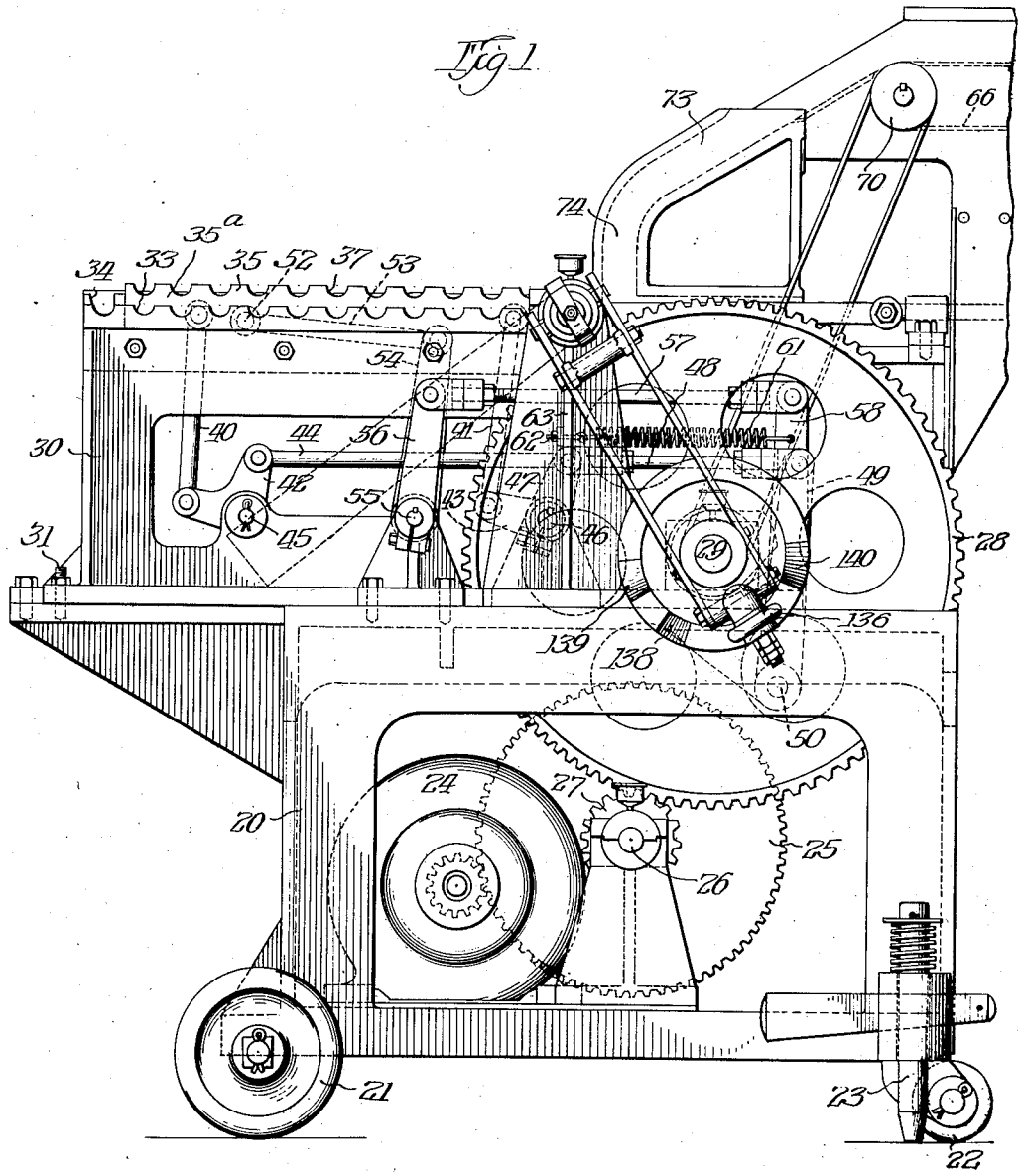
March 10, 1925. 1,529,017

J. A. DYBLIE

NUTTING UP MACHINE

Filed Feb. 13, 1922 8 Sheets-Sheet 1

Fig. 1.



Witness:
F. C. Dennison.

Inventor:
Julius A. Dyblie,
By H. Anthony Hains
Atty

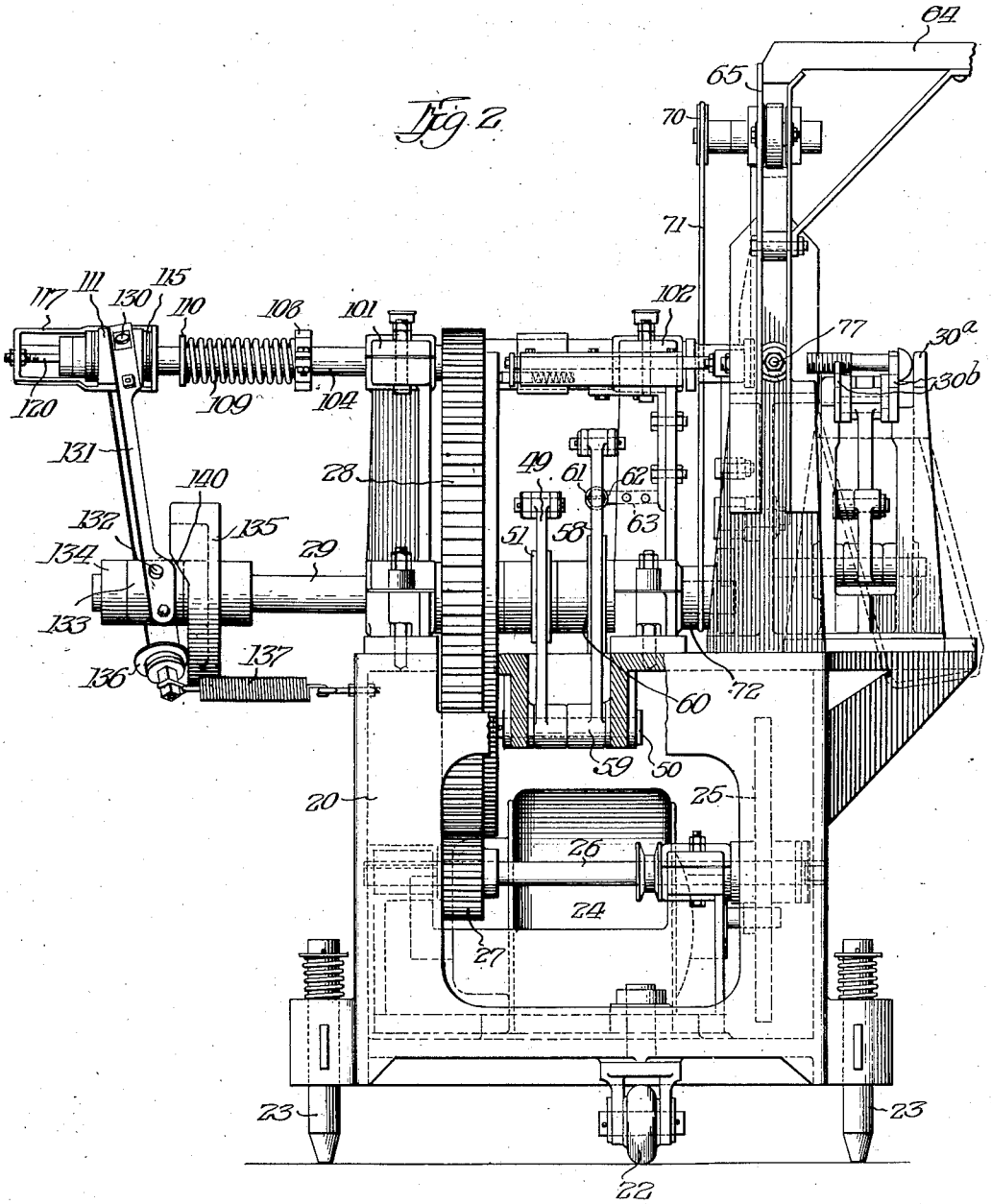
March 10, 1925. 1,529,017

J. A. DYBLIE

NUTTING UP MACHINE

Filed Feb. 13, 1922 8 Sheets-Sheet 2

Fig. 2.



