May 15, 1962 H. F. COX, JR., ETAL 3,034,547

POWER-OPERATED DRIVER FOR THREADED FASTENERS

Filed Aug. 24, 1959 6 Sheets-Sheet 1

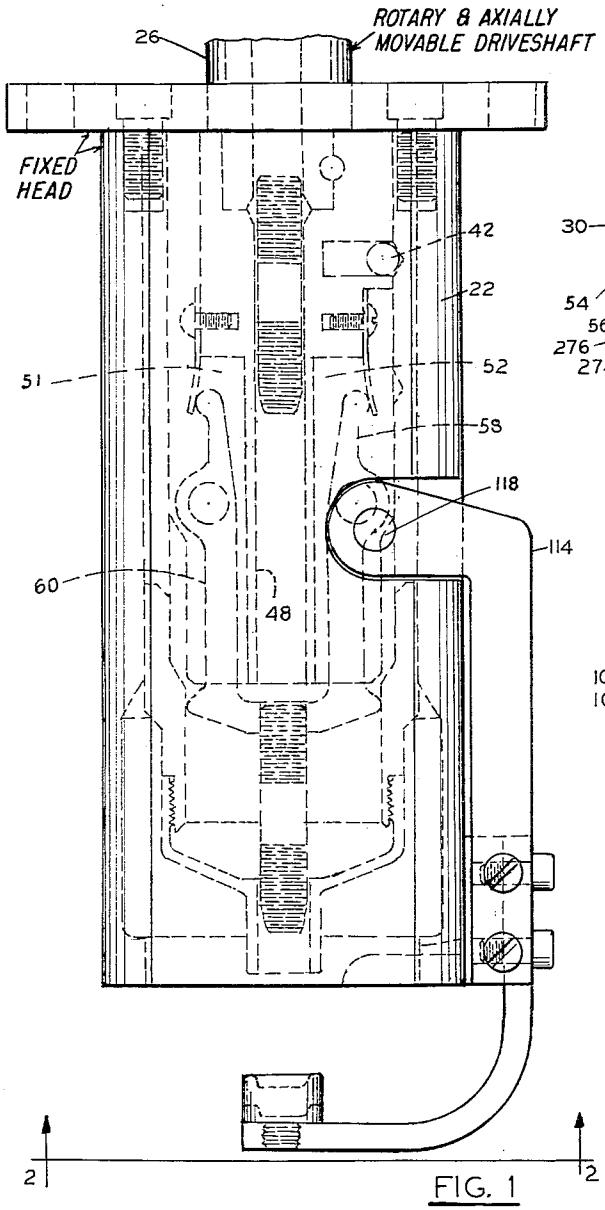


FIG. 1

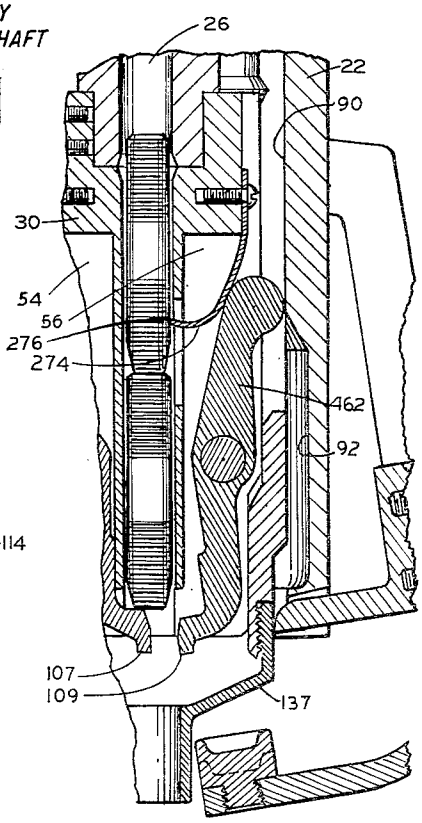


FIG. 11

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POWER-OPERATED DRIVER FOR THREADED FASTENERS

Filed Aug. 24, 1959 6 Sheets-Sheet 2

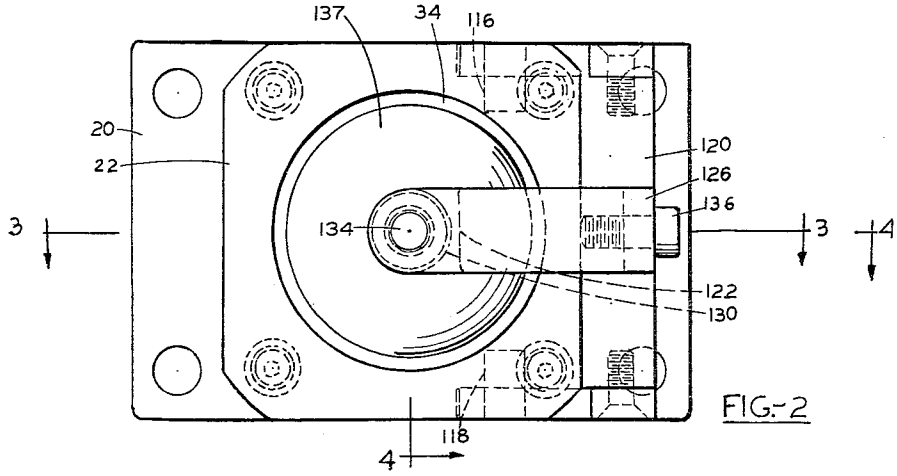


FIG.-2

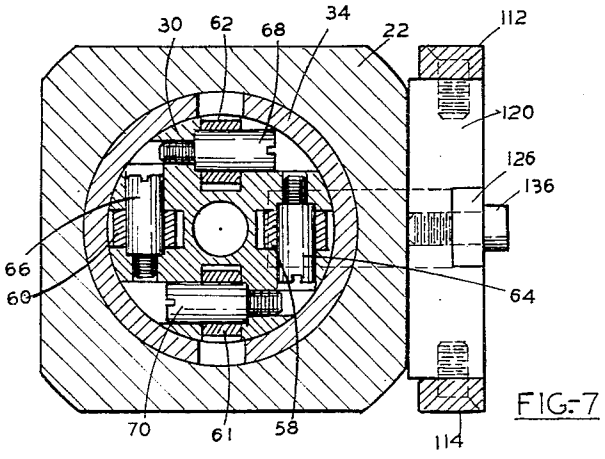


