March 18, 1941. L. E. POOLE 2,235,083

MACHINE FOR FINISHING ENDS OF TUBING

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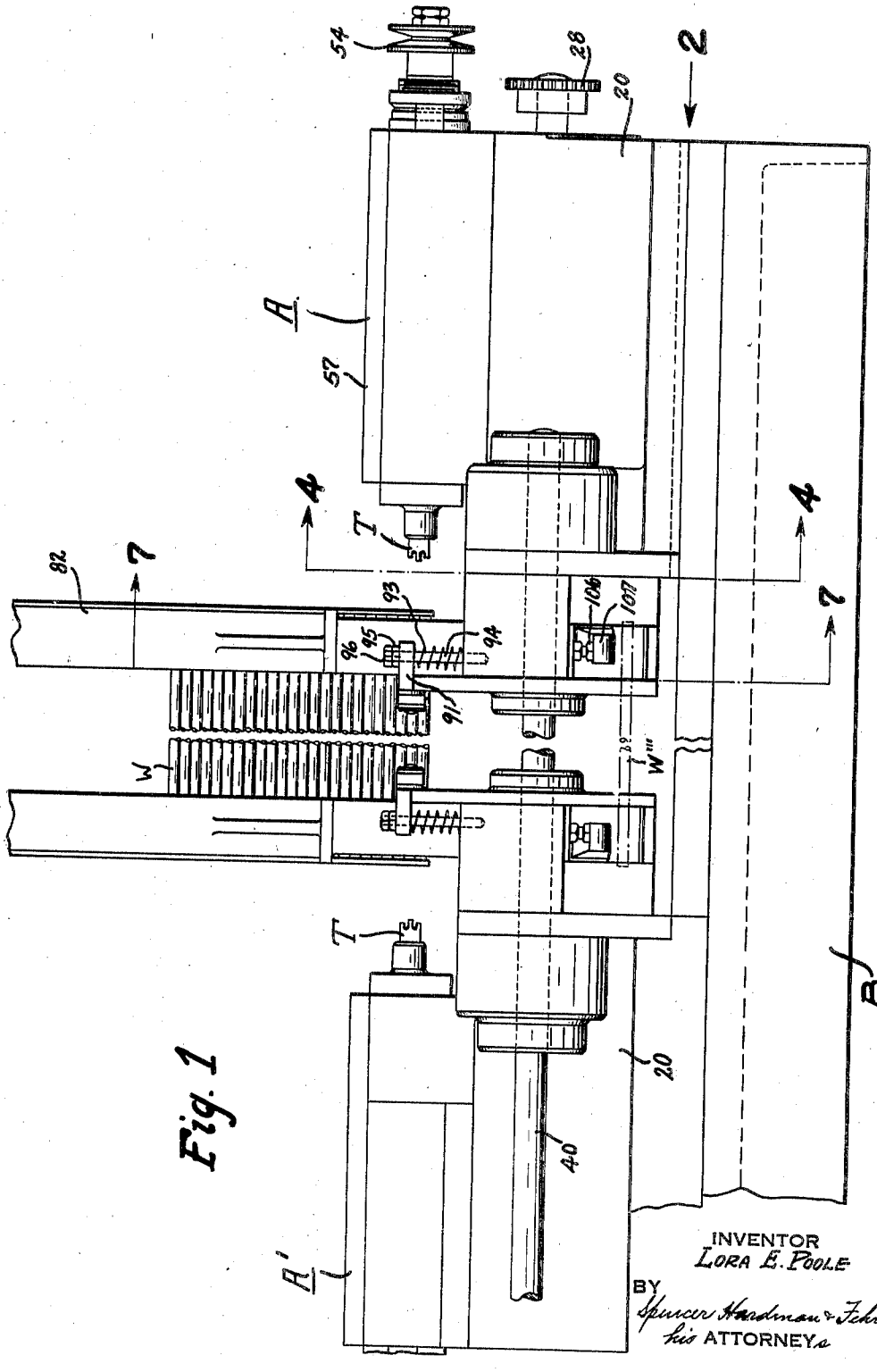


