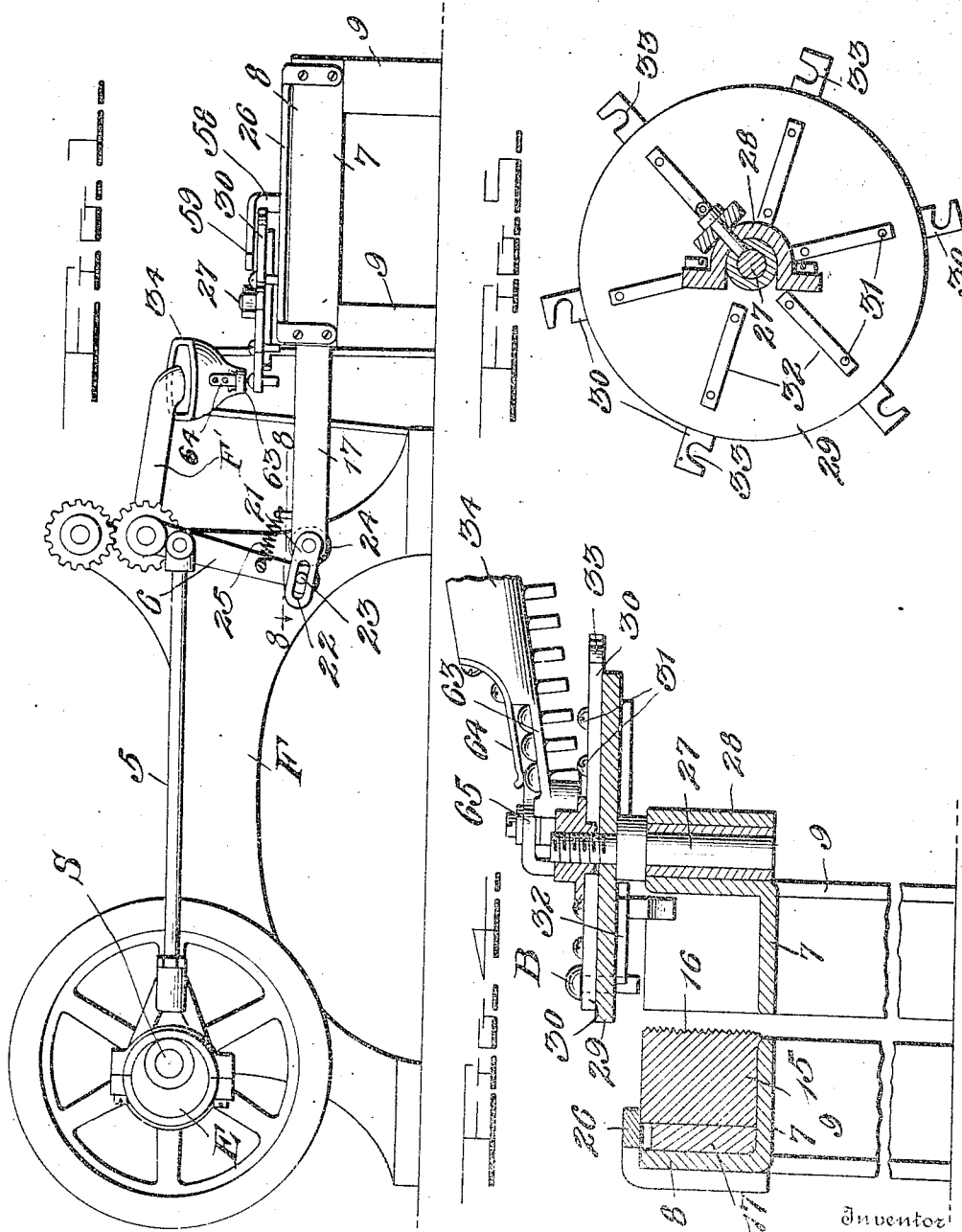


G. A. J. HAINSWORTH.
BOLT THREAD ROLLING MECHANISM.
APPLICATION FILED JULY 5, 1911.

1,055,459.

Patented Mar. 11, 1913.

3 SHEETS-SHEET 1.



Witnesses
Chas. L. Griebauer.
L. V. Ellis.