FIG.-7

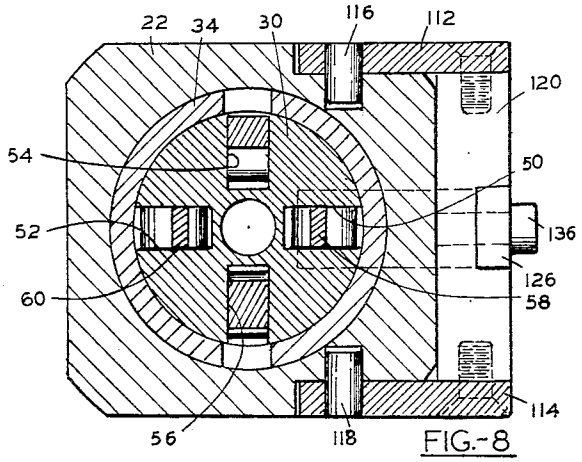


FIG.-8

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POWER-OPERATED DRIVER FOR THREADED FASTENERS

Filed Aug. 24, 1959 6 Sheets-Sheet 3

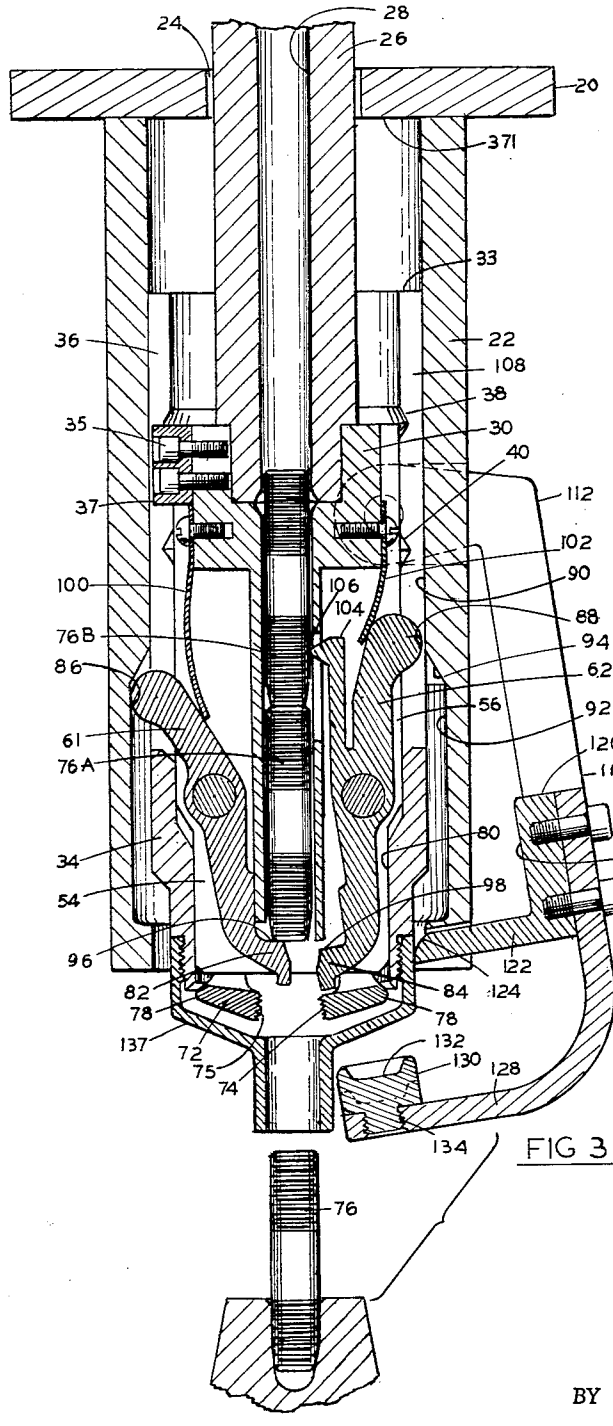


FIG 3

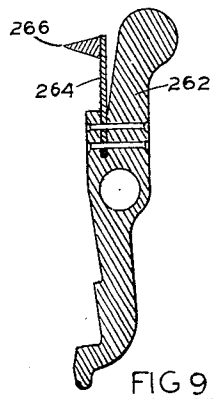


FIG 9

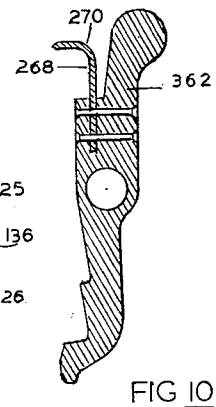


FIG 10

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Filed Aug. 24, 1959 6 Sheets-Sheet 4