Fig. 1

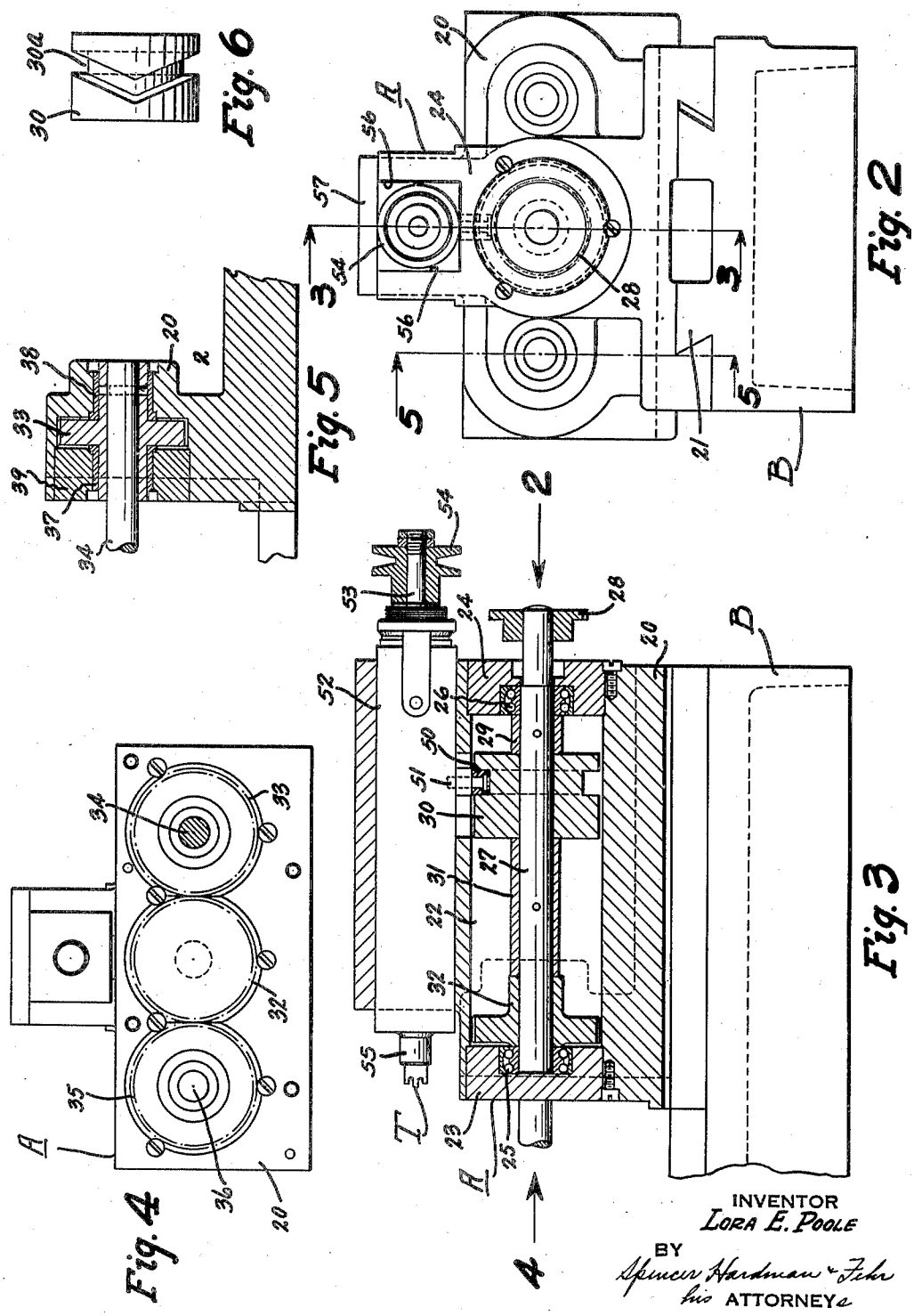
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