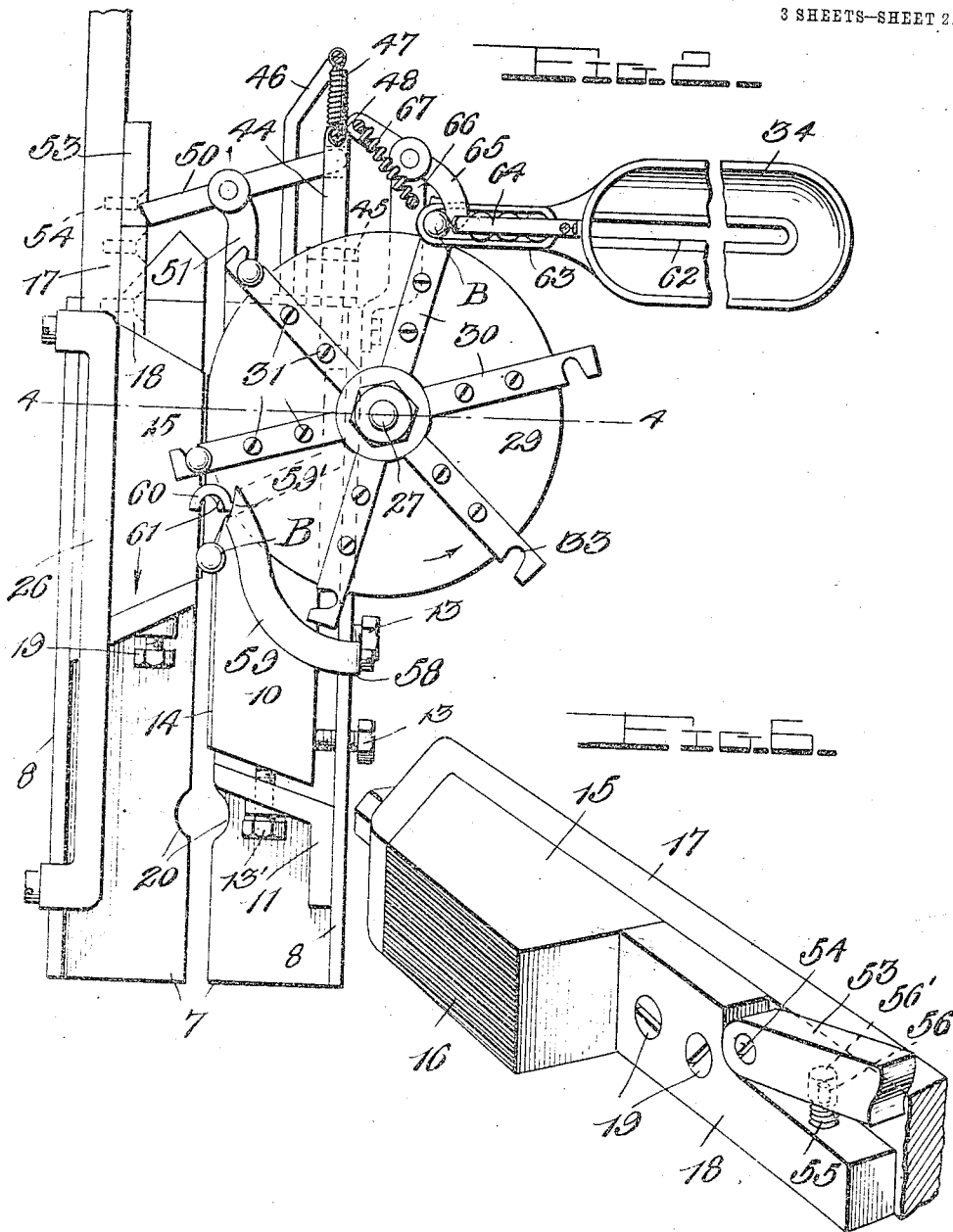
George A. J. Hainsworth,
By Watson E. Coleman,
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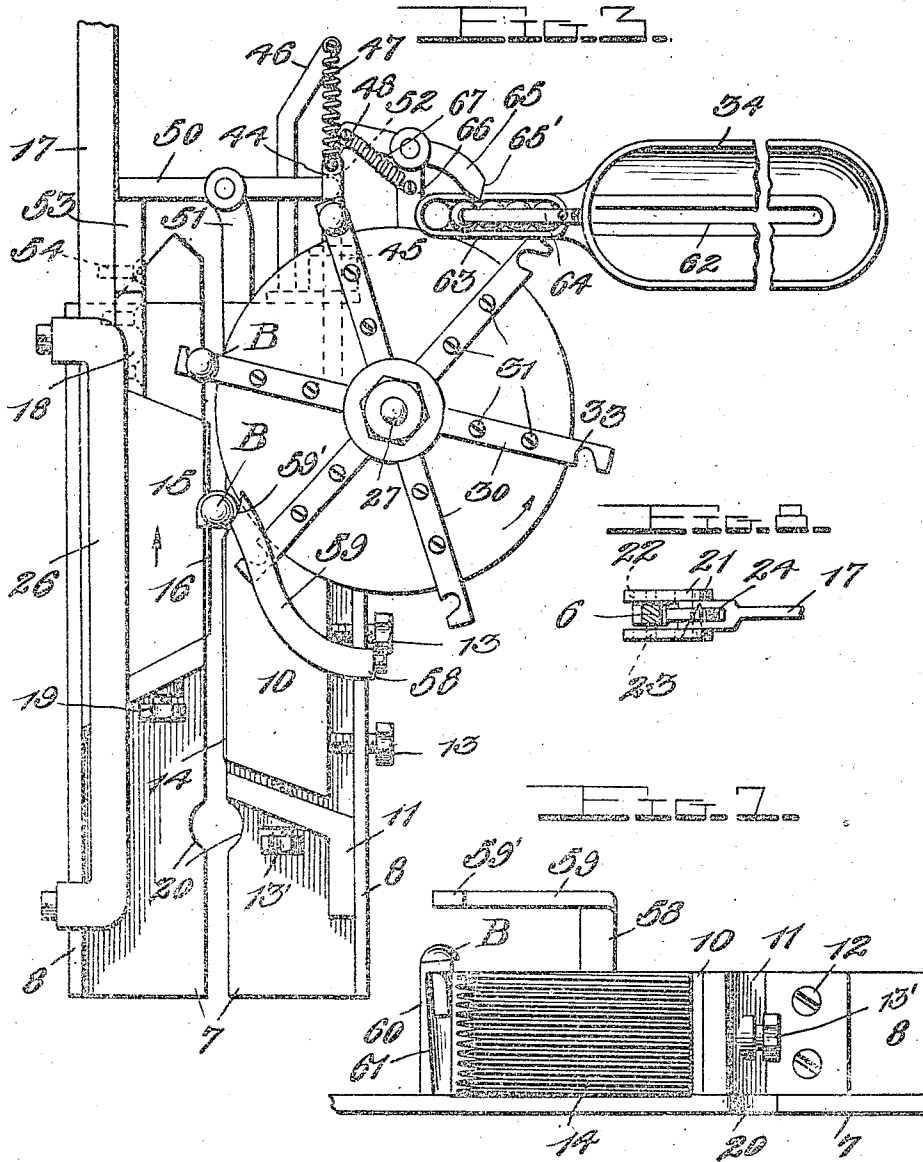
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Witnesses