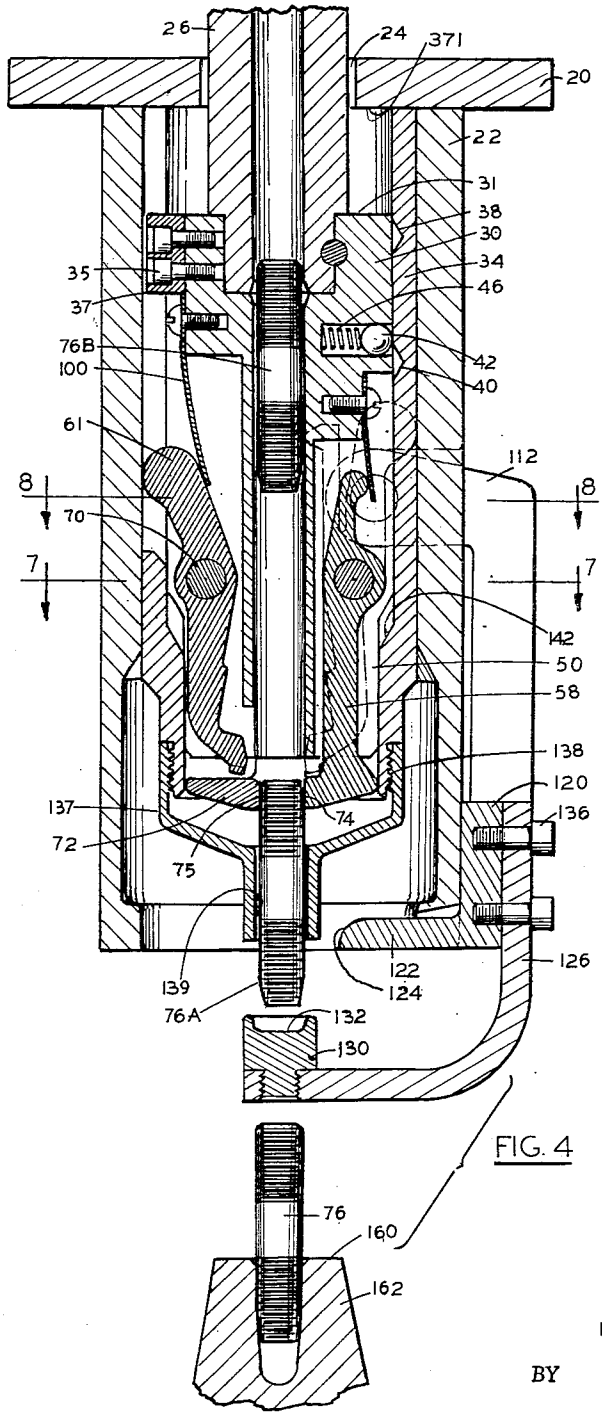


FIG. 4

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POWER-OPERATED DRIVER FOR THREADED FASTENERS

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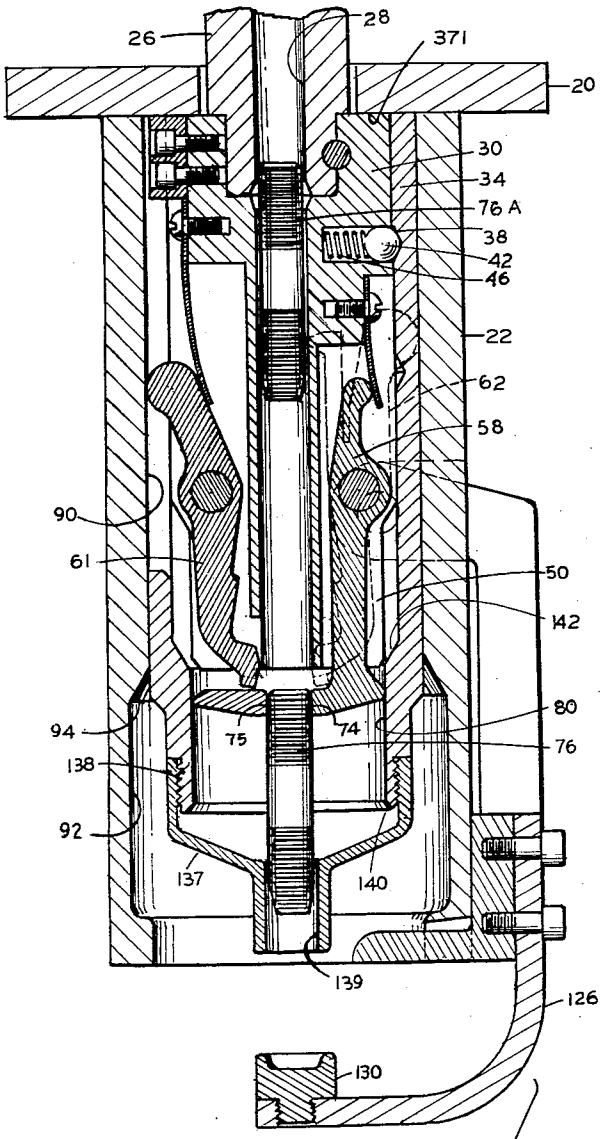
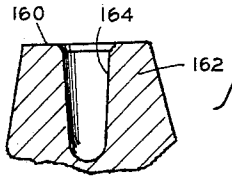


FIG. 5



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POWER-OPERATED DRIVER FOR THREADED FASTENERS

Filed Aug. 24, 1959 6 Sheets-Sheet 6

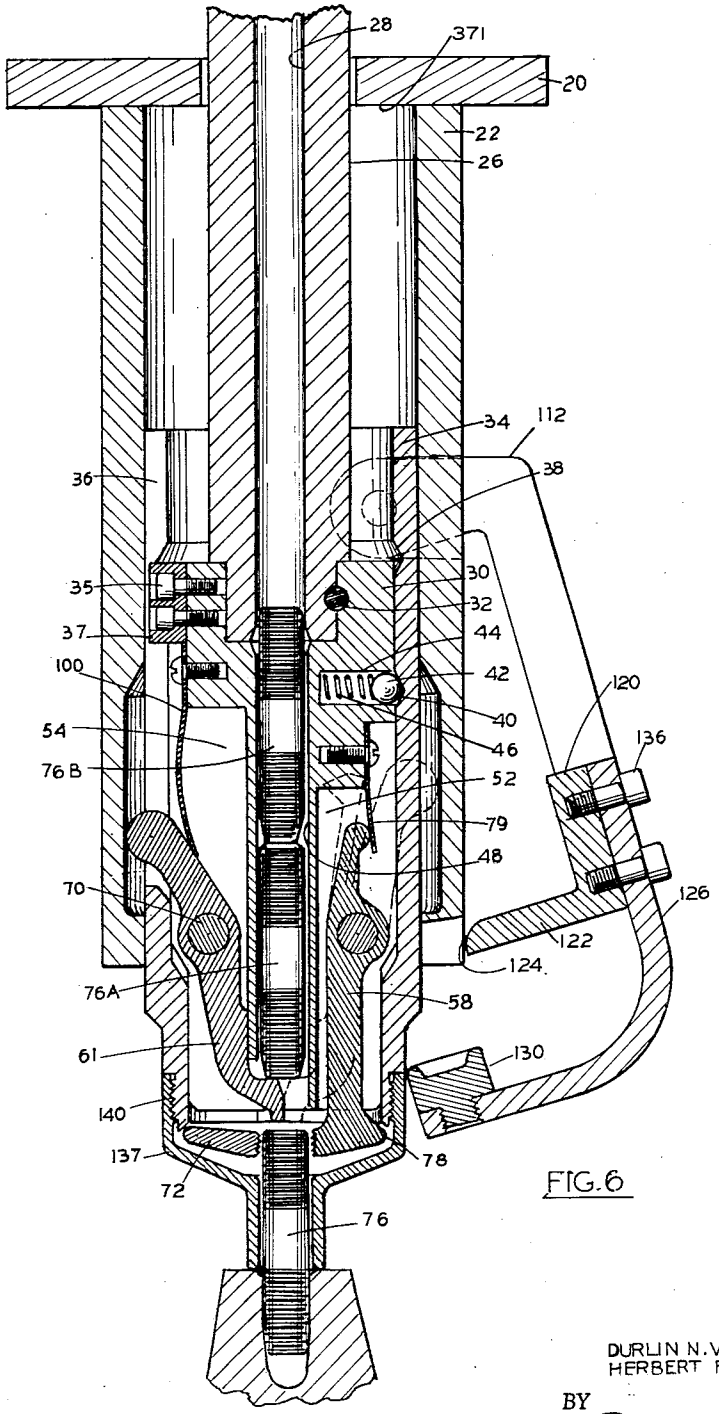


FIG. 6

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United States Patent Office 3,034,547
Patented May 15, 1962

3,034,547

POWER-OPERATED DRIVER FOR THREADED FASTENERS

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Filed Aug. 24, 1959, Ser. No. 835,724
18 Claims. (Cl. 144—32)

This invention relates to a driver for threaded fasteners and more particularly to a stud driver having center feed whereby a sequence of studs may be driven in rapid succession without the necessity of auxiliary feeding equipment.