Witness:
Geo. E. Larson

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By H. Anthony Horn
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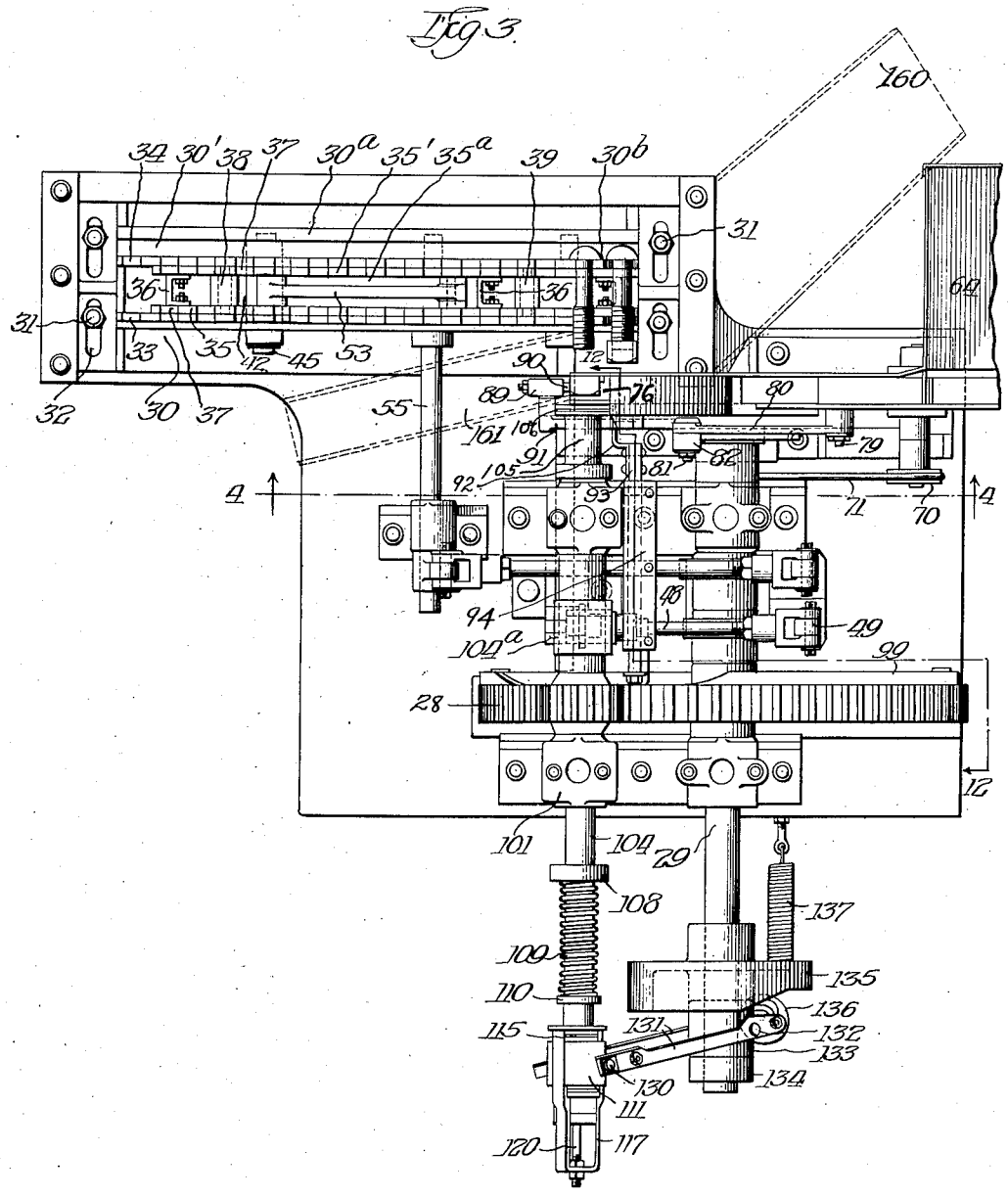
March 10, 1925. 1,529,017

J. A. DYBLIE

NUTTING UP MACHINE

Filed Feb. 13, 1922 8 Sheets-Sheet 3

Fig 3.



Witness:
Fred. C. Dawson.

Inventor:
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Atty

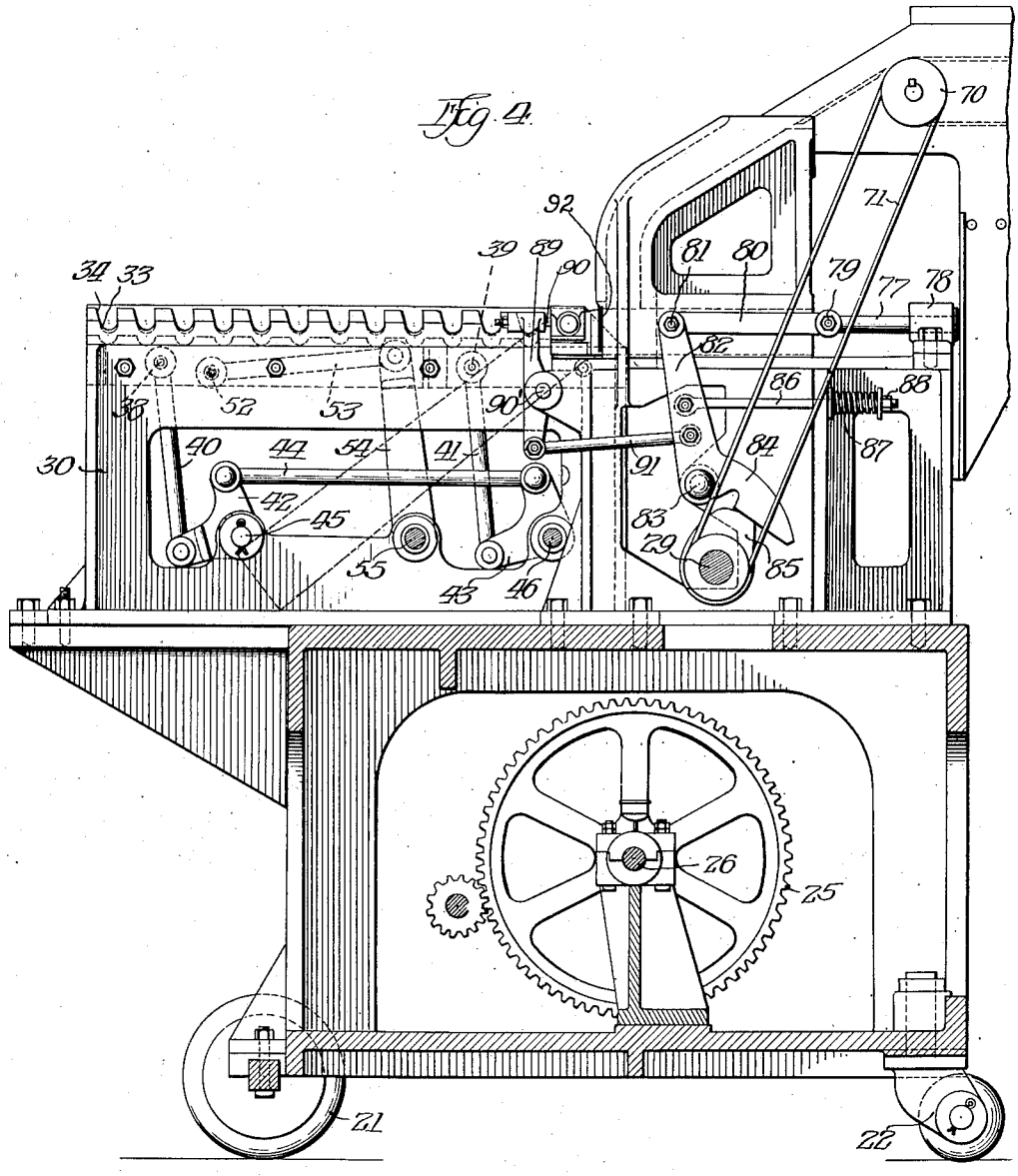
March 10, 1925. 1,529,017

J. A. DYBLIE

NUTTING UP MACHINE

Filed Feb. 13, 1922 8 Sheets-Sheet 4

Fig. 4.