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UNITED STATES PATENT OFFICE.

GEORGE A. J. HAINSWORTH, OF NEWARK, OHIO.

BOLT-THREAD-ROLLING MECHANISM.

1,055,459.

Specification of Letters Patent.

Patented Mar. 11, 1913.

Original application filed February 23, 1911, Serial No. 611,367. Divided and this application filed July 5, 1911. Serial No. 636,872.

To all whom it may concern:

Be it known that I, GEORGE A. J. HAINSWORTH, a citizen of the United States, residing at Newark, in the county of Licking and State of Ohio, have invented certain new and useful Improvements in Bolt-Thread-Rolling Mechanism, of which the following is a specification, reference being had to the accompanying drawings.

10 This invention relates to bolt thread rolling mechanism of that character embodying stationary and movable threading dies as disclosed in my prior patent, Number 1,018,706, issued February 27, 1912, of which this application is a division.

15 The primary object of the present invention resides in the provision of a thread rolling mechanism including stationary and movable dies, and means for automatically feeding the bolts to the dies successively in the movements of the movable die in the same direction.

20 Another object of the invention is to provide improved means for mounting the dies, and means for adjusting the stationary die and rigidly securing the same in its adjusted position.

25 A further object of the invention is to provide a thread rolling mechanism arranged as an accessory to the bolt forming machine, said mechanism including a stationary die and a reciprocable die, means connecting the reciprocable die to the bolt forming mechanism whereby said die is reciprocated, means for automatically feeding the bolts as they leave the forming machine to a carrying element, said means being actuated in the movement of the reciprocable die in one direction, and additional means automatically actuated in the movement of the reciprocable die in the opposite direction to actuate said carrying element and position the bolts between the threading dies.

