, and through them into working position. To provide this space when needed, each of the tubes 12 is slidable held in the heads 8 and 9 of the reel. As shown in Figs. 4 and 6, each tube 12 is carried in the head 8 on ball bearings 13, the outer bearing race 14 being secured in the reel by a threaded locking ring 15, and the inner race 16 fitting snugly, but slidably around the tube 12. Similarly, in the head 9 the tube is carried on ball bearings 17, and the inner race 18 slidably engages the tube 12. Each tube 12 has fixed upon it a locking collar 19, and for each of the tubes the head 9 carries a swinging latch 20 which is pivoted at 21 and is normally held by a spring 22 in position for encounter with the flat face of the collar 19 so as to retain the tube 12 in projected position closely adjacent the corresponding spindle (not shown) of the screw machine. 

When it is desired to slide the tube 12 back from the spindle to give access to the rod stock in the tube it is only necessary for the operator to press the projecting finger-piece 23 of the latch 20 so as to swing the latch clear of the collar 19; he may then slide the tube back until its terminal collar 24 strikes the face of the reel head 9.

When the tube is returned to its normal position the beveled face 15 of the collar 19 engages the beveled surface 20 of the latch, momentarily forcing the latch aside so that the collar can be moved to its final position against the surface of the head 9; then the spring 22 will return the latch to locking position. In order that the tubes 12 may turn freely on their ball bearings with the stock which they contain, whenever the stock is rotated by the spindles of the screw machine, each of the latches 20 is looked into its swing to locking position by a pin 22 which holds the latch just out of contact with the tube 12, as seen in Fig. 3.

In a screw machine of the type shown in Patent No. 1,823,749 it is necessary to remove the stock pusher jaws and their feed tubes from the spindle whenever the size or shape of stock employed in the machine is changed. Since the feed tubes carried by the spindles are considerably longer than the clearance afforded by merely shifting the stock tubes 12, as just described, the head 9 itself is constructed so that it may be shifted toward the left in Fig. 1, away from the head of the screw machine, carrying the stock tubes 12 with it, to provide sufficient space for this operation of changing the stock pushers. The shaft 6 has a toothed rack 25 cut in its cylindrical surface, and the hub 26 of the head 9 houses a pinion 27 meshing with the teeth of the rack 25, as seen in Fig. 4. A bearing 28 is formed on the head 9 for the shaft 29 of the pinion 27, and the shaft has a squared end at 30 accessible through the periphery of each size or shape of stock. The shaft 29 is retained in its bearing 28 by means of a thread stud 31 set into the face of the head 9 and engaging a groove 32 in the shaft. By applying a suitable crank or socket wrench to the squared end 30 the operator can turn the shaft 29 to cause the pinion 27 to travel along the rack 25 and thus feed the head 9 back along the shaft 6 far away from the machine as desired. When the crank or wrench is to be applied to the part 30 for thus shifting the head 9, the spindle-carrying head of the screw machine will first be "indexed" or turned to rotate the reel to a position at which the squared end 30 of the gear shaft 29 is conveniently disposed, as, for example, at the upper side of the reel, as in Fig. 3. The rack teeth 25 may extend to any suitable distance; as shown in Fig. 1 they are cut into about one-half the length of the shaft 6.

It will be evident that when the head 9 is thus adjusted toward the head 8 of the reel, all the tubes 12 being locked to the head by means of the latches 29 are swung in with the stock, thus providing ample clearance space between the ends of the tubes and the head of the machine for manipulating the rod stock into working position in the collets of the spindles. The head 8 on the other hand, will remain in its cradle 10, being held therein against axial movement by engagement of the bearing rollers 33 in the peripheral groove 34 of the head 8. The head 9 differs in that its periphery 35 is not grooved (Fig. 6) and will therefore slide off the bearing rollers 36 on which it is normally carried in the cradle 11. One edge of the surface 35 is beveled at 37 to facilitate replacing the head 9 on the rollers 36 when it is returned to normal working position by reverse rotation of the adjusting shaft 28 and its pinion 27.

Preferably, the reel structure is reinforced and stiffened by means of a web member shown at 38 in Fig. 1, intermediate the heads 8 and 9. This web 38 is fixed to the shaft 6 and is provided with ball bearings similar to those in the heads 8 and 9 for supporting the tubes 12 and permitting their sliding adjustment readily, as already described. The bearing cradle 10 is steadied by horizontal tie members 39 which connect it to the cradle 11, as seen in Fig. 1, and hold it firmly against the frictional thrust of the tubes 12 as they are shifted longitudinally through their bearings 16. And to insure retention of the head 8 on its bearing rollers when the stock tubes are operated at high speed, an arcuate member 16 may be connected to the cradle 10 to extend over the head 8, and may have a bearing roller 33 engaged in the groove 34, as seen in Fig. 2.

The drawings show the pedestal 1 formed with a broad base extending transversely of the axis of the reel and having upstanding horns 40 which serve as portions of the rack to hold supplies of stock for use in the reel. The rack is completed by a member 41 standing on the floor adjacent the end of the machine bed 5 and having horns similar to the horns 40 and shaped to cradle the rod stock until they are needed in the machine. The horns 40 may also serve to anchor bracing straps 43 which extend upwardly therefrom and into connection with the
2,328,733

I claim as my invention:

1. A stock reel for a multiple spindle screw machine comprising a shaft with driving means for coupling one end of the shaft to the indexing head of the machine, a plurality of stock tubes extending parallel to the shaft, a pair of heads on the shaft engaged for rotation therewith and supporting said tubes, the head at the end of the reel adjacent the machine being slidably adjustable along the shaft, said shaft being provided with rack teeth, and a gear journaled in said head meshing with said rack and rotatable for feeding the head along the shaft.