In stud drivers heretofore employed, it has been usual to provide separate apparatus to feed a single stud, one at a time to the stud driving chuck because of the fact that each individual stud must be gripped for the driving operation by a portion of its threads. The location of such feed apparatus is such as to interfere often with work requiring many closely spaced studs, and tends to limit the speed of operation. In an application filed August 4, 1959, Serial No. 831,585, by Herbert F. Cox, Jr. and Durlin N. Van Alstyne, there is shown a center feed stud driver wherein a sequence of studs is fed to the driver through the hollow drive shaft. As set forth in that application, during the driving of a stud, the stud is held by threaded jaws complementally engaging a portion of the thread of the stud and the stud is prevented from rotating by being backed up by the next successive stud which is rigidly held against axial movement by jaws having complemental threaded faces, it being understood that mere axial thrust upon the second stud does not produce rotation of the second stud necessary for axial movement. The second stud therefore acts as a solid abutment to the stud being driven, because the stud being driven has no tendency to rotate the second stud except by the abutting contact, which contact is insufficient to impart rotation to the second stud against the friction of the jaws holding it.

In some instances, the studs being driven are formed by processes which create rough and untrue ends. For example, in the threading process the end thread may form an irregularity on the end of the stud, or the shearing process which originally cut the stud blanks to their proper length may produce a burr or irregularity on the stud end. Such irregularities could in effect create a jaw clutch effect between the driven stud and the backing up stud whereby torque, during driving, is transmitted from the driven stud to the backing up stud. Should this occur, the driven stud would transmit torque to the holding stud, and the resistance to turning of the driven stud, during the attempt at thread cutting would be transmitted to the second stud, and both studs would thread up ino the chuck together, destroying the rigid abutment normally afforded the stud being driven.

The present invention is directed to a construction wherein studs having such irregularities may be driven positively and without danger of the effect described. The apparatus is similar in some respects and as to certain features to that disclosed in the application aforesaid, but the improvement is directed to an arrangement wherein the stud being driven and the successive stud are separated during the driving operation, there being provided means for entering the feed bore during the driving operation and establishing a blocking of the bore during the driving of the end stud independent of the following stud.

The various features of the invention will appear more fully hereinafter from the following detailed description when taken in conjunction with the accompanying drawings. It is expressly understood that the drawings are employed for purposes of illustration only and are not designed as a definition of the limits of the invention, reference being had for this purpose to the appended claims.

In the drawings wherein like reference characters indicate like parts:

FIGURE 1 is a side elevation of the center feed stud driver;

FIGURE 2 is an end view of the stud driver, viewed from the bottom as from the line 2—2 of FIGURE 1;

FIGURE 3 is a longitudinal sectional view taken substantially on the line 3—3 of FIGURE 2. The apparatus is shown in an intermediate return stroke position following the driving of a stud;

FIGURE 4 is a quarter sectional view taken on the line 4—4 of FIGURE 2 and shows the apparatus in an intermediate return stroke position following that of FIGURE 3;

FIGURE 5 is a quarter section taken on the line 4—4 of FIGURE 2 showing the apparatus in its fully retracted position preparatory to commencing a cycle of operation;

FIGURE 6 is a quarter section taken on the line 4—4 of FIGURE 2 illustrating the apparatus at the bottom of its stroke immediately following the driving of a stud;

FIGURE 7 is a transverse section taken substantially on the line 7—7 of FIGURE 4;

FIGURE 8 is a transverse section taken substantially on the line 8—8 of FIGURE 4;

FIGURE 9 is a sectional view of a modified form of jaw of the type shown in FIGURE 3;

FIGURE 10 is a sectional view of a further modified form of a jaw; and

FIGURE 11 is a sectional view including a still further modified jaw of the type shown in FIGURE 3.

Referring to FIGURES 1 and 3, there is shown a stationary driving head 20 which may be fixed to the arbor of apparatus corresponding to a drill press or the like, and such head is held rigid and stationary. The head comprises a depending housing or sleeve 22 within which is contained the stud driving assembly. Entering the head from above through an aperture 24 is a rotary drive shaft 26 having a hollow axial stud feed bore 28 which is vertically movable by any suitable power to provide the sequence of operation. Upon the lower end of the drive shaft 26 is a drive spindle 30 which is keyed to the drive shaft as at 32 (see FIGURE 6). Surrounding the spindle is a hollow sleeve 34 which is slidably disposed within the head sleeve 22. The sleeve 34 is provided with a longitudinal slot 36 which cooperates with a key 37 affixed to the spindle as by screws 35 whereby the sleeve 34 and the spindle 30 rotate together. The sleeve is axially movable with, and slidable with respect to the spindle at, or between, two end positions, the sleeve 34 being provided with spaced detent recesses 38 and 40 which cooperate with a detent ball 42. The recesses may be annular in extent to facilitate manufacture. The detent ball 42 is spring pressed and disposed in a radial aperture 44 in the spindle 30. The ball 42 is urged outwardly against the internal wall of the sleeve 34 and into either one of the detent recesses 38 and 40 by the spring 46.

Th spindle 30 has a feed bore 48 coaxial with the bore 28. The spindle 30 is provided on its exterior with four slots 50 and 52, and 54 and 56, within which are disposed primary and second fingers 58 and 60, and 61 and 62. The primary fingers 58 and 60 are pivoted on heavy transverse pins 64 and 66, and the secondary fingers 61 and 62 are pivoted on heavy transverse pins 68 and 70, threaded into the spindle.

The primary fingers are alike and have arcuate jaws 72 having arcuate female thread faces 74 and 75 to com-

plementally embrace a portion of the threaded exterior of a stud such as 76. The jaws have exterior arcuate cam follower faces 78 adapted to engage within the internal cylindrical wall 80 of the lower end of the sleeve 34. The radial spacing between the thread faces 74 and 75, and the arcuate faces 78, is such as to provide a solid grip of a portion of the threads of a stud such as 76, when the jaws are disposed within the cylindrical wall 80 of the sleeve 34, for example as shown in FIGURES 4 and 5, wherein for illustrative purposes, the primary finger 58 and its thread face 74 are shown, and a fragmentary portion of the other primary finger jaw with its thread face 75 is also shown in section, for illustrative purposes only, to show the grip upon the stud. The primary fingers are normally urged to a non-gripping position by leaf springs 79.

The secondary fingers 61 and 62 are provided with similar inwardly extending abutment ends 82 and 84 at their lower ends, and cam followers 86 and 88 at their upper ends. The cam followers rotate with the spindle assembly and ride on the stationary internal cylindrical wall 90 of the dependent head sleeve 22. The internal wall 90 is provided with an enlarged diameter cylindrical portion 92 at its lower end which connects with the internal cylindrical wall 90 through a conical wall portion or conical cam 94. The lower ends 82 and 84 of the secondary fingers are adapted to swing into the position indicated in FIGURE 6, the finger 84 being shown in dotted outline, in view of the quarter section, in order to illustrate the position taken by its end 84. It will be seen that when the secondary fingers are swung to the position indicated in FIGURE 6, or the secondary finger 61 has its lower end 82 in the position shown in FIGURE 3, the upper faces 96 and 98 of the abutment ends either together, or singly, serve as a stop to prevent the feed of the second in line stud 76A, which in turn supports the successive studs there-behind such as the next stud 76B. The lower ends of the secondary fingers are urged inwardly by leaf springs 100 and 102.