30 With the above and other objects in view, the invention consists of the novel features of construction, combination and arrangement of parts hereinafter fully described and claimed, and illustrated in the accompanying drawings, in which—

35 Figure 1 is a side elevation of a thread rolling mechanism showing the same arranged for operation in conjunction with a bolt forming machine; Fig. 2 is a top plan view showing the positions of the parts at the start of the threading movement of the

reciprocable die; Fig. 3 is a similar view showing the positions of the parts during the reverse movement of the reciprocable die and the rotative movement of the bolt carrying table; Fig. 4 is a section taken on the line 4—4 of Fig. 2; Fig. 5 is a bottom plan view of the table; Fig. 6 is a detail perspective view of the reciprocatory die and parts associated therewith; Fig. 7 is a detail side elevation of the stationary threading die and the bolt receiving post. Fig. 8 is a detail section taken on the line 8—8 of Fig. 1.

40 The present invention has for its primary object the provision of simple and efficient means whereby the bolts are automatically fed as they leave the forming machine, to the threading dies, the feeding and threading mechanism being coöperatively associated for synchronous operation, the bolts being automatically handled from the time they leave the forming machine until discharged from the thread rolling mechanism.

45 In Fig. 1 of the drawings I have illustrated a bolt forming machine which may be of any approved construction. As this machine constitutes no part of the present invention it will not be described in detail. It will suffice to state that the connection of my improved thread rolling mechanism with the forming machine whereby said mechanism is actuated is effected by means of a connecting rod or pitman 5 which is connected at one end to an eccentric E arranged upon the fly wheel shaft S which is suitably mounted upon the supporting frame F of the forming machine. This connecting rod 5 is pivotally connected at its other end to an arm 6 which is mounted upon a suitable stud bearing arranged in the end of the frame F.

50 The thread rolling mechanism in which the present invention more particularly resides includes a frame 7 which consists of the two parallel longitudinal angle bars 8, mounted upon the upper ends of similar angular standards 9. The vertical flanges of the parallel ways or guide bars 8 are arranged at their outer edges, the inner edges of said angle bars being slightly spaced as shown in Fig. 2. Upon one of the angular ways or guides a relatively stationary adjustable die 10 is arranged. This die is in the form of a block having inclined ends against which the angle brackets 11 engage, said brackets being rigidly fixed by means of the screws 12 to the

vertical flange of the angle bar 8 which forms the guide. Adjusting screws 13 are also threaded through the vertical flange of the guide and bear against the die 10 to force the same inwardly toward the longitudinal space between the inner edges of the guide bars. The transversely disposed flanges of the angle brackets 11 limit the inward movement of the die block 10 and in these brackets the binding screws 13' are arranged to rigidly hold said die in its adjusted position. The die block 10 rests upon the horizontal flange of the guide bar 8, and in the operation of the mechanism, the inner face of said block which is provided with the cutting threads 14 extends slightly beyond the inner edge of said guide bar for a purpose which will be obvious from the following description.

A movable die 15 is arranged upon the other of the angular guides or ways 8. This die is also provided with a threaded face 16 similar to the threaded face 14 of the die 10 to which it is opposed. The movable die 15 is secured in the end of the reciprocatory bar 17, the end of said bar being disposed at an angle against which one end of the die abuts. A plate 18 is secured to one side of the bar 17 and engages the other end of said die. A screw 19 is threaded through the angular end of the reciprocatory bar 17 and engages the die block to rigidly fix the same in position. The inner edge portion of the movable die 15 extends beyond the longitudinal inner edge of the angular guide or way 8 and in the threading of the bolt shanks the bolts are adapted to be caught and moved between the opposed threaded faces of the dies 10 and 15, and at the end of the effective movement of the movable die 15, when the bolt shanks will have been moved across the entire opposed faces of the dies, the bolt is deposited through the recesses 20 formed in the inner opposed edges of the angle bars 8, into a suitable receptacle arranged beneath the same.

The reciprocatory bar 17 is connected to the oscillatory arm 6 by means of the links 21, which at one of their ends are pivoted to the end of the bar 17. The other ends of the links 21 are provided with short longitudinal slots 22 to permit of the movement of the links upon the pins 23 which project from opposite sides of the arm 6. A roller 24 is mounted in the end of the bar 17 and bears against the edge of the oscillatory arm. A coiled spring 25 also connects said arm and the bar 17 and acts to hold the roller 24 yieldingly in engagement with said arm, whereby, in the oscillatory movement of the arm said roller may freely rotate longitudinally thereon as the slotted ends of the connecting links move upon the pins 23. By providing such connections, the movable die block has free sliding movement upon the

frame and the connecting bar 17 is relieved of undue strain which would be caused by the direct pivotal connection of said bar to the arm 6, owing to the oscillatory movement of the latter.

