W. A. LEONARD.

ROLLER FEED MECHANISM.

APPLICATION FILED NOV. 15, 1906.

899,492.

Patented Sept. 22, 1908.

2 SHEETS—SHEET 1.

FIG. 1.

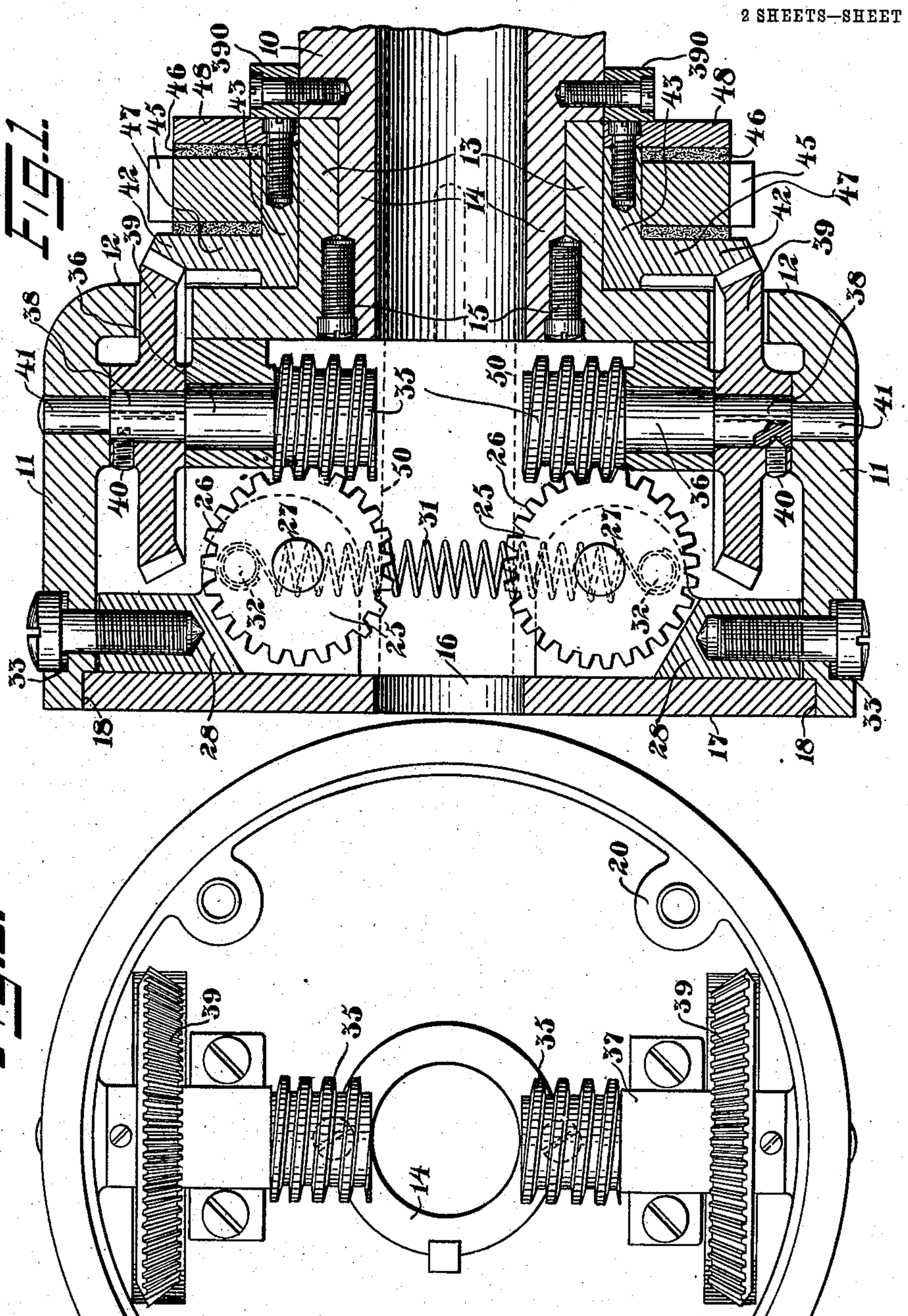

FIG. 2.