2. A stock reel for a multiple spindle screw machine comprising a shaft with driving means for coupling one end of the shaft to the indexing head of the machine, a plurality of stock tubes extending parallel to the shaft, and a pair of heads on the shaft engaged for rotation therewith and supporting said tubes, the head at the end of the reel adjacent the machine being slidably adjustable along the shaft and the head at the end of the reel adjacent to the indexing head being provided with positively engaged gearing operable to feed the head in either direction along the shaft.

3. A stock reel for a multiple spindle screw machine comprising a shaft with driving means for coupling one end of the shaft to the indexing head of the machine, a plurality of stock tubes extending parallel to the shaft, a pair of heads on the shaft engaged for rotation therewith and supporting said tubes, the head at the end of the reel adjacent the machine being adjustable along the shaft, and means normally interlocking the stock tubes with said adjustable head for longitudinal movement therewith, said tubes being longitudinally slidable in the other head.

4. A stock reel for a multiple spindle screw machine comprising a shaft with driving means for coupling one end of the shaft to the indexing head of the machine, a plurality of stock tubes extending parallel to the shaft, a pair of heads on the shaft engaged for rotation therewith and supporting said tubes, and bearing means on which said heads are rotatably carried, said bearing means being fixed in relation to the machine, the head at the end of the reel adjacent the machine being adjustable along the shaft, means normally interlocking the stock tubes with said adjustable head for longitudinal movement therewith, the bearing for the other head having means inter-engaged with said head and preventing its movement in the direction of the shaft axis, and the stock tubes being longitudinally slidable in said other head.

5. A stock reel for a multiple spindle screw machine comprising a shaft with driving means for coupling one end of the shaft to the indexing head of the machine, bearing means by which the other end of the shaft is supported for rotation, a plurality of stock tubes extending parallel to the shaft, a pair of heads on the shaft engaged for rotation therewith and supporting said tubes, the head at the end of the reel adjacent the machine being adjustable along the shaft, and means normally interlocking the stock tubes with said adjustable head for longitudinal movement therewith.

6. A stock reel for a multiple spindle screw machine comprising a shaft with driving means for coupling one end of the shaft to the indexing head of the machine, a plurality of stock tubes extending parallel to the shaft, a pair of heads on the shaft engaged for rotation therewith and supporting said tubes, the head at the end of the reel adjacent the machine being slidably adjustable along the shaft, said shaft being provided with rack teeth, a gear journaled in said head meshing with said rack and rotatable for feeding the head along the shaft, bearing means on which said members are rotatably carried, said bearing means being fixed in relation to the machine, and releasable latching means by which the stock tubes are normally interlocked with the adjustable head at their working positions in relation to the spindles of the machine, said tubes being longitudinally slidable in the other head, and the bearing means for said other head having means inter-engaged with said head which prevents its movement in the direction of the shaft axis.

7. A stock reel for a multiple spindle screw machine connected to the indexing head of the machine for rotation therewith, said reel including a shaft, a plurality of stock tubes extending parallel to the shaft, a pair of heads on the shaft connected thereby for rotation and supporting said tubes, the head at the end of the reel adjacent the machine being spaced away from the machine by a substantial distance, said tubes with the end portions of the tubes projecting from the head through said distance and closely proximate the machine in their working positions, said end portions of the tubes being longitudinally adjustable in said head for retraction from working position back to said head, and separate latching means for each tube on one of the heads normally locking the tubes at projected working position but individually releasable at will.

8. In the combination defined in claim 7, stop means on each tube engaging with one of the heads to prevent withdrawal of the end of the tube from said head adjacent the machine.

9. In the combination defined in claim 7, a terminal collar on each tube engageable with said head adjacent the machine to prevent withdrawal of the end of the tube from said head.

10. In the combination defined in claim 7, a collar fixed on each tube in position to engage one of the heads and limit the extent of projection of the tube toward the machine in working position, said collar actuating a pair of said inter-engaging means.

11. In the combination defined in claim 7, said stock tubes being slidable bodily in said heads independently of each other toward and from their working positions, each tube having a fixed collar which abuts one of the heads when the tube is at working position and a second collar which abuts one of the heads to limit the sliding movement of the tube away from working position and prevents withdrawal of the tube from the head adjacent the machine.

12. A stock reel for a multiple spindle screw machine connected for rotation with the indexing head of the machine, said reel including a shaft, a plurality of stock tubes extending parallel to the shaft and a pair of heads connected for rotation thereby and supporting said tubes, the stock tubes being longitudinally slidable in said heads independently of each other toward and from their working positions in relation to the spindles of the machine, a pair of locking members for each tube comprising a fixed collar which stands adjacent one of the heads when the tube is at working position and a separate latch on said head engageable with said tube.
4. A collar to hold the tube at working position, each latch being individually releasable at will to permit sliding the tube away from the spindle of the machine which it serves, said latch being spring-pressed to latching position and one of said locking members having a beveled face causing the latch to ride over the collar as the tube is returned toward the spindle, whereby the tube is automatically locked in working position.

13. A stock reel for a multiple spindle screw machine connected to the indexing head of the machine for rotation therewith, said reel including a shaft, a plurality of stock tubes extending parallel to the said shaft, a pair of heads on the shaft engaged for rotation therewith and anti-friction bearings fixedly mounted in said heads and supporting said tubes, the head at the end of the reel adjacent the machine being spaced away from the machine by a substantial distance with the end portions of the tubes projecting from their bearings in the head through said distance and closely proximate the machine in their working positions, the tubes being slideable in their bearings in said head for retraction of said projecting end portions from working position back to said head, and stop means preventing withdrawal of the tubes from said bearings.

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