No. 641,040. Patented Jan. 9, 1900.

C. G. RICHARDSON.

ROD FEEDING DEVICE.

(Application filed June 15, 1899.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 2.

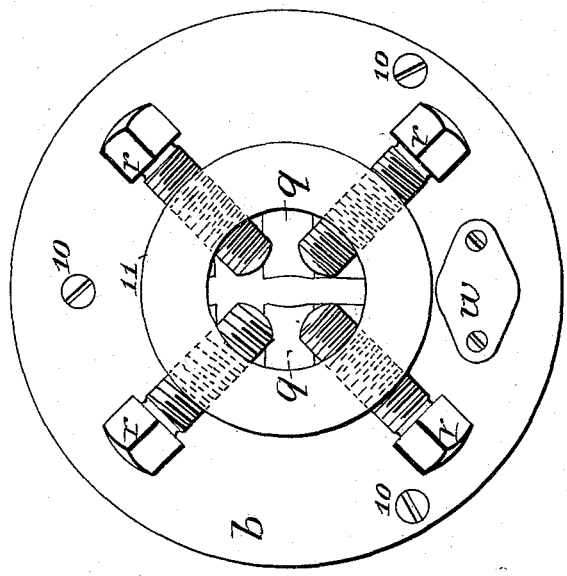

Fig. 1.

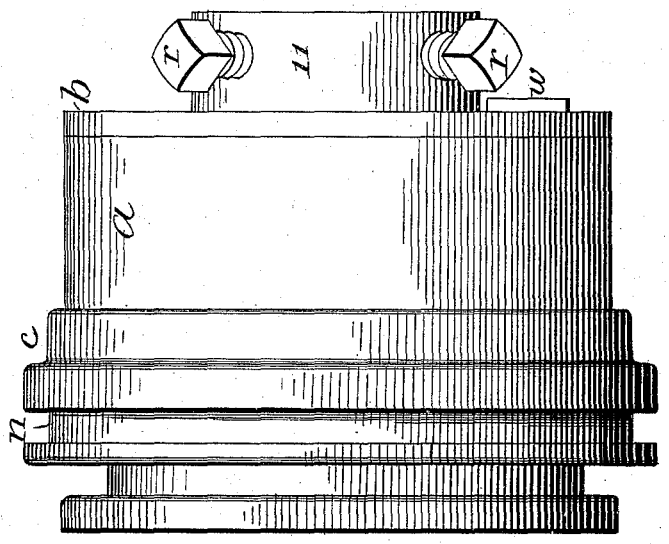

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Fig. 3.

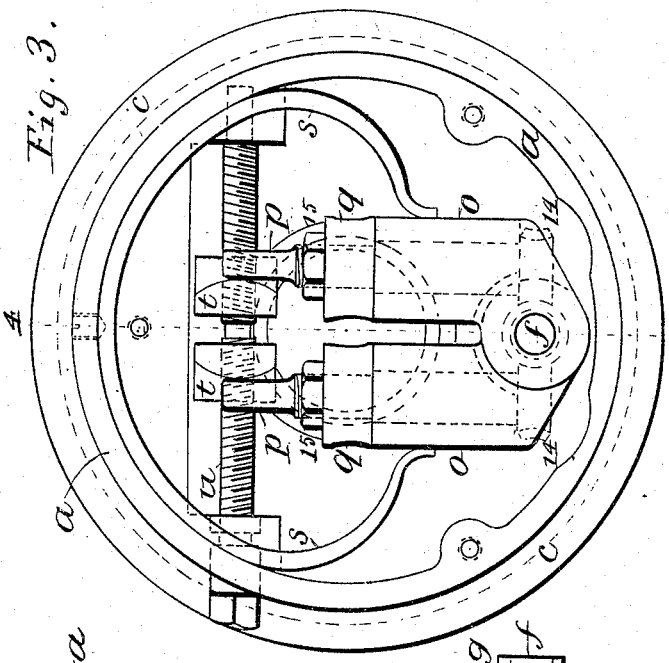

Fig. 5.