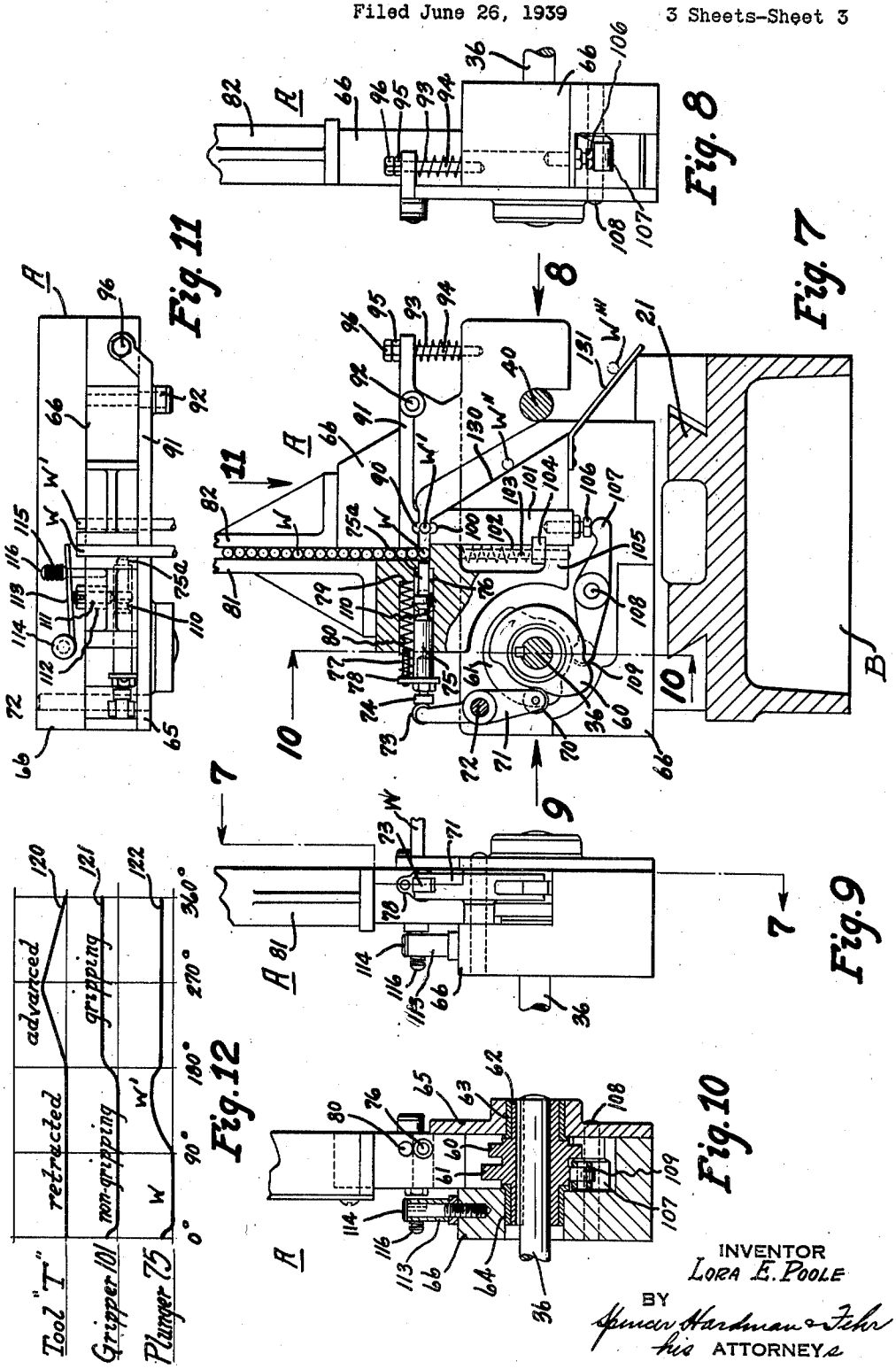
Filed June 26, 1939 3 Sheets-Sheet 2