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2 SHEETS—SHEET 2.

FIG. 5.

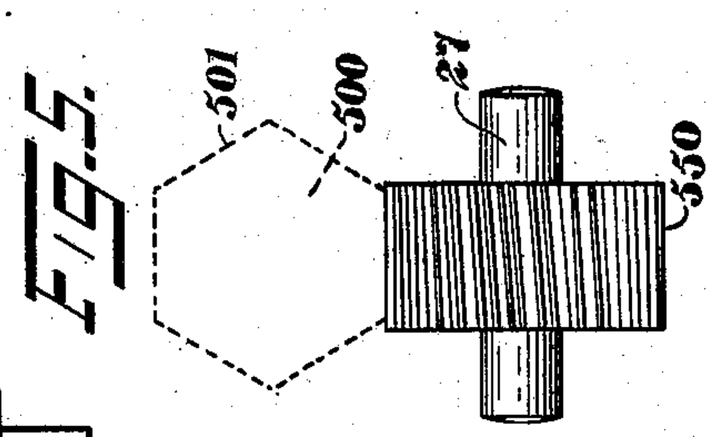


FIG. 6.

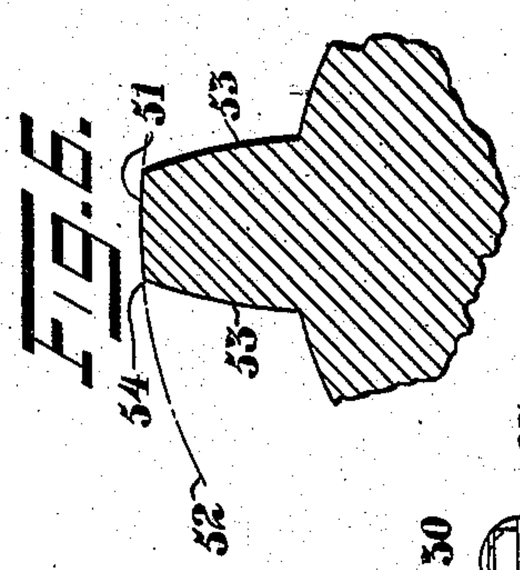
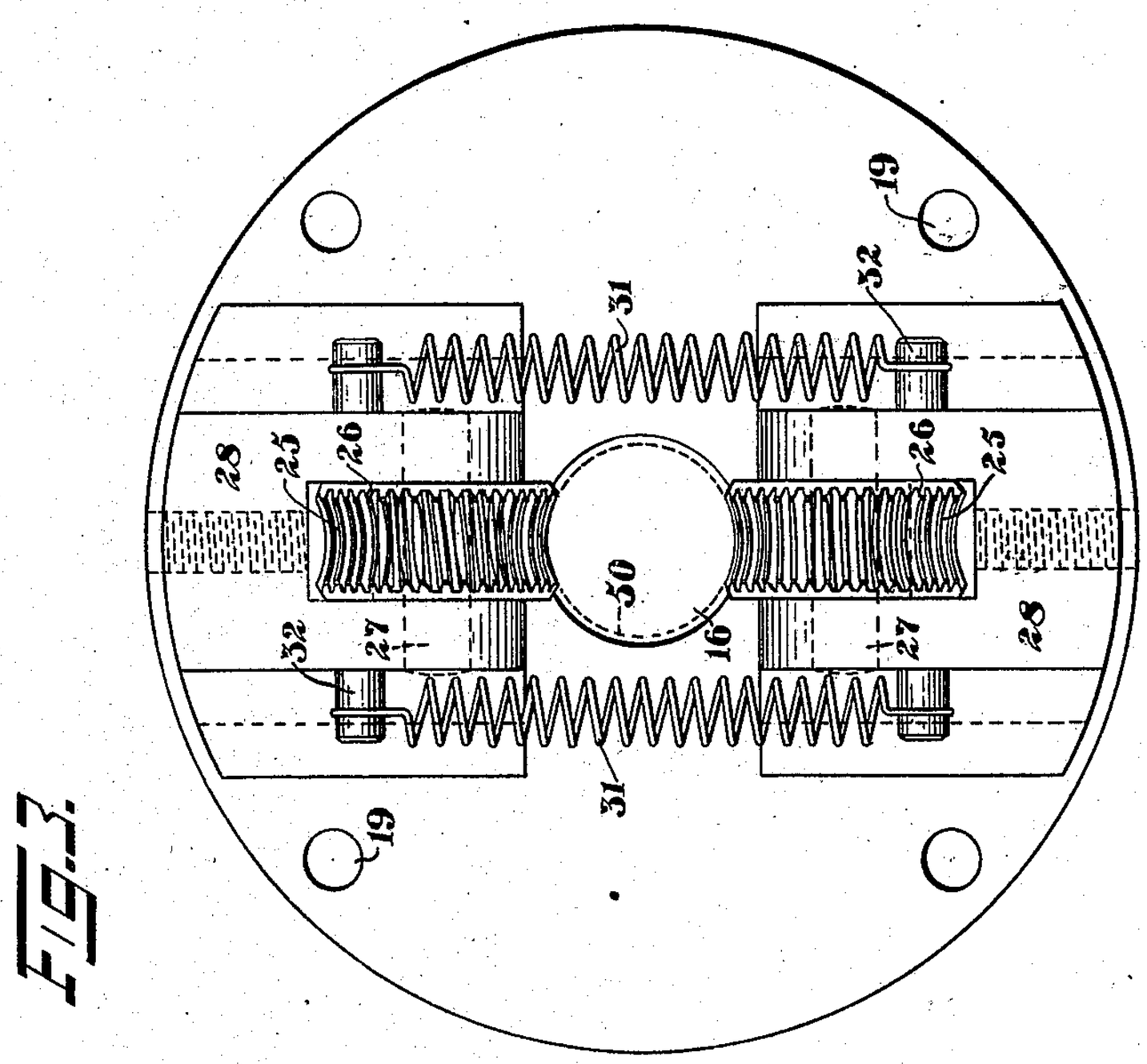