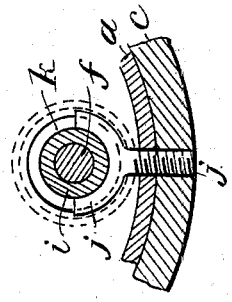

Fig. 9.

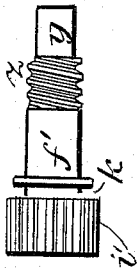

Fig. 4.

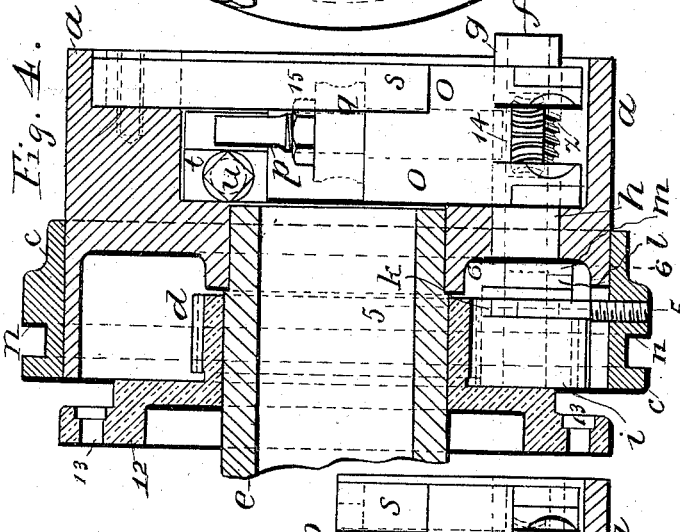

Fig. 7.

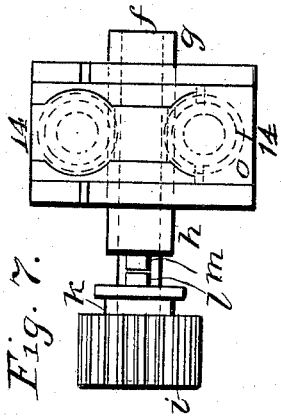

Fig. 8.

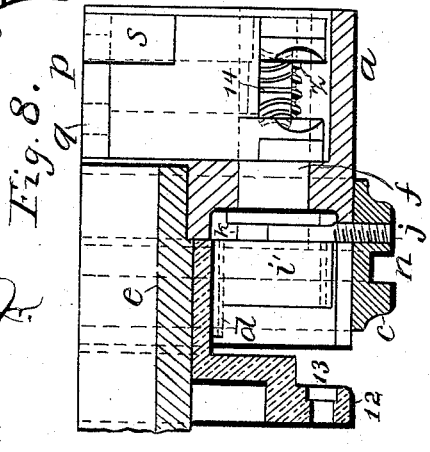

Fig. 6.

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UNITED STATES PATENT OFFICE.

CHARLES GODFREY RICHARDSON, OF SPRINGFIELD, VERMONT.

ROD-FEEDING DEVICE.

SPECIFICATION forming part of Letters Patent No. 641,040, dated January 9, 1900.

Application filed June 15, 1899. Serial No. 720,669. (No model.)

To all whom it may concern:

Be it known that I, CHARLES GODFREY RICHARDSON, a citizen of the United States, residing at Springfield, in the county of Windsor and State of Vermont, have invented certain new and useful Improvements in Rod-Feeding Devices; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in rod-feeding devices which have for their primary object the bringing of a new length of work through the rapidly-rotating hollow spindle of a turret-lathe or screw-machine without the necessity of stopping the machine for this purpose.

The devices to which my improvement appertains have a rotary carrier on the hollow spindle containing feed-rolls which are given a motion of rotation about their own axes while revolving with the carrier about the axis of the spindle, so that the rod is fed forward by means independent of those which rotate the rod, though connected therewith, a provision being supplied by which the feed motion of the rolls can be arrested or set up at the will of the operator without interfering with their motion of revolution about the axis of the spindle and carrier.