Witness:
Fred. C. Dorison

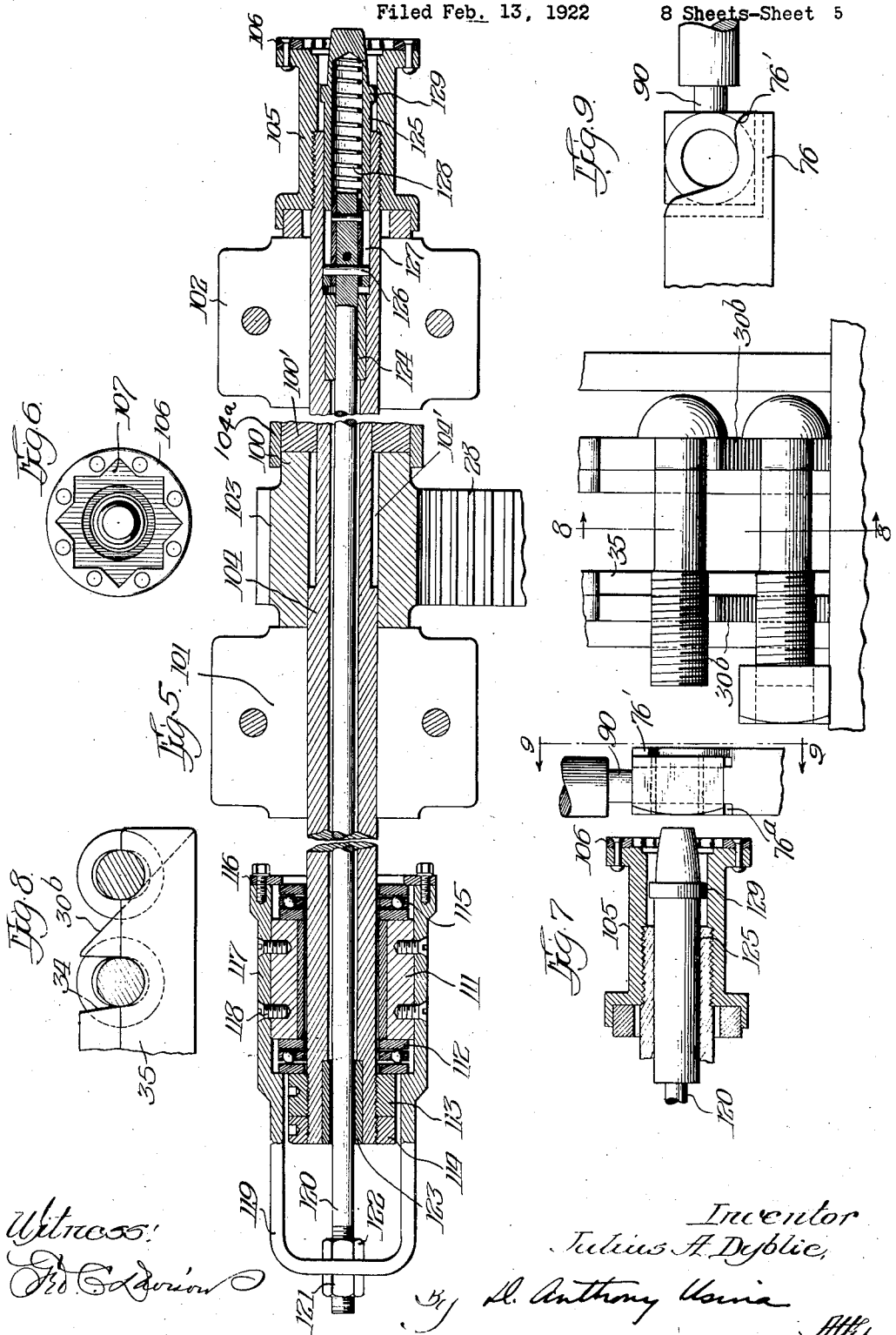
Inventor
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March 10, 1925. 1,529,017