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MACHINE FOR FINISHING ENDS OF TUBING

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MACHINE FOR FINISHING ENDS OF TUBING

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Application June 26, 1939, Serial No. 281,090

10 Claims. (Cl. 82—2)

This invention relates to apparatus for removing the burr or rough edges from the ends of rods, tubes, etc., which have been cut into lengths by a saw or the like.

The principal object of the present invention is to provide a machine for simultaneously dressing both ends of a length of rod or tubing.

A further object is to provide a machine which can be adjusted for operation upon tubing of different lengths. In this connection it is an object to provide a machine having a base upon which are mounted operating heads which may be secured to the base at varying distances in order to accommodate the machine for different lengths of work. Each operating head includes a tool-carrying spindle, a section of a magazine in which the work is stacked, means for moving the work from the lower end of the magazine to a position substantially in alignment with the tool carried by the rotary spindle and means for clamping the work in the properly aligned position. The two heads together provide a magazine or rack for supporting end portions of the work, devices engaging the work near the ends thereof for moving the lowermost piece from the magazine to a position in alignment with the two tools, means for clamping the work in alignment with the two tools, means for clamping the work in aligned position and means for moving the tools simultaneously into engagement with the ends of the work pieces.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings wherein a preferred embodiment of the present invention is clearly shown.

In the drawings:

Fig. 1 is a front elevation, partly fragmentary, of a machine embodying the present invention;

Fig. 2 is an end view looking in the direction of arrow 2 of Figs. 1 and 3;

Fig. 3 is a sectional view along the line 3—3 of Fig. 2;

Fig. 4 is a view looking in the direction of the arrow 4 of Fig. 3 and is a sectional view on the line 4—4 of Fig. 1;

Fig. 5 is a sectional view on the line 5—5 of Fig. 2;

Fig. 6 is a side view of a cam shown in section in Fig. 3;

Fig. 7 is a sectional view taken on the line 7—7 of Fig. 1 and line 7—7 of Fig. 9;

Fig. 8 is a fragmentary view looking in the direction of arrow 8 of Fig. 7;

Fig. 9 is a fragmentary view looking in the direction of arrow 9 of Fig. 7;

Fig. 10 is a sectional view on the line 10—10 of Fig. 7;

Fig. 11 is a plan view looking in the direction of arrow 11 of Fig. 7.

Fig. 12 is a chart of movements of certain mechanisms.

Referring to Fig. 1, the machine comprises a base B supporting a right-hand head A and left-hand head A'. The heads A and A' are substantially identical. Therefore, only the head A will be described in detail. Head A comprises a frame 20 slidable longitudinally on ways 21 provided by base B. Frame 20 is provided with a central bore 22 closed at its ends by bearing blocks 23 and 24 carrying, respectively, ball bearings 25 and 26 supporting a shaft 27 to which are attached a sprocket 28, a spacer 29, a cam 30, a spacer 31 and a gear 32. The sprocket 28 is driven by a chain, not shown, connected with another sprocket which is driven by an electric motor through a friction clutch.

Referring to Fig. 4, gear 32 drives a gear 33 mounted on a shaft 34 and a gear 35 mounted on a shaft 36. Shafts 34 and 36 are supported by the frame 20. Referring to Fig. 5, it will be seen that the hub of gear 33 is journaled in bearings 37 and 38 provided respectively by a bearing block 39 and a portion of frame 20. The hub of the gear 33 is attached to shaft 34 by a pin 40. The head A' has a corresponding gear 33, the hub of which is provided with a longitudinal spline connection with the shaft 40 which extends through a portion of the casing of head A'. Shaft 40 is of sufficient length to provide for adjustment of distance between the heads A and A', while the shaft remains drivingly connected with the gear 34 of the head A' as well as with the gear 34 of head A.

The cam 30, shown in Figs. 3 and 6, is provided with a cam groove 30a which receives a roller 50 mounted on a stud 51 attached to a slidable frame 52 supporting a high speed spindle 53 carrying at one end a V-belt pulley 54 and at the other end a tool holder 55 for receiving a suitable burr-removing tool T. The frame 52 slides horizontally in a groove 56 provided by the frame 20 and is retained by a cover plate 57. The V-belt pulley 54 receives a V-belt passing around another V-belt pulley located a substantial distance above pulley 54 and driven directly by an electric motor. As indicated in Fig. 6, the cam groove 30a is so shaped as to cause reciprocation of tool T toward and away from

the work during substantially one-half revolution of shaft 27. During the remaining one-half revolution of shaft 27 the tool T remains retracted from the work; and, during this time of retraction, a new work piece is moved from the magazine to operating position and the completed work piece is ejected.