FIG. 4.

FIG. 3.



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UNITED STATES PATENT OFFICE.

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ROLLER FEED MECHANISM.

No. 899,492. Specification of Letters Patent. Patented Sept. 22, 1908.

Application filed November 15, 1906. Serial No. 343,489.

To all whom it may concern:

Be it known that I, WILBUR A. LEONARD, a citizen of the United States, residing in New Haven, in the county of New Haven and State of Connecticut, have invented certain new and useful Improvements in Roller Feed Mechanism, of which the following is a specification.

This invention relates to roller feed mechanisms, and particularly such as are employed in lathes and similar tools, and has for an object to provide an efficient durable and simple device of this character.

In the present organization the peripheries of the feed rollers which carry the gripping or stock engaging faces thereof also carry the faces whereby these rollers may be engaged by an actuator and rotated. Pursuant to this invention the feed rollers may be constructed in the form of worm wheels and their actuators will then be worms meshing directly therewith. Of course, strictly speaking the faces of the worm-teeth at the addendum line constitute the perimeter of the roll, and the flanks of these teeth are the faces presented to the worm for deriving motion therefrom. But the same face of the rollers carries both the stock engaging and the actuator engaging faces or surfaces, and in fact the flanks of the worm-teeth will, when these are coming into engagement with the stock, engage the stock coöperatively with the engagement of the same by the faces of the teeth, especially when the rollers are pressed strongly against the stock. If a pair of such rollers are employed they will be so mounted that they may move toward each other for varying the amount of intermediate space for the accommodation of the stock being fed, and elastic means will be provided for so drawing the rollers toward each other. This elastic means may constitute a pair of springs each connected at its respective ends with said rollers so that vibration of the stock will not cause cramping of the rollers. Both of the rollers will move in unison and the spring tension, and consequently the pressure upon the stock, will not be varied by the variation of the position of the axis of the stock relative to the axis of revolution of the rollers.