J. A. DYBLIE

NUTTING UP MACHINE

Filed Feb. 13, 1922 8 Sheets-Sheet 5

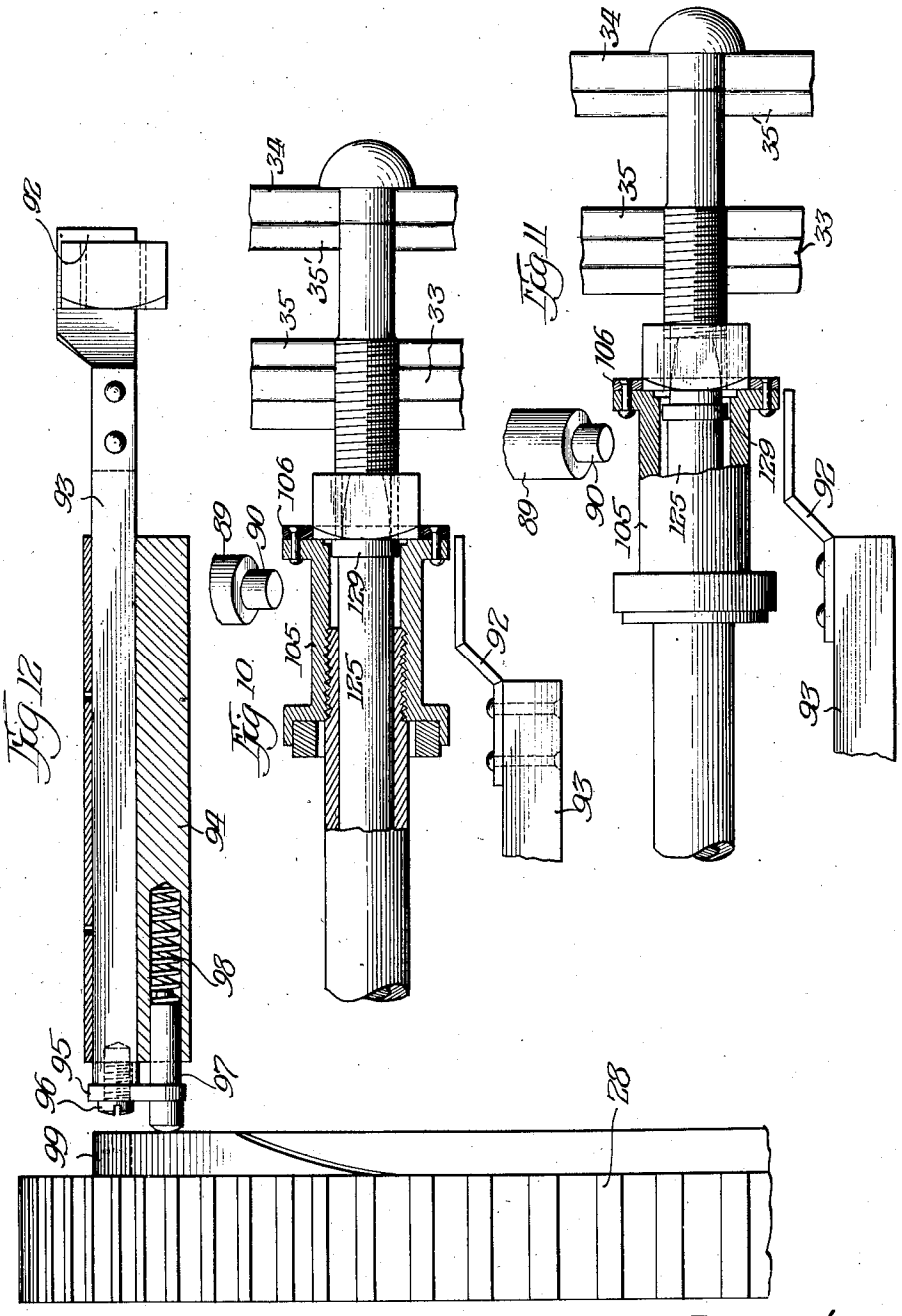


March 10, 1925. 1,529,017

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NUTTING UP MACHINE

Filed Feb. 13, 1922 8 Sheets-Sheet 6



Witness:
Geo. E. Dorsey

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March 10, 1925. 1,529,017

J. A. DYBLIE

NUTTING UP MACHINE

Filed Feb. 13, 1922 8 Sheets-Sheet 7

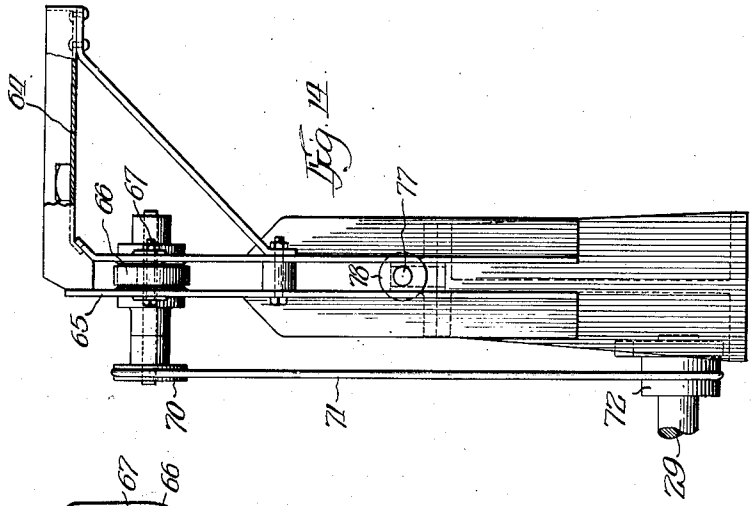


Fig. 14

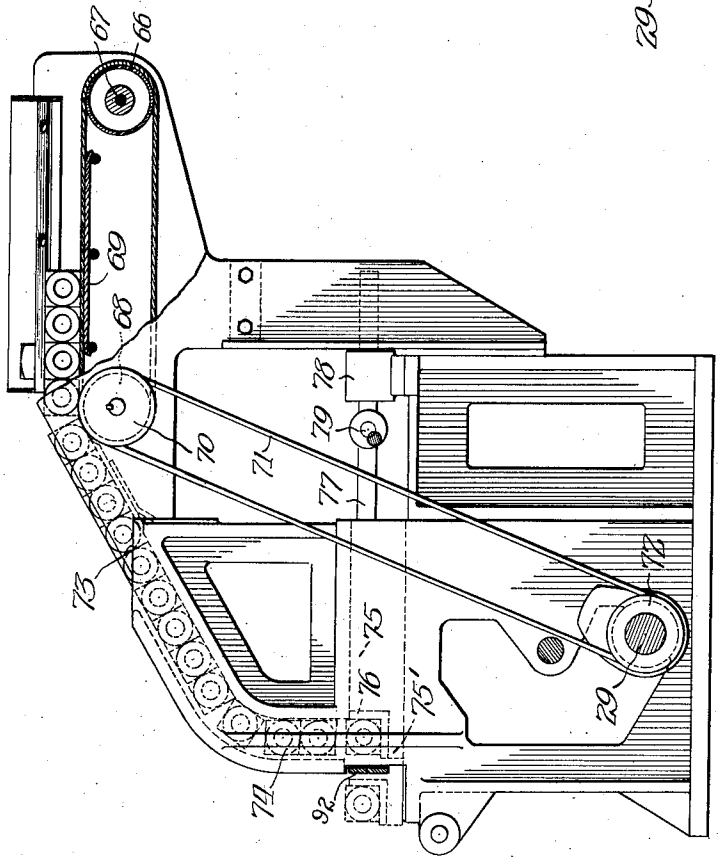


Fig. 13

Witness:
Fred C. Dawson

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March 10, 1925. 1,529,017

J. A. DYBLIE

NUTTING UP MACHINE

Filed Feb. 13, 1922 8 Sheets-Sheet 8

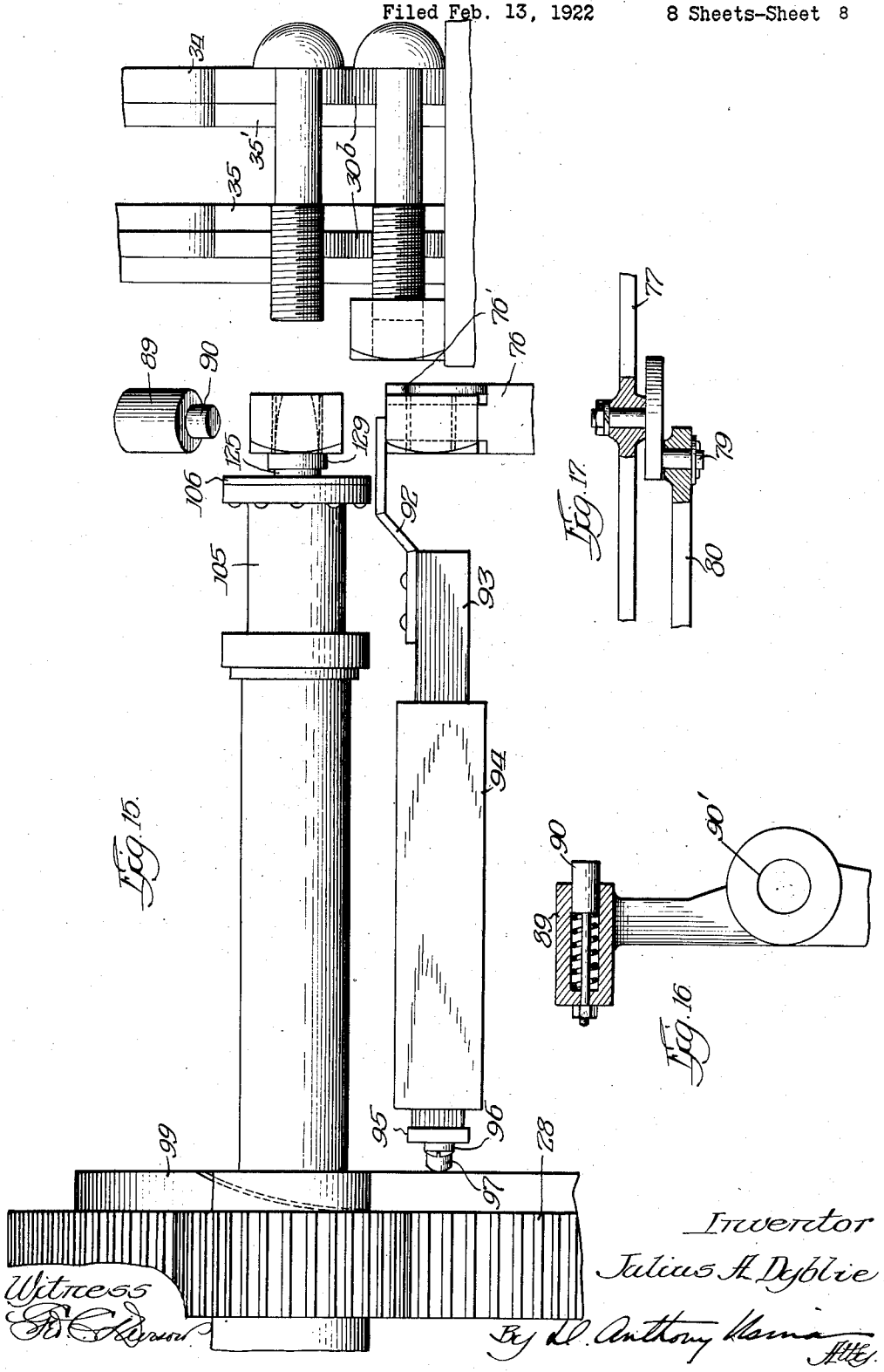


Fig. 15.

Fig. 17.

Fig. 16.

Witness

Inventor
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By D. Anthony Manning
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Patented Mar. 10, 1925. 1,529,017

UNITED STATES PATENT OFFICE.

JULIUS A. DYBLIE, OF JOLIET, ILLINOIS.

NUTTING-UP MACHINE.

Application filed February 13, 1922. Serial No. 536,125.

To all whom it may concern:

Be it known that I, JULIUS A. DYBLIE, a citizen of the United States, residing at Joliet, in the county of Will and State of Illinois, have invented certain new and useful Improvements in Nutting-Up Machines, of which the following is a specification.

This invention relates to a new and improved nutting-up machine and more specifically to a machine adapted to mechanically juxtapose bolts and nuts and to thread the nuts upon the bolts. In connection with numerous types of bolts, such, for example, as track bolts, it is necessary that the bolts be shipped with the nut threaded upon each bolt. Though some nutting up machines have been developed, it has been a general practice heretofore to thread these nuts upon the bolts by hand. This is particularly true in connection with hot-forged nuts for the reason that these nuts are subject to considerable irregularity in shape and in the location of the threaded opening.

In hand work, the nuts are not uniformly placed upon the bolts and frequently, through carelessness, bolts without nuts will be found in the kegs and such bolts are useless.

It is an object of the present invention to provide a machine which will mechanically bring together nuts and bolts and will positively and uniformly thread the nuts upon the bolts.

It is a further object to provide a machine of this character which is adapted to handle nuts which are somewhat irregular in size and form.

It is also an object to provide a machine which will positively deliver the nutted bolts for packing.

It is an additional object to provide a machine which may be operated at relatively high speed and which will nut up bolts in large quantities with a minimum of hand labor.

Other and further objects will appear as the description proceeds.

Broadly, my invention comprises, in a nutting-up machine, conveying means for nuts and conveying means for bolts, these two conveying means having overlapping paths and means adapted to intermittently enter the point of overlap of the two paths to screw the nut upon the bolt.

In its more specific form, the bolt carrying conveyor comprises a fixed rack and a reciprocated rack adapted to give the bolts a step by step movement in the fixed rack. The nut carrying conveyor comprises a chute and a reciprocating bar adapted to intermittently take a nut from the chute and present it adjacent the end of the bolt.