The magazine for holding the work and the means for moving work pieces one at a time from the bottom of the magazine to the operating position will now be described with reference to Figs. 1 and 7 to 11 inclusive. The shaft 36, shown in Fig. 4, is shown in section in Fig. 7. The shaft 36 is keyed to cams 60 and 61 integral with a hub 62 journaled in bearings 63 and 64 provided by a plate 65 and a frame 66 which is attached to the frame 20, (see Figs. 10 and 7). Cam 60 cooperates with a roller 70 carried by arm 71 pivoted on a rod 72 carried by the frame 66 and the plate 65. The upper end of arm 71 carries a roller 73 bearing against a set screw 74 threaded into a plunger 75 guided for horizontal movement within a recess 76 provided by the frame 66. Rod 75 is urged toward the left, as viewed in Fig. 7, by spring 77 bearing, at one end, against the plate 78 attached to the plunger 75 and at the other end against an end wall 79 of recess 80 provided in frame 66 for receiving this spring 77. Plunger 75 is provided with a reduced end 75*a* in alignment with the lowermost work piece W located in a stack of work pieces, the end portions of which are retained by magazine plates 81 and 82 carried by the frame 66.

The cam 60 is so shaped as to effect, through the action of lever 71, movement of plunger 75 sufficient to move the lowermost work piece W to move into the operating position W'. In this position of the work piece it is located in vertical alignment with a notch 90 provided in a bar 91 pivoted at 92 upon the frame 66 and urged counterclockwise into the position shown by a spring 93 by encircling a stud 94 extending vertically from the frame 66 passing through an opening in the bar 91 and receiving adjusting screws 95 and 96. By turning the screws 95 and 96 the initial position of the bar 91 can be varied to vary the clamping pressure.

When the work piece is in the position W' it is also in vertical alignment with a notch 100 provided at the upper end of a slide 101 which is urged normally downwardly by a spring 102 encircling a rod 103 and bearing against a lug 104 provided by the slide 101. The spring 102 urges the lug 104 against a lug 105 provided by the frame 66 and therefore locates the slide 101 in its lowest position shown in Fig. 7. Slide 101 carries a set screw 106 engageable with a lever 107 pivoted on a rod 108 and provided with a roller 109 cooperating with the cam 61. By turning screw 106, the height to which slide 101 is raised by cam 61 can be varied so as to locate the work piece in alignment with the tool T.

The plunger 75 is provided with a circumferential groove 110 which receives a plunger 111 guided for horizontal sliding movement by a boss 112 provided by the frame 66. The plunger 111 is engaged by a lever 113 pivoted on a screw 114 threaded in the frame 66 as shown in Figs. 10 and 11. Lever 113 is urged toward the work pieces W by spring 115 surrounding a stud 116 which passes through the lever 113 and attached to the frame 66. When the plunger 75 is positioned so that its groove 110 is in alignment with the pin 111, said pin is permitted to move in toward the plate 65 thereby permitting spring 115 to move the lever 113 against the adjacent end of the work piece W which is the lowest one in the stack between the magazine plates 81 and 82.

Each of the heads A and A' are equipped with a spring-urged lever 113. Both levers 113 are released at the same time during movement of the plungers 75 which locate their respective groove 110 simultaneously in alignment with the pins 111. During the movement of the work piece W from its lowermost position in the stack between the magazine plates 81 and 82 to the operating position W', the work piece W is moved to an intermediate position in which it is no longer under the stack of other work pieces, those pieces remaining in the magazine being supported upon the plunger end 75*a*. The work piece in the position intermediate to W and W', therefore, has freedom of movement longitudinally. Immediately following the movement of plunger 75 which frees the lowermost work piece and causes those remaining in the stack to be supported on the plunger end 75*a*, the plunger grooves 110 are located in alignment with the pins 111 thereby permitting the springs 115 to be released to cause the arms 113 to bear against the ends of the work piece in its intermediate position, thereby causing it to be shifted longitudinally, if necessary, so that work piece will be centered fairly accurately with respect to the heads A and A'. This automatic shifting of the work pieces as they are moved from the magazine to the operating position W' insures that the lengths of the work pieces will be fairly uniform, since the amounts of metal removed by the tools T will be substantially equal.