My invention consists in improved means for instituting and arresting the rotation of the feed-rolls on their own axes without interfering with the motion of revolution of said feed-rolls about the axis of the carrier.

In the accompanying drawings, forming a part of this specification, Figure 1 is a side elevation of the rotary carrier. Fig. 2 is an end view of said carrier. Fig. 3 is an end view of the carrier with the end plate and centering means removed, showing the internal mechanism. Fig. 4 is a vertical central section on line 4 4 of Fig. 3, cutting the carrier, the shifting-ring, the stationary gear, and the rotary spindle and showing the interior mechanism. Fig. 5 is a detail section on line 5 5 of Fig. 4, showing the fork which shifts the loose pinion *i*. Fig. 6 is a detail section on line 6 6 of Fig. 4, showing the engagement-lug *m*. Fig. 7 is a plan view from beneath of a portion of the interior mechanism. Fig. 8 is a vertical central sectional view of a portion of the carrier, showing a modification of the construction shown in Fig. 4. Fig. 9 is a detail view of a portion of said modification.

e is the rotary hollow spindle of the rod-feeding machine.

a is the revolving carrier or shell, mounted on hollow spindle *e* and rotating with it on a common axis.

b is the front plate, closing the carrier *a* and detachably secured thereto by screws 10 10. Said plate has a hub 11, carrying the centering-screws *r r* for loosely adjusting the rod to true axial position.

f is a worm-shaft, having on it the worm *z*, rotatably mounted in bushings *g h*, driven into plate *b* and carrier *a*, respectively.

i is a pinion loosely borne on worm-shaft *f* and capable of being laterally shifted on said worm-shaft by means hereinafter described.

d is a stationary gear-wheel forming a part of fixed plate 12 and having teeth which intermesh with the teeth of shifting pinion *i*. Said fixed plate is provided with bolt-holes 13 13, by which it may be firmly secured to the stationary parts of the screw-threading machine. The stationary gear *d* is concentric with spindle *e*, which revolves within said gear *d*.

c is a ring mounted on the shell or carrier *a*, so as to be shiftable laterally on said carrier while both are rotating by means of a shipper-fork set in the groove *n* of said ring or by any other well-known and convenient means for shifting the same.

j is a fork mounted in ring *c*, as shown in Fig. 5, passing through a slot in carrier *a*, and engaging the loose pinion *i* by means of the annular groove *k*, formed thereon. When the ring *c* is shifted, the fork *j* shifts the pinion *i* on its shaft *f* accordingly. *l* is a clutch tooth or projection formed on or integral with the shifting pinion *i*.

m is a pin or lug fitted into shaft *f* and capable of engagement with projection *l* when the pinion *i* is shifted laterally toward the same.

o o are shaft-boxes pivoted on shaft *f*, so as to oscillate about the same as a center. These boxes carry rotary shafts *p p*, which bear at one extremity of each the worm-gears 14 14, which are at all times in gear with the

worm z, no matter what may be the position of the shafts p p. On said shafts p p are fixed the feed-rolls q q on each side of and opposite to the center of rotation of carrier a, made detachable and adjustable by means of the nuts 15 15. Said feed-rolls rotate with the shafts p p, as driven by the worm z, and their peripheries are made to conform to the shape of the driven rod, being shown in the drawings as slightly concave to feed a round rod. If the rod should be polygonal in section, these rolls could be removed and others substituted having a periphery shaped to conform thereto, if desired; but ordinarily this is not necessary, as the rolls have enough contact to feed the rod. The extremities of shafts p p are extended and rounded, as shown in Figs. 3 and 4, for a purpose presently to be explained.