The nut rotating device comprises a reciprocating, rotating member which is moved into and out of engagement with the nut. This member is provided with a plunger adapted to enter the opening in the nut to thus center the opening in relation to the bolt.

I have illustrated a preferred embodiment of my invention in the accompanying drawings. in which—

Figure 1 is a side elevation of my machine;

Figure 2 is a view of Figure 1 as seen from the right;

Figure 3 is a plan view of the machine;

Figure 4 is a vertical section, taken on line 4—4 of Figure 3;

Figure 5 is a longitudinal section partly broken away showing a nut centering and rotating assembly;

Figure 6 is a face view of the nut engaging member;

Figure 7 is a broken plan view partly in section showing the relation of the nut, bolt and nut rotating members;

Figure 8 is a fragmentary section taken on line 8—8 of Figure 7;

Figure 9 is a fragmentary section taken on line 9—9 of Figure 7;

Figure 10 is a view similar to Figure 7 but showing a nut moved against the end of the bolt;

Figure 11 is a view similar to Figure 10 but showing the nut threaded upon the bolt;

Figure 12 is a fragmentary section taken on line 12—12 of Figure 3;

Figure 13 is a side elevation, partly broken away, of the nut conveying mechanism; and

Figure 14 is a view of Figure 13 as seen from the right.

Figure 15 is a fragmentary plan view showing the nut arrester, nut socket and associated parts;

Figure 16 is a fragmentary view partly in section showing the bell crank and spring pressed nut holding plunger; and

Figure 17 is a fragmentary plan view partly in section of the eccentric nut pusher connection.

Referring now to the drawings, the machine comprises the base frame 20 which

is supported at one end by the pair of wheels 21 and at the opposite end by the pivot wheel 22 and adjustable pins 23. To this frame is secured the electric motor 24 which furnishes the power for the operation of the machine. Motor power is transmitted through the gear wheel 25 to shaft 26 and from that shaft through pinion 27 to gear wheel 28 which is secured to the drive shaft 29. Supported upon the base frame is the upper frame provided with the upwardly extending portions 30 and 30'. This upper frame is secured to the base frame by bolts 31 fitting in elongate slots 32, thus permitting lateral adjustment of the upper frame upon the base frame. A plate bolted to the member 30 has its upper edge provided with semi-circular recesses 33 forming a rack capable of holding bolts in parallel series. A similar plate bolted to the outer member 30' is provided with notches 34 which register with the notches 33. These notches 34, however, as best shown in Figure 8, are deeper than the recesses 33 and are adapted to receive the oval shoulders adjacent the heads of the bolts and to thus prevent the bolts from rotating. The member 30' is also provided with the fixed flange 30^a against which the heads of the bolts bear. The right end of the members 30 and 30' are cut off at an angle as shown at 30^b. Intermediate the two members 30 and 30' are members 35 and 35' joined by members 36 to form a movable frame 35^a. The members 35 extend parallel to the members 30 and 30' and are formed with notches 37 therein similar to the notches 33 in the member 30.

Adjacent either end of the movable frame are the pivots 38 and 39 to which are pivoted the levers 40 and 41. The lower ends of these levers are pivotally connected to bell cranks 42 and 43, the upper arms of the bell cranks being connected by the rod 44 so that the two bell cranks operate in unison. The bell crank 42 is pivoted upon a short shaft 45 supported in the members 30 and 30'. The bell crank 43 is keyed to the shaft 46 which shaft extends transversely of the machine parallel to the main drive shaft 29. To this shaft 46 is keyed an arm 47 shown in Figure 1, the upper end of which is connected by the adjustable link 48 to an arm 49 which is pivoted to the base frame at 50. This arm 49 bears against the cam 51 carried by the main drive shaft 29.

It will be noted that the weight of the movable frame consisting of members 35 and 36 rests upon the bell cranks and tends to maintain the arm 49 against the cam 51. The movable frame is further provided with a pivot 52 to which is connected the rod 53, the opposite end of which is pivotally connected to the arm 54. This arm 54 is keyed to the shaft 55 which extends transversely of the machine and which is supported in the members 30 and 30'. This shaft 55 has also keyed thereto the arm 56, the upper end of which is pivotally connected by link 57 to the arm 58 which latter is pivoted at 59 beside the pivot 50 of the arm 49. This arm 58 bears against the cam 60 which is rotated by main shaft 29. This arm 58 has connected thereto the spring 61, the opposite end of which is connected at 62 to the upper frame member 63. This spring 61 serves to hold the arm 58 against the cam 60.

The nut handling portion of the machine comprises the table 64 at one side of which is the trough 65. The bottom of the trough is formed by the upper run of the conveyor belt 66 which belt passes over pulleys 67 and 68. The upper run is supported by fixed member 69. The pulley 70 is keyed to the shaft of the pulley 68 and this pulley 70 is connected by the drive belt 71 to the pulley 72 upon the main shaft 29. The sloping chute 73 leads from the delivery end of the trough 65, this chute terminating at 74 in a short, vertical drop.

The nut pusher bar 75 has its end 76 reciprocated to and from a position under the end of the vertical portion 74 of the chute. The bar 75 is provided with the rear extension 77 which is guided through the block 78. The pin 79 connects the extension 77 with the link 80, the latter being connected at 81 to the bell crank lever 82. The connection between the link 80 and the pin 79 is eccentric whereby the position of the bar 75 may be adjusted. This lever 82 is pivoted at 83 to the frame and its lower arm 84 engages a cam 85 carried by the shaft 29.

The rod 86 is pivotally connected to the upper arm of the lever 82 and extends through an opening in the frame. The spring 87 surrounds the rod 86 and is held between the frame and the nut 88 upon the rod. This spring serves to maintain the lower arm of the bell crank 82 in contact with the cam 85.

The bell crank 89 is pivotally supported at 90' upon the frame, and the lower arm of this bell crank is connected by the link 91 to the upper arm of the bell crank 82. The upper arm of the bell crank 89 carries the spring pressed plunger 90 which is opposed in direction to the outer end of the nut pusher 75. The nut arrester 92 is carried by the plunger 93 which reciprocates in the guide 94, as best shown in Figure 12. The opposite end of the rod 93 has the yoke 95 secured thereto by means of cap screw 96. The pin 97 is fitted into the yoke and its inner end compresses the spring 98 contained in a bore in the guide block 94. The head of the pin 97 engages a cam 99 carried by the inner, lateral face of the gear wheel 28.

The nut rotating assembly is best shown in Figure 5 and comprises the hollow shaft 100, which is mounted upon the tubular shaft 104 between blocks 101 and 102 which blocks support shaft 104. The hollow shaft 100 carries the pinion 103 which is in mesh with the gear wheel 28 and is driven thereby. The shaft 100 is connected to the shaft 104 by the feathers 100′ fitting in elongated grooves 104′ in the shaft 104 so that this shaft is caused to rotate with the pinion shaft 100 but is slidable therein. The feathers are retained in place by sleeve 104ª.

Rigidly secured to the inner end of the tubular shaft is nut socket body 105 provided with the nut socket 106. As best shown in Figure 6, this head is provided with a recess 107 adapted to receive nuts and to cause them to rotate with the head. The recess is star-shaped rather than square so as to limit the amount of slip before the head positively engages the nut to 45 degrees rather than 90 degrees.

As shown in Figure 2, the tubular shaft 104 has the fixed spring seat 108 clamped thereto. The spring 109 is fitted about the shaft to the left of the collar and the slidable spring seat 110 is fitted upon the shaft adjacent the opposite end of the spring.

The collar 111 is slidably fitted upon the shaft 104. The thrust bearing assembly 112 is located between the slidable collar 111 and the round nut 113 which latter is held in place upon the outer end of the shaft by the jam nut 114. The inner face of the sliding collar 111 bears against the thrust bearing assembly 115. This assembly is retained adjacent the sliding collar by means of the ring plate 116 which latter is secured to the yoke 117. The yoke 117 is secured by screws 118 to the sliding collar 111. The outer U-shaped portion 119 of the yoke has the sliding plunger 120 connected thereto by nuts 121 and 122, the connection being such that the plunger may be adjusted relative to the yoke.

The plunger 120 is supported in bearings 123 and 124 in the tubular shaft 104 and its inner end has the plunger head 125 slidably secured thereto by means of the key 126. This key has its end located in slots 127 in the head. The head is pressed outwardly relative to the plunger by means of the spring 128 which is enclosed by the head. The outer end of the head is slightly tapered and is provided with the shoulder 129 adapted to bear against the nuts.