The approximate timing of the mechanisms of the present machine is shown graphically in Fig. 12. Line 120 indicates movements of the rotary tool T mounted on the spindle carriage 52. Line 121 represents movements of the gripping member 101. Line 122 represents movements of the plunger 75. While the tool T is retracted and the gripping member 101 is moved to non-gripping position the plunger 75 moves the work piece from position W to W' and then the plunger 75 retracts to an intermediate position in which it supports the weight of the work pieces remaining in the stack between the magazine plates 81 and 82. While the plunger 75 is in this intermediate position the member 101 is raised to grip the work into the position W' between the member 101 and the spring-urged lever 91. While the work piece is being operated upon by the tool T, it is elevated above the position W' a distance about one-half the diameter of the work. While the ends of the work piece are held clamped between pairs of members 91 and 101, the tools T advance simultaneously against the ends of the work piece to dress off any burrs or the like which are left by the saw which roughly severed the work piece from the supply of stock. After the tools T operate upon the work they retract and then the gripper 101 is lowered and the plunger 75 returns to the position shown in Fig. 7 preparatory to moving another work piece to position to be operated upon by the gripping member 91 and 101.

Movement of a new work piece from position W to W' causes a finished work piece to be ejected from position W' and to descend along a chute provided by surfaces 130 and 131 as indicated at W'' and W''' and be received by a hopper (not shown).

While the embodiment of the present invention as herein disclosed, constitutes a preferred form, it is to be understood that other forms might be adopted, all coming within the scope of the claims which follow.

What is claimed is as follows:

1. A machine for finishing the ends of tubes rods and similar work pieces comprising rotatable spindles for carrying tools which operate simultaneously upon the ends of the work piece, a magazine for supporting a plurallity of work pieces, plunger means for moving a work piece from the magazine to a position adjacent the tools, cam operated means for moving the plunger step-by-step to said position; means operable during the interval of rest of the plunger for centering the work piece longitudinally between the tools, means for aligning the work piece with the tools and for clamping the work piece in aligned position, and means for moving the spindles simultaneously to move the tools into engagement with the ends of the work piece.

2. A machine for finishing the ends of tubes rods and similar work pieces comprising rotatable spindles for carrying tools which operate simultaneously upon the ends of the work piece, a magazine for supporting a plurality of workpieces, slidable means for moving a work piece from the magazine step-by-step to a position adjacent the tools, means controlled by the slidable means and engageable with the ends of the work piece during an interval of rest in its movement from the magazine for centering the work piece longitudinally with respect to the tools, means for aligning the work piece with the tools and for clamping the work piece in aligned position, and means for moving the spindles simultaneously to move the tools into engagement with the ends of the work piece.

3. A machine for finishing the ends of tubes rods and similar work pieces comprising rotatable spindles for carrying tools which operate simultaneously upon the ends of the work piece, a magazine for supporting a plurality of work pieces, means for intermittently moving a work piece from the magazine to a position adjacent the tools, members spring urged toward the ends of the work piece and released for action during a period of rest of the means which moves the work piece from the magazine for centering the work piece longitudinally with respect to the tools, means for aligning the work piece with the tools and for clamping the work piece in aligned position, and means for moving the spindles simultaneously to move the tools into engagement with the ends of the work piece.

4. A machine for finishing the ends of the tube, rods and similar work pieces comprising a base, similar heads supported by the base and relatively adjustable longitudinally of the base to vary the distance between them in order to adapt the machine to work pieces of different lengths, each head comprising a spindle carriage, a tool carrying spindle rotatably supported by the carriage, means for reciprocating the spindle carriage in order to move the tool against an end of the work piece, magazine parts for engaging end portions of a plurality of work pieces to hold them in a stack, means engaging an end portion of a work piece in order to move the work pieces from the magazine to a position adjacent the tool, means engageable with an end portion of the work piece to align the work piece with the tool and to clamp the work piece in aligned position, and means for operating the mechanisms of the heads simultaneously in recurrent sequence in order that both ends of the work piece will be simultaneously finished.