t t are blocks having projecting lugs with curved faces bearing against the said rounded ends of shafts p p on the inside. These blocks are mounted on the right and left threaded screw-shaft u, borne revolubly in carrier a and square-headed to enable it to be turned by a wrench or key. By this means the blocks t t can be simultaneously approximated or separated to any required extent. Their function is to bear against the rounded ends of the rotating shafts p p when adjusted to the required degree of separation, and thereby hold the rolls q q at approximately the right distance apart for any particular diameter of rod or bar to be fed, the said shafts p p being held elastically against the said curved faces with a suitable degree of pressure by means of the double spring s s, bearing against the outside of the boxes o o. The rolls should preferably be set to a diameter of aperture a little smaller than the diameter of the rod or bar to be fed, so that the spring s may elastically hold the rolls against the bar with the required amount of pressure, thereby permitting the spring to compensate for variations in the diameter of the bar or rod as fed and cause it to be fed forward with an approximately uniform grasp.

The cap or plate w is for the purpose of taking the end thrust of the worm-shaft f and is detachable.

Operation: The machine being in readiness for operation, the rod or bar desired to be operated upon is passed within the hollow spindle e and axially adjusted to central position between the feed-rolls q q by means of the centering-screws r r r r. The rolls are adjusted to the proper aperture by means of the right and left screw-shaft u, the proper rolls to fit the bar having been previously selected and inserted. The shifting ring c is thrown to the left, as shown in Fig. 4, so that the pinion i will revolve loosely on shaft f without communicating a motion of rotation thereto. The hollow spindle e and the carrier are now started into rotation. If all is in readiness for the screw-threading operation, the ring c is now shifted to the right by the means provided, thereby shifting loose pinion laterally on its shaft, bringing tooth l into collision with lug m on shaft f, and thereby causing said shaft and its worm z to rotate. The rotation of worm z sets up a motion of rotation in worm-gears 14 14 on shafts p p, and these latter cause the feed-rolls q q to revolve in the proper direction to feed the rod or bar forward. When the proper length of bar has been fed forward and it is desired to arrest the feed of the bar, it is only necessary to shift the ring c to the left, when loose pinion i becomes disengaged from its shaft f and the feed motion ceases. A peculiar advantage in this mode of applying and arresting the feed motion is that no brake or frictional means are employed; but the arrest is instantaneous by a simple shift of gear, making the action precise and prompt both in setting up and in stopping the feed of the bar without regard to the rotary motion of the same.

Figs. 8 and 9 show a slight modification of parts without difference of result. f' is the worm-shaft, and i' is the pinion; but instead of the pinion being loose on the shaft the two are made integral, as shown in Fig. 9, and the disengagement is effected by drawing the worm z bodily out of contact with worm-gears 14 14 as both shaft and pinion are drawn forcibly to the left by the movement of ring c in that direction. In this event the smooth portion y of the shaft f' comes opposite the worm-gears; but when it is desired to resume the feed motion the shift of ring c in the opposite direction causes the return of worm z to its position between the worm-gears 14 14, thereby setting up the rotation of the feed-rolls when the carrier is in revolution.

I claim and desire to secure by Letters Patent—

1. In a rod-feeding device, a revoluble hollow spindle, a carrier affixed thereto and revolving therewith, feed-rolls mounted in said carrier, a stationary gear fixed concentric with said revoluble spindle, a gear mounted on a shaft in the said carrier engaging with the said stationary gear, suitable connections between the gear on the said shaft and the feed-rolls, and means for bringing said connections into or out of operation at will, whereby the feed-rolls may be made to rotate about their axis or not while revolving with the carrier about the axis of the spindle, substantially as specified.

2. In a rod-feeding device, a revoluble hollow spindle, a carrier affixed thereto and revolving therewith, a stationary gear fixed concentric with said revoluble spindle, a movable gear mounted revolubly in said carrier engaging with said stationary gear, feed-rolls mounted revolubly within the carrier on each side of the axis thereof, connections between said movable gear and said feed-rolls whereby the latter derive rotary motion on their axes from the former, and means for shifting said movable gear laterally, whereby said con-

nections are broken or restored at will, and the rotation of the feed-rolls on their axes thus arrested or restored without interfering with their motion of revolution about the axis of the carrier, substantially as specified.