The sliding collar 111 is connected by trunnions 130 to the outer end of the rocking arm 131. This arm 131 is pivoted upon trunnions 132 carried by the sleeve 133 which latter is loosely fitted upon the main shaft 29. This sleeve 133 is retained between the outer fixed sleeve 134 and the central boss of the main cam wheel 135. The lower end of the rocking arm 131 is provided with the cam follower roller 136 adapted to roll upon the outer lateral cam face of the wheel 135. The inner end of the rocking arm is connected by the spring 137 to the base frame, this spring serving to maintain the roller 136 against the cam wheel 135.

As shown in Figure 1, the cam wheel is provided with a cam surface having a first lift 138 and a second lift 139 with a short dwell between the lifts. The cam gradually rises slightly and then drops off, with a single drop 140. The purpose of this cam formation will appear hereafter.

In the operation of my machine, a series of bolts are placed in the notches 33 and 34 in the fixed frames. A quantity of nuts are placed in the nut trough and chute. When the shaft 29 is rotated, the cam 51 forces the arm 49 to the right as seen in Figure 1. This movement to the right is transmitted to link 48 and by arm 47 to the shaft 46. The bell crank lever 43 is keyed to the shaft 46 and the rotation of the shaft 46 serves to rotate the bell crank lever in the clockwise direction as seen in Figures 1 and 4. Due to the connection by the link 44, the bell crank 42 makes an identical movement. The rotation of these bell cranks serves to move upwardly the movable frame 35ª and the frame lifts with it the bolts. The bolts are lifted from the notches 33 and 34, in the fixed frame and are carried in the notches 37 in the movable frame. This movement is sufficient so that the bolts are lifted entirely clear of the notches in the fixed frame.

At this point in the cycle of operation, the cam 60 upon shaft 29 swings the lever 58 to the right and this movement to the right is transmitted through link 57 and arm 56 to the shaft 55. Movement of the shaft 55 causes the arm 54 to move from the position in which it is shown in Figure 4 to that in which it is shown in Figure 1. This arm is connected by link 53 and pin 52 to the movable frame and this movement moves the movable frame to the right a distance of one notch to the position in which it is shown in Figure 1.

While the movable frame is held to the right in this manner, the arm 49 is dropped from its cam 51 and the weight of the movable frame and of the bolts carried thereby serve to move the frame downwardly, thus rotating the bell cranks 42 and 43 in the counterclockwise direction. When the movable frame passes below the level of the fixed frame, the bolts are deposited in the notches upon the fixed frame. The movable frame drops down to the level in which it is shown in dotted lines in Figure 4, being held against further downward movement by the engagement of the arm 49 with the low point of the cam 51.

While the movable frame is in its lower

position, the arm 58 moves down from the high point of the cam 60, being held against the cam by the spring 61. This movement of the arm 58 by its connection with the arm 54 serves to swing the movable frame to the left a distance of one notch. This completes the cycle of movement of the frame and as has been explained, such movement of the frame advances all of the bolts a distance of one notch and presents a new bolt opposite the nutting-up shaft.

Referring now to the nut presenting means, the nut pusher bar 75, when in its inward position, has the lowermost nut of the series in the chute resting upon its outer end 76. This end 76 as shown in Figure 9 is provided with a lip 76′ adapted to aid in retaining the nut thereon and is further provided with grooves 76ª adapted to receive any burrs on the edge of the nuts. As the shaft 29 rotates, the cam 85 lifts the lower end 84 of the bell crank 82 and the upper end of the bell crank moves to the left as seen in Figure 4, and by means of the link 80, the nut pusher bar is moved to the left. It carries with it the lowermost nut and the remaining column of nuts rests upon the top of the rear portion of the bar. The nut carried by the pusher is moved outwardly to a point oposite the bolt in the last notch in the rack, the paths of the nuts and the bolts thus overlapping at this point.

It will be observed that the cam which reciprocates the nut arrester 92, shown in Figure 11, is so timed that the arrester is withdrawn just as the pusher bar starts to move forward. When the pusher bar is later retracted, the nut arrester is advanced as soon as the pusher has cleared its path, and the arrester prevents the lowermost nut from falling off the end 76 of the pusher as the column of nuts drops down upon being cleared by the main body of the pusher bar.

The bell crank 89 is operatively connected to the bell crank 82 and is operated simultaneously therewith. The spring press plunger 90 is brought against the outer face of the nut carried by the bar as the nut reaches its position in alignment with the bolt. The nut is thus yieldingly retained between the plunger and the pusher bar, and is supported upon the portion 76 of the bar.

When the nut is positioned in alignment with the bolt by means of the pusher 75 and the plunger 90, the cam follower roller 136 rises up the first rise 138 on the main cam surface. This swings outwardly the lower end of the roller arm 131 and causes its upward end to swing inwardly. This inward movement is transmitted through trunions 130 to the slidable collar 111. The yoke 117 moves with the collar 111 and the yoke carries with it the plunger 120. This movement of the plunger 120 serves to carry its head 125 toward the nut and the tapered head enters the opening in the nut and centers the nut on the plunger, the shoulder 129 bringing up against the face of the nut.

At this point in the operation of the machine, the nut pusher and the plunger 90 are withdrawn from contact with the nut which remains supported upon the plunger head 125. Immediately thereafter, the cam follower roller 136 rises upon the second lift 139 of the cam and the upper end of the rocker arm is swung further to the right carrying with it the collar 111. This further movement of the collar is transmitted to the plunger 125 and the plunger is advanced until its face bears against the end of the bolt, the yielding permitted by the spring 128 in the head taking care of any inequality of lengths of bolts.

Further, this second movement of the collar 111 brings the thrust bearing 115 against the spring seat 110 and moves that seat to the right. Through the spring 109 and fixed spring seat 108, the tubular shaft 104 is thrust yieldingly to the right. The nut socket 106 is brought to bear against the nut and as it rotates, the nut slips into the socket and is then rotated with the tubular shaft. This rotation screws the nut upon the bolt. In order to keep a uniform pressure upon the nut, the cam surface has a continual slight rise from the lift 139 to the drop-off 140 so that the tubular shaft is urged forward an amount approximately equal to that which the nut advances as it is threaded upon the bolt. When the cam follower 136 rolls down the drop-off portion 140 of the cam, the roller is held in engagement with the cam by the spring 137 and the collar 111 is swung outwardly. Through its connection by means of yoke 117, the plunger 120 moves outwardly with the collar. The collar also through thrust bearing 112 engages the round nut 113 and moves the tubular shaft 104 outwardly, the movement of the plunger beginning prior to the movement of the shaft.

The operations of the machine are so coordinated that as soon as the nutting-up shaft assembly starts to move to the left and clears the nut, the movable rack 35ª lifts the bolts and moves them forward one notch in the manner which has been described. As the movable rack moves downwardly, the bolt which has just been nutted up is carried downwardly at a point beyond the last notch in the fixed rack. It engages the sloping surface 30ᵇ of members 30 and 30′, and when the movable rack moves to the left, the nutted up bolt slides off these sloping surfaces into a suitable chute 160, shown in Figure 3, which preferably leads to a keg or similar receptacle or packing case.

Should there be no bolt opposite a nut

which has been presented by the push rod and centered and thrust forward by the plunger head 125, when this head is drawn back, the nut will be thrust from the head by its engagement with the nut socket 106 and will drop downwardly. A suitable chute 161, shown in Figure 3, may be provided to carry off any such nuts.

The bolt holding frame members 30 and 30′ may be adjusted laterally upon the base frame so as to render the machine capable of nutting up bolts of different lengths. It is essential only that the threaded end of the bolt be presented in the proper relation to the nutting-up shaft.

I have shown one particular embodiment of my invention but this obviously is capable of modification to adapt it for use with varying bolts and nuts and to varying conditions of use. It is my intention to cover all such modifications as come within the spirit and scope of the appended claims.

I claim:

1. In a nutting-up machine, conveying means for nuts, and conveying means for bolts, having overlapping paths, and means intermittently entering the point of overlap of said paths and adapted to screw a nut upon a bolt.

2. In a nutting-up machine, conveying means for nuts, and conveying means for bolts, having overlapping paths, and means adapted to screw a nut upon a bolt, said bolt conveying means comprising a fixed rack having bolt retaining notches and means moving said bolts progressively from notch to notch.

3. In a nutting-up machine, conveying means for nuts, and conveying means for bolts, having overlapping paths, and means adapted to screw a nut upon a bolt, said bolt conveying means comprising a fixed rack having bolt retaining notches and a movable rack for moving said bolts progressively from notch to notch.