The secondary finger 62 differs from finger 61 in that the upper end thereof is longer and is bifurcated to provide a yielding dog 104 having a V edge 106 adapted to engage between adjacent threads of a threaded stud such as 76B. The arm 104 is sufficiently slender and resilient so that should the V edge 106 engage the crest of a stud thread, the arm 104 will resiliently yield until the stud 76B drops one-half a thread pitch whereby the V edge will seat between the threads. It will appear that the upper end of the secondary finger 61 will extend through the slot 36 to engage the inside wall of the head sleeve 22. It will also appear that the sleeve 34 is slotted lengthwise on the opposite side, as at 108, to permit the follower end 88 of the secondary finger 62 to ride upon the internal wall of the head sleeve 22.

The secondary fingers 61 and 62 at their lower ends are provided with abutment faces 107 and 109, FIGURE 11, which when closed together in the manner indicated in FIGURE 6 form an abutment for the upper end of a stud such as 76 during the course of the driving of such stud.

Located upon the outside of the head sleeve 22 is a pivoted shoe 110 comprising spaced arms 112 and 114, FIGURE 8, which extend inwardly at their upper ends and are pivoted on pivot pins 116 and 118. The arms at their lower end are connected by a bridge member 120. Centrally of the bridge member there is provided an inwardly projecting tongue 122 having a cam surface 124, the function of which will appear hereinafter.

The bridge member 120 is provided with an abutment or stop 125 which engages the external wall of the head sleeve 22, to limit the clockwise swinging movement of the pivoted shoe 110. Adjustably secured to the bridge member is a depending arm 126 that extends inwardly at its lower end to the axis of the apparatus as at 128. On the end of such arm, there is provided a stop member 130 in the form of a boss, which stop member is provided with a recess 132 in its upper end and in which the lower end of a threaded stud may nest. Such stop member 130 may be interchangeable with members of varied lengths and recesses to accommodate studs of different lengths, as will appear hereinafter. The member is conveniently threaded into the arm 128 as at 134 whereby stop members of different lengths may be readily interchanged. The arm 126 may be adjustably held upon the bridge member 120 by screws 136.

The lower end of the sleeve 34 is provided with a nose 137, threaded upon the lower end of the sleeve as at 138. The nose forms a cap, that in turn has a coaxial guide sleeve 139 through which the respective studs pass and are guided during operation.

The internal cylindrical wall 80 of the sleeve 34 terminates at its opposite ends with annular outwardly flaring conical camming surfaces 140 and 142.

Reference to FIGURES 3 through 6 will be had for a description of the operation of the device. In FIGURE 5 the sleeve 34 and the spindle 30 are in their uppermost position and the detent ball 42 is located in the detent groove 38. The V edge 106 of the secondary finger 62 is engaged in the threads of the stud 76A, and is holding such stud from dropping down the bore 28 as by gravity, and is likewise holding a succession of studs there-behind in the bore 28. The primary fingers 58 and 60 are in gripping relation to the stud 76 which is to be driven, by reason of the engagement of the circular faces 78 within the wall 80 of the sleeve 34.

The continuously rotating drive shaft 26, as it commences its downward movement toward the position shown in FIGURE 6, causes the sleeve 34 to descend with the spindle, it being held by the detent ball 42 lying in the detent recess 38. The spindle assembly, comprising spindle 30 and sleeve 34, thus moves downwardly as a unit. As the nose 137 of the sleeve 34 contacts the cam surface 124 of the shoe 110, the shoe is swung clear of the sleeve 34 to the position in which it appears in FIGURE 6. As the spindle assembly descends further, the lower end of the guide sleeve 139 of the nose 137 contacts the upper surface 160 of the workpiece 162. Thereafter relative axial movement takes place between the sleeve 34 and the spindle 30, the spindle 30 continuing its movement downward while the sleeve 34 is prevented from further downward movement, such relative movement being permitted by the ball 42 moving out of the detent recess 38.

Further downward movement of the spindle 30 projects the stud 76 into the aperture 164 of the workpiece, and rotatingly threads the stud 76 into the aperture 164, thereby cutting or forming the threads in the aperture 164 as rotation and downward movement continue. During this portion of the operation, the arcuate faces 78 ride downwardly along the cylindrical wall 80 of the sleeve 34 and the thread faces 74 and 75 are rigidly held in engagement with the threads of the stud. During this operation, the upper end of the stud 76 is in abutting relation with the under faces 107 and 109 of the secondary fingers 61 and 62.

It will appear that as the assembly including the spindle 30 and 34 move downwardly, the cam follower end 86 of the secondary finger 61 rides along the internal cylindrical wall 90 of the head sleeve 22 until it reaches the annular conical cam portion 94 of the wall of the sleeve 22 which leads into the enlarged diameter cylindrical wall 92 of the sleeve 34. At this point, the spring 100 urges the upper end of the secondary finger 61 outwardly and the lower end 82 inwardly to the position shown for example in FIGURE 6, and such action takes place prior to the entrance of the stud into the workpiece aperture 164. Further downward movement of the spindle assembly, that is spindle 30 and sleeve 34, causes the cam follower end 88 of the secondary finger 62 to ride into the annular conical cam 94 and into the enlarged cylindrical bore 92, whereupon spring 102 urges the upper end of

finger 62 outwardly and the lower end 84 inwardly to the position indicated in dotted outline in FIGURE 6.

In order to permit the lower ends of the secondary fingers 61 and 62 to swing into position, the stud 76 is initially held so that its upper end is sufficiently low so as not to interfere with the arcuate swinging movement of 61 and 62, thus leaving a slight clearance space between the upper end of the stud and the faces 107 and 109 of the secondary fingers 61 and 62. The fingers 61 and 62 are in a position to abut the upper end of the stud and prevent axial movement of the stud relative to the spindle. When the stud enters the recess 164 of the workpiece, its rotation is momentarially retarded and thereby caused to thread upwardly within the primary fingers 58 and 60 until the upper end of the stud strikes the abutment faces 107 and 109 of the fingers 61 and 62. Thereupon further axial movement relative to the spindle is prevented and driving torque is transmitted to the stud 76 through the primary fingers 58 and 60 to cause the stud to rotate with the assembly, and form its thread and take its place within the recess 164, the ultimate position of the stud 76 being that shown in FIGURE 6.