The actuators for direct engagement with the stock engaging gripping perimeter of the rollers may be worms so that the movement in and out of the rollers will not change their driving relation with the worms. By having feed rollers constructed in this manner and driven immediately from the worms the number of the parts in the operative train is minimized. The feed rollers being required not only to advance the stock but also to engage the actuators the journals of each are given substantial bearings at each side of the roller, and these journals may be carried by the head in such manner that the torsional or rotating strain is not communicated to the rod feed actuating train. The gear directly connected to the worm shaft may be provided with journals at both sides. The thrust of the working engagement between the various parts is efficiently taken care of throughout the entire structure.

The casing of the device may be substantially closed by an end plate which will be normally constituted for ready removal, and upon which the feed rollers may be mounted. This will give ease in opening up the device as occasion may demand, and especially facilitate the interchangeability of the feed rollers. The direct working thrust of the rollers will be received by this end plate, and the torsional or rod rotating thrust will also be received by such end plate, as well as the thrust of the driving engagement of the worms against the worm wheels or feed rollers.

If the feed rollers are given a shape which will enable these to engage the faces of a rod, as for instance, a hexagon rod, the rolls will not be able to slip upon such rod when the power is suddenly applied and the head rotated, consequently there is provided herein a shock absorber between the mechanism for rotating the feed rollers and the driver for the same.

In the drawings accompanying and forming a part of this specification Figure 1 is a central longitudinal section of a feed mechanism embodying a form of the present invention. Fig. 2 is an end view of the same with the closing or end plate removed. Fig. 3 is a view of the inside of the closing or end plate, showing the feed rollers and their carriages. Fig. 4 is an edge view of the portion of the device shown in Fig. 3; this is not a projection of Fig. 3 since it shows the plate in a position turned about ninety degrees. Fig. 5 is a detail of a roller which may be em-

ployed on flat sided stock; and Fig. 6 shows an enlarged worm-wheel tooth in cross section.

The feeding mechanism herein is shown mounted upon a spindle 10, which will be driven in some convenient manner from a source of power, not shown, and which may be the hollow spindle found in machine tools upon which this invention is adapted to be employed.

The frame of the device, which may for convenience be called a head, is shown herein in the form of a casing 11 having an end portion 12 which carries a hub 13 mounted upon a reduced portion 14 of the spindle and secured thereto by screw keys 15, and the casing is closed, with the exception of the stock opening 16, at the other end, by a plate 17 occupying a rabbet 18 in the end of the casing, and held in place by screws traversing openings 19 in the plate and tapped bosses 20 conveniently located on the casing.

The feed rollers, designated without discrimination by 25, are illustrated as provided with combined stock feeding and actuating teeth 26, in the present illustration these rollers are given the form of worm wheels. Each of these wheels is shown as mounted upon a shaft or journal 27, projecting from each side, and mounted in bearings in a device which may be characterized as a feed-roller carriage 28, which has guides 29 engaging ways 30, in the present illustration shown integral with the plate 17. This construction is an illustration of a manner for carrying out that feature of my invention which permits each of the rollers to be independently movable toward and from the stock position. In the present instance the movement is radial. The two feed-roller carriages are shown as connected by a pair of extension springs 31 engaging pins 32 upon the sides of the carriages and upon the respective sides or ends of the feed rollers. By this means the rollers are connected together by springs. This will insure that both of the rollers shall at all times engage the stock irrespective of its vibration. Since when it is moved so that its axis is out of coincidence with the axis of revolution of the rollers one roller will be forced away from its axis of rotation and the other roller will, by means of the spring connection, instantly follow it up, not only by a tendency to yield to the normal tension of the spring, but since the other roller moves away, the tension of the spring will be augmented, and produce a quicker action of the roller than if this only responded to the normal spring tension. The casing adjacent to the position of the carriage 28 is provided with an opening through which a screw 33 will pass and have a working fit, the screw then entering a tapped hole in the carriage. By this means the forward in inward movement of the carriage may be adjustably limited. When it is desired to remove the rollers, for the purpose of substituting new or changing the size, the screws 33 will be removed, as will also the screws holding the plate to the casing. The plate and the rollers and their carriages may be removed without disturbing any of the other parts of the device.