3. In a rod-feeding device, a revoluble hollow spindle, a carrier affixed thereto and revolving therewith, a stationary gear fixed concentric with said revoluble spindle, a movable gear within the carrier in engagement with said stationary gear, a worm-shaft revolubly connected with said movable gear, a pair of feed-rolls mounted on revoluble shafts within the carrier, worm-gears on said shafts in engagement with the worm on said worm-shaft, whereby the feed-rolls receive rotary motion therefrom, and means for shifting said movable gear laterally, whereby the connection between the latter and said feed-roll shafts and gears may be interrupted at will, and the rotary motion of the feed-rolls on their axes thereby arrested or renewed independently of their motion of revolution about the axis of the carrier, substantially as specified.

4. In a rod-feeding device, a revoluble hollow spindle, a carrier affixed thereto and revolving therewith, a stationary gear fixed concentric with said revoluble spindle, a worm-shaft in said carrier, feed-rolls in mechanical connection with said worm-shaft and rotated thereby on their respective axes, a loose pinion mounted on said worm-shaft, in gear with the said stationary gear, and means for shifting said loose pinion into or out of connection with said worm-shaft, whereby the latter may communicate rotary motion to said feed-rolls or not at will while revolving about the axis of the carrier, substantially as specified.

5. In a rod-feeding device, a revoluble hollow spindle, a carrier affixed thereto and revolving therewith, a stationary gear fixed concentric with said revoluble spindle, a worm-shaft and worm, a pair of shaft-boxes pivoted on said worm-shaft, feed-roll shafts within said shaft-boxes, feed-rolls on said shafts, worm-gears on said shafts, engaging with said worm, and means for establishing a driving connection between said stationary gear and said worm-shaft at will, whereby rotary motion is communicated from said stationary gear to the feed-rolls while revolving about the axis of the carrier, substantially as specified.

6. In a rod-feeding device, the combination of the stationary gear, the revoluble spindle concentric therewith, the rotary carrier, the worm-shaft and worm mounted therein, the feed-rolls, the feed-roll shafts having worm-gears in engagement with the worm on the worm-shaft, the shaft-boxes pivoted on said worm-shaft, and the spring for maintaining elastic pressure of the feed-rolls upon the driven rod, substantially as specified.

7. In a rod-feeding device, the combination of a stationary gear, a revoluble spindle concentric therewith, a rotary carrier, a worm-shaft and worm mounted therein, shaft-boxes pivoted to oscillate about the axis of the worm-shaft, feed-roll shafts in said boxes, worm-gears on said shafts in engagement with said worm, feed-rolls q detachably borne on said feed-roll shafts, spring s, and means for adjustably limiting the inward movement of said feed-rolls against the thrust of said spring, substantially as specified.

8. In a rod-feeding device, the combination of a rotary carrier, a worm-shaft and worm mounted therein, a stationary gear concentric with the axis of said carrier, a loose pinion in engagement with said stationary gear, and means for bringing said loose pinion into and out of engagement with said worm-shaft, substantially as specified.

9. In a rod-feeding device, the combination of a rotary carrier, a worm-shaft and worm mounted therein, shaft-boxes pivoted to oscillate about the axis of the worm-shaft, feed-roll shafts p, p, in said boxes, feed-rolls mounted on said shafts, worm-gears on said shafts in engagement with said worm, spring s, blocks t, t, bearing against the extremities of said feed-roll shafts, and means for simultaneously adjusting the position of said blocks and the space between said feed-rolls, substantially as specified.

10. In a rod-feeding device, the combination of a rotary carrier, a worm-shaft and worm mounted therein, a stationary gear concentric with the axis of said rotary carrier, a pinion in engagement with said stationary gear and connected with said worm-shaft, a groove k in said pinion, a fork j in engagement with said groove k, and means for shifting said fork and pinion laterally while said carrier is in rotation, substantially as specified.

In testimony whereof I affix my signature in presence of two witnesses.

CHARLES GODFREY RICHARDSON.

Witnesses:

C. E. RICHARDSON,

ALICE RICHARDSON.