As the spindle 30 moves downwardly relative to the sleeve 34, the sleeve 34 abutting the workpiece 160, the arcuate faces 78 of the fingers 58 and 60 move downwardly along the cylindrical internal wall 80, until the detent ball 42 reaches the edge of the detent groove 40, whereupon the sleeve snaps upwardly to seat the ball 42 in the groove 40, at which time the arcuate surfaces 78 reach the conical camming surface 140 whereupon the lower ends of the primary fingers 58 and 60 are allowed to move outward to immediately release their grip upon the stud 76, to take the position indicated in FIGURE 6.

At this point, the ball 42 has seated in the lower detent groove 40 in the sleeve 34. Upward movement of the rotating shaft 26 brings the spindle and sleeve 34 upwardly within the non-rotating head sleeve 22, and the studs 76A and 76B and those following are lifted initially during the return movement. When the spindle and sleeve assembly have moved upwardly a sufficient distance, the shoe 110 swings into the position in which it is shown in FIGURE 4, wherein the stop member 130 is in axial alignment with the feed bore of the apparatus. As the cam 124 permits the shoe to swing clockwise to the stop position of FIGURE 4, the cam follower 86 of the secondary finger 61 rides out of the cylindrical face 92, along the conical face 94, and upon the cylindrical wall 90, thereby moving the lower end 82 of secondary finger 61 radially outward from beneath the stud 76A. Previously the cam follower surface 88 of the finger 62 had ridden upon the cylindrical face 90 thereby projecting the V edge 106 into the threads of the stud 76B to hold the stud 76B and those following it against downward movement within the bore 28. Such movement radially retracted the finger end 84 from the path of the stud 76A. The radial outward movement of the lower end 82 of the secondary finger 61 clears the stud 76A, allowing it to drop until its end nests in the end 132 of the stop 130 where it is held in proper position for subsequent gripping by the primary fingers 58 and 60.

Further upward movement of the spindle and sleeve 34 brings the upper end 33 of the sleeve 34 into engagement with the surface 371 of the head 20 thereby arresting further upward movement of the sleeve 34. The spindle continues its upward movement causing the ball 42 to move out of the detent groove 40, and upon further relative axial movement between the spindle and sleeve 34, the arcuate faces 78 of the primary fingers are caused to ride within the cylindrical face 80 of the sleeve 34 thereby drawing the primary fingers 58 and 60 together in gripping relation around the stud which is now 76A. Further upward movement of the spindle continues until the upper end 31 thereof engages the inside face 371 of the head 20 and all the parts are then in a position as shown in FIGURE 5. The stud 76A now becomes the next stud in line for driving.

In FIGURES 9, 10, and 11, modified forms of secondary fingers 62 are shown. In FIGURE 9 the finger 262 is provided with a spring leaf 264, the end of which is provided with a V edge 266 for engagement with the stud threads. In FIGURE 10 the finger 362 is provided with a spring arm 268 that is inwardly bent at 270 to provide a V edge for engagement with the threads. In FIGURE 11 the finger 462 does not carry the V edge arm as in the other forms but the spring leaf employed to urge the upper end of the finger outwardly is extended as at 274 to provide a V edge as at 276 for engaging the threads of the stud 76. It will be apparent that when the secondary finger 462 is rocked counterclockwise and moved from the cylindrical surface 92 to the cylindrical surface 90, its spring 274 will be urged yieldingly inward so as to engage the threads of the stud 76.

Although a single embodiment of the invention with several alternate details in respect to secondary fingers, has been illustrated and described, it is to be understood that the invention is not limited thereto. As various changes in the construction and arrangement may be made without departing from the spirit of the invention, as will be apparent to those skilled in the art, reference will be had to the appended claims for a definition of the limits of the invention.

What is claimed is:

1. A center feed driver for threaded fastener members comprising a drive spindle having a center bore for receiving a series of threaded members in sequence, means carried by the spindle for complementally gripping the threads of a threaded member having an end portion projecting beyond the end of the drive spindle bore, and means carried by the spindle for securing another threaded member of said series immediately following said first member within the bore against axial movement and in spaced relation to said first threaded member, and abutment means carried by the spindle adapted to be interposed in said bore between the members, and adapted to engage the other end of said first threaded member.

2. A center feed driver for threaded fastener members comprising a drive spindle having a center bore for receiving a series of aligned threaded members in sequence, means carried by the spindle for complementally gripping the threads of a member with its end portion projecting beyond the end of the drive spindle bore, and means carried by the spindle for securing a second threaded member of said series within the bore against axial movement, in spaced axial relation to said first member and sleeve means disposed about said spindle and having axial movement relative to said spindle for actuating said gripping means, and abutment means carried by the spindle, and laterally movable into the bore between said members.

3. A center feed driver for threaded fastener members comprising a drive spindle having a center bore for receiving a series of aligned threaded members in sequence, means carried by the spindle for complementally gripping the threads of a member with its end portion projecting beyond the end of the drive spindle bore, and means complementally the spindle for securing a second threaded member of said series within the bore against axial movement, in spaced axial relation to said first member, sleeve means disposed about said spindle and having axial movement relative to said spindle for actuating said gripping and securing means, a sleeve housing surrounding said sleeve means and spindle, abutment means carried by the spindle and laterally movable into and out of the bore between said members, and means responsive to relative movement between said spindle and housing for actuating said abutment means.

4. A center feed driver for threaded fastener members comprising a drive spindle having a center bore for receiving a series of threaded members in sequence, laterally movable gripper means carried by the spindle for

complementally gripping the threads of a threaded member having an end portion projecting beyond the end of the drive spindle bore, and means laterally movable into and out of the bore and carried by the spindle for intermittently blocking the bore of said spindle behind said projecting threaded member, and ahead of the second threaded member of said sequence, and means for holding said second member in axial spaced relation from said movable means during movement into said bore.

5. A center feed driver for threaded fastener members comprising a drive spindle having a center bore for receiving a series of threaded members in sequence, laterally movable gripper means carried by the spindle for complementally gripping the threads of a threaded member having an end portion projecting beyond the end of the drive spindle bore, means carried by the spindle for intermittently blocking the bore of said spindle behind said projecting threaded member, and ahead of the succeeding threaded member, and sleeve means axially movable relative to said spindle for actuating said blocking means.

6. A center feed stud driver comprising a non-rotatable hollow head having an open ended sleeve, a drive spindle slidably and rotatably mounted within said head, having a center bore extending the length thereof for receiving a series of threaded studs in sequence, a sleeve slidably disposed on said spindle, and keyed for rotation therewith, and disposed between said spindle and open ended sleeve, radially and axially extending slots in said spindle, a primary finger pivoted in one of said slots, adapted to complementally grip the threads of a stud in said bore, and means responsive to relative movement between said intermediate sleeve and said spindle for controlling the operation of said primary finger and the grip and release of said stud, a secondary finger pivoted in another of said slots adapted to enter and block the bore behind said first named stud and to grip a stud located behind said first named stud, in spaced axial relation to said first named stud, and means responsive to relative movement between said spindle and said head sleeve for controlling the grip and release of said secondary finger upon said second stud.