The die 15 and the bar 17 to which it is secured are held upon the angular guide or way 8 against vertical movement by means of a longitudinal bar 26, which at its ends is secured to the angular bar 8, the ends of said bar being slightly offset to dispose the intermediate portion thereof inwardly of the vertical flange of the angle bar 8 and immediately above the bar 17. The foregoing description discloses the manner in which the thread forming dies are mounted and actuated to thread the bolt shanks when the same are disposed between the threading surfaces of the dies. I will now proceed to describe the manner in which the bolts are successively fed to the dies, and the means whereby the feeding mechanism is automatically actuated in the movement of the reciprocable die.

With the above end in view, a vertical pivot rod 27 is mounted in a suitable bearing 28 fixed to the side of the angular guide or way 8 upon which the stationary die block 10 is secured. Upon the upper end of this pivot rod or shaft 27, the circular feeding wheel or table 29 is mounted. A plurality of arms 30 are radially arranged upon the upper surface of the table and rigidly fixed thereto by means of the screws 31 which extend entirely through the body of the table and are threaded into the radially disposed plates 32 arranged on the under side thereof. The outer ends of the arms 30 project beyond the periphery of the table and are provided with the transversely extending recesses 33 which are of a depth equal to more than one-half of the width of the arms. These recesses are adapted to receive the shanks of the bolts which are deposited into a hopper 34 arranged beneath the discharge tube F' of the bolt forming machine. The particular construction of this hopper and the manner in which the bolt shanks are singly delivered to the arms arranged upon the rotatable feed table will be later described in detail.

The means for intermittently rotating the feed table to successively feed the bolts carried thereby to the threading dies consists of a longitudinally slidable spring retracted bar 44 which is mounted for movement in a U-shaped guide bracket 45 fixed to one of the angular supporting standards 9 upon which the guides or ways 8 are arranged. An arm 46 is also rigidly secured at one end to said standard and one end of a retractile spring 47 is secured to the other end of said arm, said spring being connected to a pin 48 fixed in the slidable bar 44. The bar 44 is automatically actuated in the return or

non-effective reciprocating stroke of the die bar 17, through the medium of an arm 50 which is pivotally mounted intermediate of its ends upon the outer end of a support 51 which is also secured to the frame standard 9. One end of this arm is disposed in an elongated slot 52 in the end of the slidable bar 44, said arm or lever 50 being moved upon its pivot by means of a dog 53 which is pivotally mounted upon one side of the reciprocating bar 17, as indicated at 54. This dog is normally held in an elevated position so that its free end is disposed above the plane of the upper longitudinal edge of the bar 17. The dog is yieldingly held in such position for engagement with one end of the arm 50 in the return stroke of said bar by means of a coiled spring 55 which is disposed upon a pin 56, the upper end of which extends into a recess or socket 56' in the dog. The lower end of the pin 56 is fixed in the plate 18, the upper edge of which is recessed as indicated at 57 to receive the dog 53. As will be clearly seen from reference to Fig. 3 of the drawings, upon the return stroke of the bar 17 after a bolt shank has been threaded and discharged from between the dies, the free end of the dog 53 is brought into engagement with the pivotally mounted arm 50 to oscillate the same on its pivot and move the bar 44 longitudinally against the tension of the retractile spring 47. In this movement of the bar 44, the same engages one of the plates 32 on the under side of the rotary feed table 29 and moves said table to an extent equal to the distance between adjacent arms 30 in the direction of the arrow, as indicated in said figure. In this movement of the table, one of the bolts carried thereby is disposed between the opposed threading surfaces of the die blocks 10 and 15, the latter die rotating the bolt shank in its forward longitudinal movement so as to cut the threads upon the periphery thereof.