4. In a nutting-up machine, conveying means for nuts, and conveying means for bolts, having overlapping paths, and means adapted to screw a nut upon a bolt, said bolt conveying means comprising a fixed rack having bolt retaining notches and means moving said bolts progressively from notch to notch, said fixed rack being adapted to so retain the bolts as to prevent their rotation.

5. In a nutting-up machine, conveying means for nuts, and conveying means for bolts, having overlapping paths, and means adapted to screw a nut upon a bolt, said bolt conveying means comprising a fixed rack having bolt retaining notches and means moving said bolts progressively from notch to notch, said fixed rack being provided with notches adapted to engage shoulders upon bolts to prevent their rotation.

6. In a nutting-up machine, conveying means for nuts, and conveying means for bolts, having overlapping paths, and means adapted to screw a nut upon a bolt, said bolt conveying means comprising a fixed rack having bolt retaining notches and a movable rack for moving said bolts progressively from notch to notch, said movable rack being provided with operating means adapted to intermittently lift and move forward said rack.

7. In a nutting-up machine, conveying means for nuts, and conveying means for bolts, having overlapping paths, and means adapted to screw a nut upon a bolt, said bolt conveying means comprising a fixed rack having bolt retaining notches and a movable rack for moving said bolts progressively from notch to notch, said movable rack being provided with operating means adapted to intermittently lift and move forward said rack and to return it to its initial position by movement upon a plane lower than that of the fixed rack.

8. In a nutting-up machine, conveying means for nuts, and conveying means for bolts, having overlapping paths, and means adapted to screw a nut upon a bolt, said bolt conveying means comprising a fixed rack having bolt retaining notches and a movable rack for moving said bolts progressively from notch to notch, said movable rack being provided with spaced supports connected to bell crank levers whereby the rack is moved vertically through parallel, horizontal positions.

9. In a nutting-up machine, conveying means for nuts, and conveying means for bolts, having overlapping paths, and means adapted to screw a nut upon a bolt, said bolt conveying means comprising a fixed rack having bolt retaining notches and a movable rack for moving said bolts progressively from notch to notch, said movable rack being provided with spaced supports connected to bell crank levers whereby the rack is moved vertically through parallel, horizontal positions, and a lever connected to said rack whereby it is moved horizontally upon its supports.

10. In a nutting-up machine, means for holding a bolt, means for presenting a nut adjacent an end of the bolt and means adapted to engage the nut, to move the nut to a position where its threaded opening is coaxial with the bolt and to screw it upon the bolt.

11. In a nutting-up machine, means for holding a bolt, means for presenting a nut adjacent an end of the bolt, and reciprocating means adapted to center a nut relative to the bolt, to press it against the bolt, to rotate it upon the bolt and to withdraw from engagement therewith.

12. In a nutting-up machine, means for

holding a bolt, means for presenting a nut adjacent an end of the bolt, and reciprocating means carrying a plunger adapted to enter the opening in a nut to center it relative to the bolt, and carrying rotating means adapted to engage the nut and screw it upon the bolt.

13. In a nutting-up machine, means for holding a bolt, means for presenting a nut adjacent an end of the bolt, and reciprocating means carrying a spring pressed plunger adapted to enter the opening in a nut to center it relative to the bolt, the plunger engaging the end of the bolt, and carrying yieldingly thrust rotating means adapted to engage the nut and screw it upon the bolt.

14. In a nutting-up machine, means for holding a bolt, means for presenting a nut adjacent an end of the bolt, and reciprocating means carrying a plunger adapted to enter the opening in a nut to center it relative to the bolt, and carrying rotating means adapted to engage the nut and screw it upon the bolt, said reciprocating means withdrawing the plunger and rotating means after screwing the nut a predetermined number of turns upon the bolt.

15. In a nutting-up machine, means for holding a bolt, means for presenting a nut adjacent an end of the bolt, a hollow shaft aligned with said bolt, means for rotating said shaft, a sliding shaft in said hollow shaft, said sliding shaft rotating with the hollow shaft and provided with means to engage the nut.

16. In a nutting-up machine, means for holding a bolt, means for presenting a nut adjacent an end of the bolt, a hollow shaft aligned with said bolt, means for rotating said shaft, a sliding shaft in said hollow shaft, said sliding shaft rotating with the hollow shaft and provided with means to engage the nut, and cam operated means reciprocating the sliding shaft into and out of engagement with the nut.

17. In a nutting-up machine, means for holding a bolt, means for presenting a nut adjacent an end of the bolt, a hollow shaft aligned with said bolt, means for rotating said shaft, a sliding shaft in said hollow shaft, said sliding shaft rotating with the hollow shaft and provided with means to engage the nut, and cam operated means yieldingly reciprocating the sliding shaft into and out of engagement with the nut.

18. In a nutting-up machine, means for holding a bolt, means for presenting a nut adjacent an end of the bolt, a hollow shaft aligned with said bolt, means for rotating said shaft, a sliding shaft in said hollow shaft, said sliding shaft rotating with the hollow shaft and provided with means to engage the nut, and a plunger slidably mounted in the sliding shaft and adapted to center the nut relative to the shaft.

19. In a nutting-up machine, means for holding a bolt, means for presenting a nut adjacent an end of the bolt, a hollow shaft aligned with said bolt, means for rotating said shaft, a sliding shaft in said hollow shaft, said sliding shaft rotating with the hollow shaft and provided with means to engage the nut, and a plunger slidably mounted in the sliding shaft and adapted to engage the threaded opening in the nut to center the nut relative to the shaft.

20. In a nutting-up machine, means for holding a bolt, means for presenting a nut adjacent an end of the bolt, a hollow shaft aligned with said bolt, means for rotating said shaft, a sliding shaft in said hollow shaft, said sliding shaft rotating with the hollow shaft and provided with means to engage the nut and a plunger slidably mounted in the sliding shaft and adapted to center the nut relative to the shaft, the plunger having a head spring pressed outwardly from the end of the shaft.

21. In a nutting-up machine, means for holding a bolt, means for presenting a nut adjacent an end of the bolt, a drive shaft for said machine, a rotating shaft carrying means adapted to be reciprocated into and out of engagement with the nut, and a swinging arm associated with the drive shaft and rotating shaft, said arm being operated by a cam carried by the operating shaft to move the reciprocating means.

22. In a nutting-up machine, means for holding a bolt, means for presenting a nut adjacent an end of the bolt, a drive shaft for said machine, a rotating shaft carrying means adapted to be reciprocated into and out of engagement with the nut, and a swinging arm associated with the drive shaft and rotating shaft, said arm being operated by a cam carried by the operating shaft to move the reciprocating means, the swinging arm being yieldingly associated with the reciprocating means.

23. In a nutting-up machine, means for holding a bolt, means for presenting a nut adjacent an end of the bolt, a hollow shaft aligned with said bolt, means for rotating said shaft, a sliding shaft in said hollow shaft, said sliding shaft rotating with the hollow shaft and provided with means to engage the nut, and a plunger slidably mounted in the sliding shaft and adapted to center the nut relative to the shaft, the plunger being reciprocated independently of the sliding shaft.

24. In a nutting-up machine, means for holding a bolt, means for presenting a nut adjacent an end of the bolt, a hollow shaft aligned with said bolt, means for rotating said shaft, a sliding shaft in said hollow shaft, said sliding shaft rotating with the hollow shaft and provided with means to engage the nut, a plunger slidably mounted

in the sliding shaft and adapted to center the nut relative to the shaft, and means for independently reciprocating the sliding shaft and the plunger.

25. In a nutting-up machine, means for holding a bolt, means for presenting a nut adjacent an end of the bolt, a hollow shaft aligned with said bolt, means for rotating said shaft, a sliding shaft in said hollow shaft, said sliding shaft rotating with the hollow shaft and provided with means to engage the nut, a plunger slidably mounted in the sliding shaft and adapted to center the nut relative to the shaft, and means for advancing the plunger into engagement with the nut and subsequently advancing the sliding shaft into engagement with the nut.

26. In a nutting-up machine, means for holding a bolt, means for presenting a nut adjacent an end of the bolt, a hollow shaft aligned with said bolt, means for rotating said shaft, a sliding shaft in said hollow shaft, said sliding shaft rotating with the hollow shaft and provided with means to engage the nut, a plunger slidably mounted in the sliding shaft and adapted to center the nut relative to the shaft, and a cam operated arm so associated with the plunger and sliding shaft as to first advance the plunger into engagement with the nut and subsequently to advance the sliding shaft into engagement with the nut.