7. A center feed stud driver comprising a non-rotatable hollow head having an open ended sleeve, a drive spindle slidably and rotatably mounted within said head, having a center bore extending the length thereof for receiving a series of threaded studs in sequence, a sleeve slidably disposed on said spindle, and keyed for rotation therewith, and disposed between said spindle and open ended sleeve, radially and axially extending slots in said spindle, a primary finger pivoted in one of said slots, adapted to grip a stud in said bore, and means responsive to relative movement between said intermediate sleeve and said spindle for controlling the operation of said primary finger and the grip and release of said stud, a secondary finger pivoted in another of said slots adapted to grip a stud located behind said first named stud, in spaced axial relation to said first named stud, and means responsive to relative movement between said spindle and said head sleeve for controlling the grip and release of said secondary finger, upon said second stud, said secondary finger having abutment means adapted to enter the bore behind said first named stud, upon the release of said second stud.

8. A center feed stud driver comprising a non-rotatable hollow head having an open ended sleeve, a drive spindle slidably and rotatably mounted within said head, having a center bore extending the length thereof for receiving a series of threaded studs in sequence, a sleeve slidably disposed on said spindle, and keyed for rotation therewith, and disposed between said spindle and open ended sleeve, opposed pairs of radially and axially extending slots in said spindle, primary fingers pivoted in one pair of said slots, having jaw portions at their lower ends adapted to grip the threads of a stud beyond the end of said bore, and means responsive to relative movement between said intermediate sleeve and said spindle for controlling said fingers and their grip and release of said stud, secondary fingers pivoted in the other pair of said slots having abutments adapted to enter said bore behind the jaw portions of said primary fingers, and means responsive to relative movement between said spindle and said head sleeve for controlling said secondary fingers to move said abutments into and out of said bore.

9. A center feed stud driver comprising a non-rotatable hollow head having an open ended sleeve, a drive spindle slidably and rotatably mounted within said head, having a center bore extending the length thereof for receiving a series of threaded studs in sequence, a sleeve slidably disposed on said spindle, and keyed for rotation therewith, and disposed between said spindle and open ended sleeve, opposed pairs of radially and axially extending slots in said spindle, primary fingers pivoted in one pair of said slots, having jaw portions at their lower ends adapted to grip the threads of a stud beyond the end of said bore, and means responsive to relative movement between said intermediate sleeve and said spindle for controlling said fingers and their grip and release of said stud, secondary fingers pivoted in the other pair of said slots having abutments adapted to enter said bore behind the jaw portions of said primary fingers, means responsive to relative movement between said spindle and said head sleeve for said secondary fingers to move said abutments into and out of said bore, and means on one of said secondary fingers adapted to enter said bore to engage the threads of an intermediate stud in said bore upon the movement of the abutment end of said one secondary finger out of said bore.

10. A center feed threaded stud driver comprising a housing, a spindle assembly comprising a spindle and surrounding sleeve rotatable and reciprocatable within said housing, said sleeve being axially slidable on said spindle, and rotatable therewith, said spindle having an axial feed bore to receive a succession of studs, means on said housing for axially positioning a stud located beyond the end of said spindle, means on said spindle and actuated by relative movement between said spindle and sleeve for gripping a stud by its threads positioned by said positioning means, means on said spindle, and actuated by relative axial movement between said spindle and housing for blocking and unblocking the bore of said spindle behind said positioned stud, and supporting a second stud within said bore upon blocking thereof, and means responsive to relative movement between said spindle and housing for retaining a third stud against axial movement in said bore upon the unblocking of said bore by said blocking means.

11. A center feed driver for threaded fastener members comprising a non-rotatable hollow head having an open ended sleeve, a drive spindle slidably and rotatably mounted within said head having a center bore extending the length thereof for receiving a series of threaded members in sequence, a sleeve slidably disposed on said spindle and keyed for rotation therewith, and disposed between said spindle and open ended sleeve, detent means for yieldingly holding said sleeve in one or the other of two end positions, two sets of opposed radially and axially extending slots in said spindle, a pair of primary fingers pivoted in one set of said slots, adapted to grip the threads of a member in said bore, and means responsive to relative movement between said intermediate sleeve and said spindle between said detent held positions for controlling the grip and release of said member, a secondary finger pivoted in another of said slots having an abutment entering the bore behind said member and adapted to block the bore and support a second member located above said first named member and means responsive to relative movement between said spindle and said head

sleeve for controlling the movement of said secondary finger abutment into and out of said bore.

12. A center feed driver for threaded fastener members comprising a non-rotatable hollow head having an open ended sleeve, a drive spindle slidably and rotatably mounted within said head having a center bore extending the length thereof for receiving a series of threaded members in sequence, a sleeve slidably disposed on said spindle and keyed for rotation therewith, and disposed between said spindle and open ended sleeve, detent means for yieldingly holding said sleeve in one or the other of two end positions, two sets of opposed radially and axially extending slots in said spindle, a pair of primary fingers pivoted in one set of said slots, adapted to grip the threads of a member in said bore, and means responsive to relative movement between said intermediate sleeve and said spindle between said detent held positions for controlling the grip and release of said member, a secondary finger pivoted in another of said slots having an abutment entering the bore behind said member and adapted to block the bore and support a second member located above said first named member and means responsive to relative movement between said spindle, said head sleeve for controlling the movement of said secondary finger abutment into and out of said bore, and means for blocking and unblocking said bore beyond the end responsive to relative movement between said head and intermediate sleeve.

13. A center feed driver for threaded fastener members comprising a non-rotatable hollow head having an open ended sleeve, a drive spindle slidably and rotatably mounted within said head having a center bore extending the length thereof for receiving a series of threaded members in sequence, a sleeve slidably disposed on said spindle and keyed for rotation therewith, and disposed between said spindle and open ended sleeve, detent means for yieldingly holding said sleeve in one or the other of two end positions, two sets of radially and axially extending slots in said spindle, a pair of primary fingers pivoted in one set of said slots, adapted to grip the threads of a member in said bore, and means responsive to relative movement between said intermediate sleeve and said spindle between said detent held positions for controlling the grip and release of said member, a secondary finger pivoted in another of said slots having an abutment entering the bore behind said member and adapted to block the bore and support a second member located above said first named member, and means responsive to relative movement between said spindle and said head sleeve for controlling the movement of said secondary finger abutment into and out of said bore, a second secondary finger in the remaining slot having means for engaging a third member in said bore and holding the same against axial movement therein.