In order to effect an automatic removal of the bolts from the arms 30 and to properly dispose the bolts between the opposed surfaces of the die blocks in the effective movement of the reciprocable die, I provide the horizontally disposed arm 59 which is formed upon the upper end of a vertical bar 58 fixed at its lower end to the outer vertical flange of the angle bar 8. This arm extends inwardly over the stationary die block 10 and the extremity thereof is disposed immediately above the plane of movement of the ends of the radial arms 30, and is provided with a curved notch or recess 59' for engagement with the head of the bolt B whereby the same is forced out of the recess 43 in the end of the arm as the table 29 is rotated. The bolt is momentarily supported between the dies by means of a vertical post 60 which is provided with a concave face 61 to

receive the bolt shank, the head of the bolt engaging the upper end of the post. This concave face of the post is disposed in the direction of movement of the reciprocating die, so that the bolt is engaged by said die and moved out of the recess in the face of the post in the forward movement of the die block. When the bolt is positioned in the post 60, the shank of the bolt is disposed in the path of the threaded face of the movable die 15 and in the forward movement of said die the engagement of the bolt shank by the end of the die block moves the same out of the concave face of the post and against the threaded face of the opposed stationary die block as shown in Fig. 2. The bolt shank is thus rotated between the opposed faces of the stationary and movable blocks and in the forward movement of the movable die is provided with threads upon its periphery. The movement of the bolt between the opposed faces of the die blocks is effected by the provision of the inclined face on the post 60 which maintains the shank of the bolt at a forward inclination and in the direction of movement of the movable die so that when said die engages the shank the same will immediately move away from the post and between the faces of the die blocks. At the end of such forward movement of the die 15, the bolt B is discharged beyond the end of the stationary die 10 through the recesses 20 in the inner opposed edges of the angle bars 8 and deposited in the receptacle arranged beneath said bars.

In addition to the above mentioned features of the machine, I also make provision for the automatic feeding of the headed bolt shanks to the intermittently rotatable table 29. The arrangement of the elements constituting this portion of my invention and the manner in which they are operated is substantially as follows: The hopper 34 is formed with the inclined side walls and the bottom thereof is provided with a longitudinal slot 62 through which the shanks of the bolts extend, the heads thereof resting upon the opposite edges of said slot. The hopper is disposed beneath the discharge spout of the forming machine as previously described and is disposed at an inclination so that the bolts gravitate downwardly and move into the contracted neck portion 63 which is formed upon the lower end of the hopper. A leaf spring 64 is secured at one end to the wall of the hopper and the other end thereof bears upon the head of the bolt shank which is disposed in the outer end of the neck 63, to retain the bolt in position to be fed to the arms 30 of the rotatable table 29. The bolts are successively fed into the recesses 33 in the outer ends of said arms by means of a finger bar 65 which is pivotally mounted upon the end of an arm 66

rigidly fixed at its other end to the vertical flange of one of the angle bars 8. One end of the finger bar 65 is tapered or pointed as indicated at 65', and is adapted to engage between the heads of the outermost bolts which are arranged in the neck of the hopper and force the outer bolt from said neck against the tension of the spring 61, into the slot 33 of one of the radial arms 30 carried by the table 29. A spring 67 is connected to the other end of the finger bar 65 and to the supporting arm 66 and normally acts to move the bolt engaging end 65' of said bar outwardly away from the bolts. This finger bar 65 is automatically engaged and actuated in the rearward movement of the slidable bar 44 after the table 29 has been rotated in the return movement of the reciprocatory bar 17. This operation is clearly shown in Fig. 2 of the drawings and occurs immediately after each rotative movement of the table.

From the foregoing description, the operation and construction of my improved threading and slotting mechanism will be readily understood.

The operation of the parts is entirely automatic and no manual handling of the bolts is necessary from the time they leave the forming machine until they are discharged from the threading dies.

The device may be arranged for operation in connection with a bolt forming machine of any approved construction, and the rotatable table 29 may be provided with any desired number of the bolt receiving arms.

Comparatively few parts are employed in the construction of the mechanisms, and as

they are all of simple form, it will be readily seen that the machine is not liable to get out of order, and that the same is extremely durable and positive in practical operation.

The various parts of the mechanism are also susceptible of many other modifications in regard to the form, proportion and arrangement thereof within the scope of the appended claims.

Having thus described the invention what is claimed is:—

1. In a thread rolling mechanism, a stationary die, a reciprocable die, the opposed faces of said dies being provided with forming threads thereon for engagement with the periphery of a bolt, and a vertical post disposed at one end of the stationary die and having an inclined face extending in one direction of movement of the reciprocable die to direct a bolt to be threaded between the opposed thread forming faces of the dies.

2. In a thread rolling mechanism, a stationary die, a reciprocable die, the opposed faces of said dies being provided with threads for engagement with the periphery of a bolt, and a vertical post arranged at one end of the stationary die and having a forwardly inclined concave face to receive and direct a bolt between the thread forming faces of the dies.

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

GEORGE A. J. HALNSWORTH.

Witnesses:

HELEN REDMAN,
C. A. FLEMING.