The rollers 25, which as before stated may be in the form of worm wheels, will mesh with worms 35, each of which is shown as fast upon a shaft, which shaft is shown as comprising a portion 36 mounted in a bearing 37 which is securely fastened to the end 12 of the casing. The shaft has a reduced portion 38 upon which a bevel wheel 39 is mounted, such bevel wheel is illustrated as keyed to the shaft to prevent its rotation thereon and also as fastened by means of a screw key 40 to prevent its longitudinal movement. The shaft is also shown as having a still further reduced portion 41 entering a bearing in the casing 11. By this means both sides of the bevel wheel are supported by journals in suitable bearings and rotation of the axis of the shaft is prevented. The bevel wheel 39 is shown in mesh with a bevel wheel 42 which has a hub 43 rotatably mounted upon the hub 13 of the casing. A ring 44 is mounted upon the hub 43 and is provided with gear teeth 45 for meshing with some suitable actuator, not shown. For the purpose of preventing breaking of the teeth or other parts by a too rapid meshing of the driver for the device with the teeth 45, suitable shock absorbing devices may be employed, as for instance some packing 46, which may be leather, placed between the ring and the body 47 of the gear wheel 42 and a ring 48, which may be secured to the hub 43, as for instance by means of screws 49. The bevel wheel 42 will be held in mesh with the bevel wheel 39 and the thrust of meshing will be supported in the present instance by means of a suitable thrust collar 390 secured to the spindle, as for instance by means of suitable screws.

A rod, round in Figs. 1 and 3, and designated in a general way by 50, is shown between the rollers 25, and by which means the roller carriages 28 have been forced outward and the springs 31 tensioned. This will cause the rollers to engage the bar, and upon the rotation of the worms the feed rollers will be rotated and feed the bar. This, of course, being incident to the rotation of the spindle which will also cause the rollers to rotate the bar. The torsional strain, on the revolving rollers, of rotating the bar will be borne by the journals 27, which, it will be seen, are upon each side thereof, and are carried by the roller-carriages which constitute bearing blocks and are mounted upon the end plate of the casing. This will bring the thrust of the rod feeding and rotating engagement upon the plate, as well as the thrust of

the engagement between said roller and its actuator, the worm. It will be seen, that the only connection between the feed rollers and the worms is that of the meshing working engagement, and that the rollers are free to move in a direction parallel with the axis of said worm.

One feature of importance in the present improvement is the centralization of the mechanical elements. The stock passage will, in a rotary head, be centrally located, and the feed rollers will be mounted in such position that the stock engaging arc of the working longitudinal zone upon their stock engaging perimeters will be alongside of the path of stock movement. The bearings for the journals for each of the rollers are close up to the sides of the working or stock engaging zone of the roller, and another arc of contact for the engagement of the actuator, the worm 35, is located at about one-quarter angular distance around the said perimeter from said stock engaging arc, but in the same stock engaging zone. These worms are perpendicular to the path of stock movement, their axes are radially disposed to the axis of the stock, in the illustration their axes are alined, and the inner ends of the worms approach nearly to such path. In other words the spindle carries a head in which a pair of rolls is mounted each having a shaft projecting from its ends, the bearings for said shafts being located adjacent to the respective ends of the rollers, and each of said rollers having worm teeth about its perimeter in the stock engaging zone, and with which zone the worms will engage, the worms being mounted on the head with their inner ends adjacent to the path of stock movement and their axes alined and radially disposed relative to the stock when this is in position. A bevel gear mounted on each of said shafts outside of the feed roller and of larger diameter than said feed roller, will engage a bevel gear carried by the spindle. The back wall of the head is shown provided with openings for the extrusion of the bevel gears. There are two of these worms and their shaft portions respectively extend back of the stock feed rollers 25, and the gear wheels 39 fast with the worms are located in part outwardly of the feed rollers and this gives room for the relatively large gear wheels without adding materially to the size of the head or casing, gear wheels larger in diameter than the rollers, in the present illustration more than double. The present organization makes a short train from the actuator to the feed rollers. The structure is by reason of the disposition of its parts of a very strong and durable nature.