14. A center feed driver for threaded fastener members comprising a non-rotatable hollow head having an open ended sleeve, a drive spindle slidably and rotatably mounted within said head having a center bore extending the length thereof for receiving a series of threaded members in sequence, a sleeve slidably disposed on said spindle and keyed for rotation therewith, and disposed between said spindle and open ended sleeve, detent means for yieldingly holding said sleeve in one or the other of two end positions, two sets of radially and axially extending slots in said spindle, a pair of primary fingers pivoted in one set of said slots, adapted to grip the threads of a member in said bore, and means responsive to relative movement between said intermediate sleeve and said spindle between said detent held positions for controlling the grip and release of said member, a secondary finger pivoted in another of said slots having an abutment entering the bore behind said member and adapted to block the bore and support a second member located above said first named member, means responsive to relative movement between said spindle and said head sleeve for controlling the movement of said secondary finger abutment into and out of said bore, a second secondary finger in the remaining slot having means for engaging a third member in said bore and holding the same against axial movement therein, and means responsive to relative axial movement between said spindle and said head sleeve for releasing said third member following an unblocking and subsequent blocking of the bore by said first named secondary finger, and means for blocking and unblocking said bore beyond the end responsive to relative movement between said head and intermediate sleeve.

15. A center feed driver for threaded fastening members comprising a relatively stationary head having a depending hollow sleeve, a spindle and sleeve assembly disposed within the sleeve of said head and affixed upon a rotatable and axially movable drive shaft extending downwardly through said head, said sleeve being splined to said spindle and axially movable relative to said spindle, detent means for yieldingly holding said sleeve on said spindle in two axially spaced end positions, a center feed bore for threaded members extending axially through said shaft and said spindle, two pairs of opposed radial lengthwise extending slots in said spindle, lying in planes transverse to one another, and slots in said spindle sleeve radially aligned with one of said pairs of slots in said spindle, the slots in said one of said pairs having apertures extending to the spindle bore adjacent their lower ends, two opposed fingers pivoted centrally thereof on transverse axes within said one of said pair of slots, said fingers having at their lower ends radially inwardly projecting abutments adapted to project through said apertures to the axis of said bore, and cam followers at their upper ends adapted to project outwardly through said sleeve slots, said head sleeve having a cylindrical cavity having upper and lower annular inclined cam faces adapted to engage said cam followers on relative axial movement between said spindle and head, means for yieldingly urging said abutments radially inward, a pair of stud gripping fingers pivotally mounted centrally thereof within said other pair of slots on transverse axes, said gripping fingers having complemental thread engaging jaw faces at their lower ends disposed immediately beyond the end of said spindle, and radially outwardly extending cam follower portions at their lower ends, said spindle sleeve having an inwardly projecting cylindrical cam face having an annular outwardly inclined face at its lower end adapted to coact with said gripping finger cam follower portions upon relative axial movement between said spindle and spindle sleeve, said last named cylindrical face acting to hold and lock said gripping finger jaw faces upon a threaded member through the lower cam followers of said gripping fingers, means for blocking and unblocking the bore below the end thereof pivotally mounted on the head sleeve on a transverse axis to one side of the bore axis, said blocking means having a stop coaxial with the bore axis when said spindle assembly is retracted upwardly within said head, and having cam means coacting with said spindle assembly for swinging said blocking means laterally and clear of said spindle assembly when projected to drive a threaded member.

16. A center feed driver for threaded fastener members comprising a non-rotatable hollow head having an open ended sleeve, a drive spindle slidably and rotatably mounted within said head having a center bore extending the length thereof for receiving a series of threaded members in sequence, a sleeve slidably disposed on said spindle and keyed for rotation therewith, and disposed between said spindle and open ended sleeve, detent means for yieldingly holding said sleeve in one or the other of two end positions, said spindle having two sets of opposed radially and axially extending slots, said sleeve having slots aligned with one of said sets of spindle slots, a pair of primary fingers pivoted in the other set of said slots, having jaws adapted to grip the threads of a member projecting from the end of said bore, and means responsive to relative movement between said intermediate

sleeve and said spindle between said detent held positions for controlling the grip and release of said primary fingers upon said member, secondary fingers pivoted in each of the first named set of slots having blocking means adapted to enter the bore behind said first named member and prevent axial movement of said member, and means responsive to relative movement between said spindle and said head sleeve for sequentially moving the blocking means of said secondary fingers into and out of said bore, said blocking means being adapted to support a second member above the first member, and one of said secondary fingers having means to engage and hold a third member, upon movement of its blocking means from said bore in advance of the movement of the blocking means of the other secondary finger from said bore.

17. In a center feed driver for threaded fastening members, a housing having a depending sleeve, a rotary spindle disposed therewithin, and axially movable relative to said sleeve, said sleeve having an internal conical camming surface axially interposed between adjoining internal cylindrical walls, the wall above being of lesser diameter than the wall below, said spindle having an axial bore, opposed fingers pivotally mounted intermediate their ends on transverse axes in said spindle, said opposed fingers at their lower ends having symmetrical inwardly extending portions adapted to enter said bore and form supporting abutments for a column of threaded members in said bore and said fingers at their upper ends having outwardly facing cam followers adapted to ride on the internal wall of said sleeve for actuation by said conical cam surface on relative axial movement between said spindle and sleeve, one of the upper ends of said fingers being longer than the other, and having means for engaging the threads of and holding the second threaded member in said column when moved radially inward by said conical cam, and the supporting abutments of both of said fingers being adapted to be radially retracted from said bore upon actuation of the follower ends thereof inwardly by said conical cam, whereby the first of said members of the column is released while the second is held, and the second released by its holding finger only while the abutment of the other finger is in supporting position within the bore.

18. In a center feed driver for threaded fastening members, a housing having a depending sleeve, a rotary spindle disposed therewithin, and axially movable relative to said sleeve, said sleeve having an internal conical camming surface axially interposed between adjoining internal cylindrical walls, the wall above being of lesser diameter than the wall below, said spindle having an axial bore, opposed fingers pivotally mounted intermediate their ends on transverse axes in said spindle, said opposed fingers at their lower ends having symmetrical inwardly extending portions adapted to enter said bore and form supporting abutments for a column of threaded members in said bore and said fingers at their upper ends having outwardly facing cam followers adapted to ride on the internal wall of said sleeve for actuation by said conical cam surface on relative axial movement between said spindle and sleeve, one of the upper ends of said fingers being longer than the other, and having means for engaging the threads of and holding the second threaded member in said column when moved radially inward by said conical cam, and the supporting abutments of both of said fingers being adapted to be radially retracted from said bore upon actuation of the follower ends thereof inwardly by said conical cam, whereby the first of said members of the column is released while the second is held, and the second released by its holding finger only while the abutment of the other finger is in supporting position within the bore, and means carried by the spindle for gripping a portion of the threads of the released member immediately below said abutments, for driving said stud with its upper end jammed against the underside of said abutments.

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