27. In a nutting-up machine, means for holding a bolt, means for presenting a nut adjacent an end of the bolt, a hollow shaft aligned with said bolt, means for rotating said shaft, a sliding shaft in said hollow shaft, said sliding shaft rotating with the hollow shaft and provided with means to engage the nut, a plunger slidably mounted in the sliding shaft and adapted to center the nut relative to the shaft, and a cam operated arm so associated with the plunger and sliding shaft as to first advance the plunger into engagement with the nut and subsequently to advance the sliding shaft into engagement with the nut, the plunger having a head spring pressed outwardly from the end of the shaft, and the sliding shaft being yieldingly associated with the cam operated arm.

28. In a nutting-up machine, means for holding a bolt, means for presenting a nut adjacent an end of the bolt, a drive shaft for said machine, a gear wheel upon said shaft, a hollow shaft carrying a gear in mesh with said gear wheel, a tubular shaft slidably mounted in the hollow shaft, and adapted for rotation therewith, the tubular shaft being provided with a head adapted to engage a nut to cause the nut to rotate therewith, a cam carried by the drive shaft, a rocking arm supported by the shaft and actuated by the cam, the opposite end of the arm being connected to the slidable shaft and adapted to reciprocate said shaft.

29. In a nutting-up machine, means for holding a bolt, means for presenting a nut adjacent an end of the bolt, a drive shaft for said machine, a gear wheel upon said shaft, a hollow shaft carrying a gear in mesh with said gear wheel, a tubular shaft slidably mounted in the hollow shaft, and adapted for rotation therewith, the tubular shaft being provided with a head adapted to engage a nut to cause the nut to rotate therewith, a cam carried by the drive shaft, a rocking arm supported by the shaft and actuated by the cam, the opposite end of the arm being connected to the slidable shaft and adapted to reciprocate said shaft, a plunger slidably extending through the tubular shaft for centering the nut, and a yoke connecting the plunger to the rocking arm.

30. In a nutting-up machine, means for holding a bolt, means for presenting a nut adjacent an end of the bolt, a drive shaft for said machine, a gear wheel upon said shaft, a hollow shaft carrying a gear in mesh with said gear wheel, a tubular shaft slidably mounted in the hollow shaft, and adapted for rotation therewith, the tubular shaft being provided with a head adapted to engage a nut to cause the nut to rotate therewith, a cam carried by the drive shaft, a rocking arm supported by the shaft and actuated by the cam, the opposite end of the arm being yieldingly associated with the slidable shaft and adapted to reciprocate said shaft, a plunger slidably extending through the tubular shaft for centering the nut, and a yoke positively connecting the plunger to the rocking arm.

31. In a nutting-up machine, means for holding a bolt, means for presenting a nut adjacent an end of the bolt, a drive shaft for said machine, a gear wheel upon said shaft, a hollow shaft carrying a gear in mesh with said gear wheel, a tubular shaft slidably mounted in the hollow shaft, and adapted for rotation therewith, the tubular shaft being provided with a head adapted to engage a nut to cause the nut to rotate therewith, a cam carried by the drive shaft, a rocking arm supported by the shaft and actuated by the cam, the opposite end of the arm carrying a thrust collar fitting upon the tubular shaft and spaced thrust members fitted to the tubular shaft upon either side of the collar.

32. In a nutting-up machine, means for holding a bolt, means for presenting a nut adjacent an end of the bolt, a drive shaft for said machine, a gear wheel upon said shaft, a hollow shaft carrying a gear in mesh with said gear wheel, a tubular shaft slidably mounted in the hollow shaft, and

adapted for rotation therewith, the tubular shaft being provided with a head adapted to engage a nut to cause the nut to rotate therewith, a cam carried by the drive shaft, a rocking arm supported by the shaft and actuated by the cam, the opposite end of the arm carrying a thrust collar fitting upon the tubular shaft and spaced thrust members fitted to the tubular shaft upon either side of the collar, the members being so spaced as to permit a predetermined movement of the collar without coaction with the members.

33. In a nutting-up machine, means for holding a bolt, means for presenting a nut adjacent an end of the bolt, a drive shaft for said machine, a gear wheel upon said shaft, a hollow shaft carrying a gear in mesh with said gear wheel, a tubular shaft slidably mounted in the hollow shaft, and adapted for rotation therewith, the tubular shaft being provided with a head adapted to engage a nut to cause the nut to rotate therewith, a cam carried by the drive shaft, a rocking arm supported by the shaft and actuated by the cam, the opposite end of the arm carrying a thrust collar fitting upon the tubular shaft and spaced thrust members fitted to the tubular shaft upon either side of the collar, and spring means located between the collar and one of said members.

34. In a nutting-up machine, means for holding a bolt, means for presenting a nut adjacent the end of the bolt, and means for screwing the nut upon the bolt, the nut presenting means comprising a chute, and a reciprocating pusher adapted to intermittently take a nut from the chute and move it adjacent the bolt, the pusher supporting the nut and bearing against a lateral edge and against the face adjacent the bolt.

35. In a nutting-up machine, means for holding a bolt, means for presenting a nut adjacent the end of the bolt, and means for screwing the nut upon the bolt, the nut presenting means comprising a chute, and a reciprocating pusher adapted to intermittently take a nut from the chute and move it adjacent the bolt, the pusher supporting the nut and bearing against a lateral edge and against the face adjacent the bolt, and means yieldingly engaging the opposite lateral edge of the nut.

36. In a nutting-up machine, means for holding a bolt, means for presenting a nut adjacent the end of the bolt, and means for screwing the nut upon the bolt, the nut presenting means comprising a chute, and a reciprocating pusher adapted to intermittently take a nut from the chute and move it adjacent the bolt, the pusher supporting the nut and bearing against a lateral edge and against the face adjacent the bolt, and a swinging arm having a spring pressed plunger engaging the opposite lateral face of the nut.

37. In a nutting-up machine, means for holding a bolt, means for presenting a nut adjacent the end of the bolt, and means for screwing the nut upon the bolt, the nut presenting means comprising a chute, and a reciprocating pusher adapted to intermittently take a nut from the chute and move it adjacent the bolt, the pusher supporting the nut and bearing against a lateral edge and against the face adjacent the bolt, and a centering plunger adapted to enter the opening in the nut while the latter is upon the pusher and to support it upon the withdrawal of the pusher.

38. In a nutting-up machine, means for holding a bolt, means for presenting a nut adjacent the end of the bolt, and means for screwing the nut upon the bolt, the nut presenting means comprising a chute, and a reciprocating pusher adapted to intermittently take a nut from the chute and move it adjacent the bolt and to return to position relative the chute, a subsequent nut being positioned by gravity thereon, and an arrester adapted to be interposed adjacent said nut to restrain it in proper position.

39. In a nutting-up machine, means for holding a bolt, means for presenting a nut adjacent the end of the bolt, and means for screwing the nut upon the bolt, the nut presenting means comprising a chute, and a reciprocating pusher adapted to intermittently take a nut from the chute and move it adjacent the bolt and to return to position relative the chute to permit a subsequent nut to be positioned thereon, and an arrester adapted to be interposed adjacent said nut to restrain it in proper position, the arrester being provided with means to move it out of the path of the bar when the latter presents the nut.

40. In a nutting-up machine, means for holding a bolt, means for presenting a nut adjacent the end of the bolt and means for screwing the nut upon the bolt, the nut presenting means comprising a table, a trough adjacent the table adapted to receive nuts on edge, a conveyor in said trough adapted to carry nuts to a chute, and a reciprocating pusher adapted to intermittently take a nut from the chute and move it adjacent the bolt.

41. In a nutting-up machine, means for holding a bolt, means for presenting a nut adjacent the end of the bolt and means for screwing the nut upon the bolt, the nut presenting means comprising a chute, a reciprocating pusher adapted to intermittently take a nut from the chute and move it adjacent the bolt, a drive shaft for the machine, a cam on said shaft, an arm engaging the cam and actuated thereby, and a link connecting the arm to the pusher whereby

it is reciprocated by the rotation of the drive shaft, the connection between the link and pusher being adjustable whereby the path of movement of the bar may be varied.

42. In a nutting-up machine, conveying means for nuts, and conveying means for bolts, having overlapping paths, means adapted to secure the nut to the bolt at the point of overlap of the paths, the bolt conveying means serving to discharge nutted bolts beyond the point of overlap.

43. In a nutting-up machine, conveying means for nuts, and conveying means for bolts, having overlapping paths, means adapted to secure the nut to the bolt at the point of overlap of the paths, the bolt conveying means serving to discharge nutted bolts beyond the point of overlap, and a chute adapted to carry away from the point of overlap nuts unsecured to bolts.

Signed at Joliet, Illinois, this 17th day of January, 1922.

JULIUS A. DYBLIE.