In Fig. 3 the perimeters 55 of the feed rolls are shown as concave, after the well known manner of constructing worm wheels; but the perimeters of these worm-wheels may also be made flat as illustrated at 550 in Fig. 5 for the purpose of engaging the flat sides 501 of a hexagonal bar 500.

The face 51 of the worm-tooth, see Fig. 6, at the addendum line 52 will constitute the perimeter of the rolls, when this term is strictly applied, but for the present purpose the working zone or active periphery of the rollers embodies the faces 51 for engaging the stock and the flanks 53 for the engagement of the worm 35. Portions of the faces 51 and flanks 53, more particularly at and adjacent to their line of juncture 54, will engage the stock when this line is approaching the arc of contact of the pitch circles.

Having described my invention what I claim is:

1. In a roller feed, the combination with a pair of feed rollers provided with combined stock feeding and actuator engaging teeth, of a driver for each of said rollers, and said drivers having teeth for engaging the teeth on the respective rollers.

2. In a roller feed, the combination with a pair of feed rollers having teeth upon their stock engaging faces, of rotary drivers therefor having teeth in driving engagement with the teeth on said feed rollers, and means for drawing the stock engaging faces of said rollers toward each other, while in driving engagement with the teeth of said drivers, for engaging the stock.

3. In a roller feed, the combination with a pair of feed rollers in the form of worm-wheels having worm-teeth upon their stock engaging faces, of worms in driving engagement with said teeth.

4. In a roller feed mechanism, the combination with a head, of feed roller actuating means carried thereby, a removable end plate for the head, means carried by said end plate for supporting feed rollers for movement toward and from each other, and feed rollers mounted on said supporting means and constructed and adapted for removal with the said end plate while so mounted.

5. The combination with a rotary head, of feed roller actuating worms carried thereby and disposed with their working faces at substantially right angles to the axis of rotation of the head, a removable end plate for the head having means for supporting feed rollers for movement toward and from each other at substantially right angles to the said axis, feed rollers mounted in said supporting means and constructed and adapted for removal with the said end plate while so mounted and provided with worm teeth for engaging said worms, and means for elastically drawing said rollers toward the said axis.

6. In a roller feed, the combination with a head, of feed rollers, feed roller rotating means carried by the head, an end plate having means for carrying said rolls and re-

movably carried by the head and being located beyond the feed rollers in respect to the roller rotating means for receiving the thrust of the engagement between the rollers and roller rotating means.

7. In a roller feed mechanism, the combination with a rotary head, of worm wheels carried thereby and disposed in axial alinement radially of the axis of rotation of the head, an end plate removably carried by the head and provided with a stock passageway and with guideways disposed radially of said passageway and of said axis and parallel with said worm wheels, carriages mounted in said guideways and removable with said end plate while so mounted, feed rollers mounted on said carriages and provided on their stock gripping faces with worm teeth meshing with said worms when the plate is in position, and means for drawing said carriages one toward the other.

8. In a roller feed mechanism, the combination with a spindle, of a head carried by the spindle, a pair of feed rollers each having a shaft projecting from its ends, bearings for said shaft located adjacent to the respective ends of the rollers, each of said rollers having worm teeth about its perimeter in the stock engaging zone, a pair of worms for engaging said worm teeth, said worms being mounted in the head with their inner ends adjacent to the path of stock movement and their axes alined and radially disposed relative to the stock when this is in position, a bevel gear mounted on each of said shafts outside of the feed roller and of larger diameter than said feed roller, the back wall of the head having openings for the extrusion of the said bevel gears, and a bevel gear carried by said spindle meshing with the bevel gears on said shafts.

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