5. A machine for finishing the ends of the tubes, rods and similar work pieces comprising a base, similar heads supported by the base and relatively adjustable longitudinally of the base to vary the distance between them in order to adapt the machine to work pieces of different lengths, each head comprising a spindle carriage, a tool carrying spindle rotatably supported by the carriage, means for reciprocating the spindle carriage in order to move the tool against an end of the work piece, magazine parts for engaging end portions of a plurality of work pieces to hold them in a stack, means engaging an end portion of a work piece in order to move the work piece from the magazine to a position adjacent the tool, a spring urged member engageable with the end of the work piece during its movement from the magazine, the spring-urged members of both heads cooperating to center the workpiece longitudinally with respect to the tools, means engageable with an end portion of the work piece to align the work piece with the tool and to clamp the work piece in aligned position, and means for operating the mechanisms of the heads simultaneously in recurrent sequence in order that both ends of the work piece will be simultaneously finished.

6. A machine for finishing the ends of the tubes, rods and similar work pieces comprising a base, similar heads supported by the base and relatively adjustable longitudinally of the base to vary the distance between them in order to adapt the machine to work pieces of different lengths, each head comprising a spindle carriage, a tool carrying spindle rotatably supported by the carriage, means for reciprocating the spindle carriage in order to move the tool against an end of the work piece, magazine parts for engaging end portions of a plurality of work pieces to hold them in a stack, means engaging an end portion of a work piece in order to move the work piece from the magazine to a position adjacent the tool, a member spring urged toward an end of the work piece and released for action by operations of the means which moves the work piece, the spring-urged members of both heads cooperating to center the work piece longitudinally with respect to the tools, means engageable with an end portion of the work piece to align the work piece with the tool and to clamp the work piece in aligned position, and means for operating the mechanisms of the heads simultaneously in recurrent sequence in order that both ends of the work piece will be simultaneously finished.

7. A machine for finishing the ends of work pieces comprising rotatable spindles for carrying tools which operate simultaneously upon the ends of the work piece; a magazine for supporting a plurality of work pieces; a plunger for moving a work piece from the magazine to a position adjacent the tools; cam means for actuating the plunger in steps, when the plunger moves a work piece from the magazine; means controlled by the plunger for centering the work piece longitudinally with respect to the tools when the plunger has moved its first step, the plunger releasing the centering means when the cam means actuates the plunger another step and moving the work piece adjacent the tools; means for aligning the work piece with the tools and for yieldingly clamping the work piece in

aligned position; and means for moving the spindles simultaneously to move the tools into engagement with both ends of the work piece.

8. A machine for finishing the ends of work pieces comprising rotatable spindles for carrying tools which operate simultaneously upon the ends of the work piece; a magazine for supporting a plurality of work pieces; a plunger for advancing the work piece from the magazine to a position adjacent the tools; cam means for intermittently actuating the plunger to advance the work piece from the magazine to a position adjacent the tools; means controlled by the plunger and for centering the work piece longitudinally relative to the tools at one point in the advancement of the work piece; means for aligning the work piece with the tools and for clamping the work piece in aligned position; and means for moving the spindles simultaneously to move the tools into engagement with both ends of the work piece.

9. A machine for finishing the ends of work pieces comprising rotatable spindles for carrying tools which operate simultaneously upon the ends of the work piece; a magazine for supporting a plurality of work pieces; slidable members provided with recesses for moving the work piece from the magazine to a position adjacent the tools; means for intermittently moving the members to advance the work piece from the magazine; means for centering the work piece, said means including spring urged arms and plungers the plungers being arranged so that when the members are moved in one position the plungers will be urged into the recesses by the arms to permit same to engage the ends of the work piece and center the work piece longitudinally with respect to the tools; means for aligning the work piece with the tools and for yieldingly clamping the work piece in aligned position; and means for moving the spindles simultaneously to move the tools into engagement with both ends of the work piece.

10. A machine for finishing the ends of work pieces comprising rotatable spindles for varying tools which operate simultaneously upon the ends of the work piece; a magazine for supporting a plurality of work pieces; a slidable member; means for intermittently moving the slidable member to advance a work piece from the magazine to a position adjacent the tools; means associated with the slidable member adapted to be actuated during a period of rest in the advancement of the slidable member to center the work piece longitudinally with respect to the tools; means for aligning the work piece with the tools and for yieldingly clamping the work piece in aligned position; and means for moving the spindles simultaneously to move the tools into engagement with both ends of the work piece.

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