May 6, 1958 E. A. TESCH 2,832,971

PINCH POINTING MACHINE

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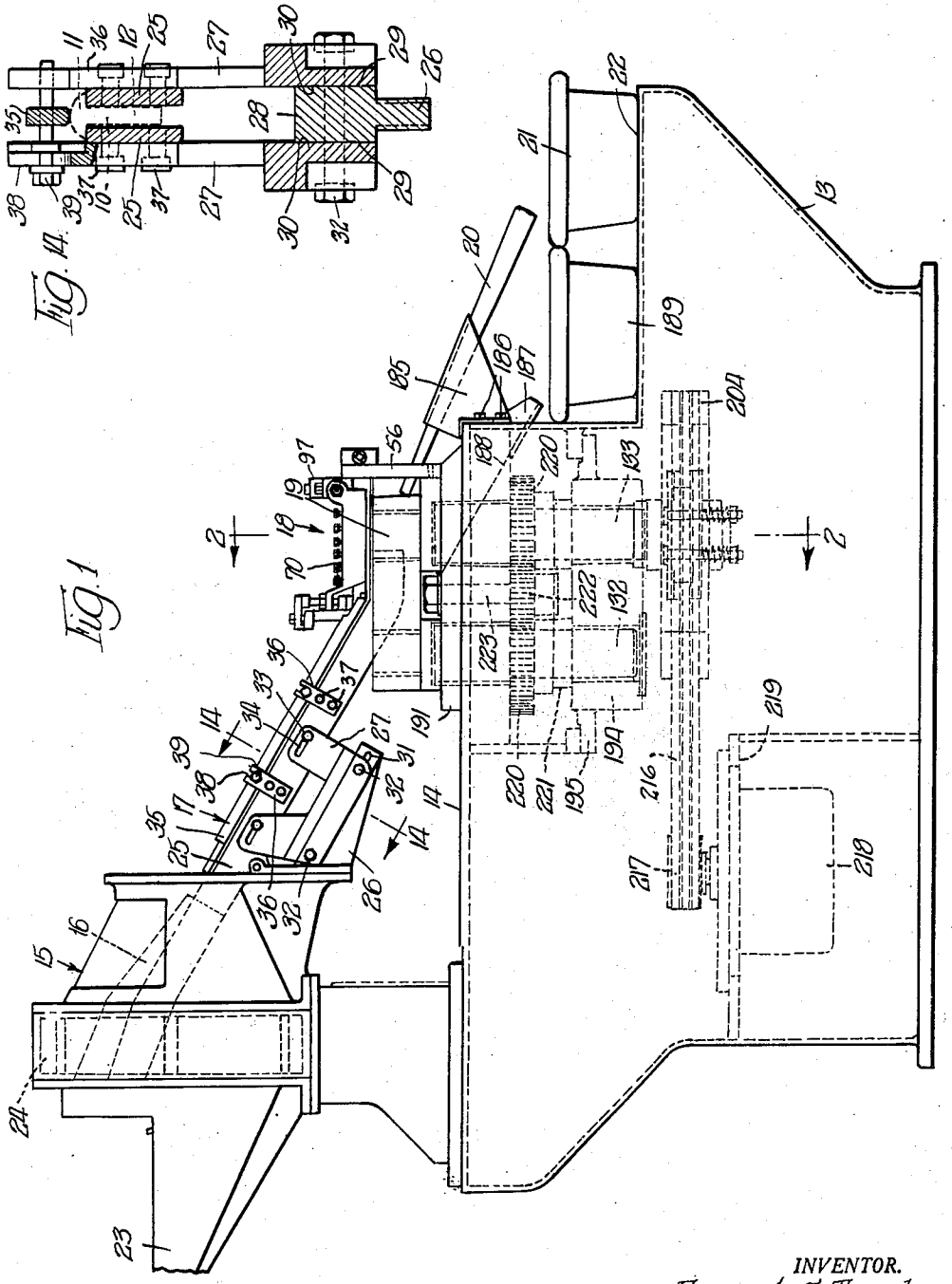


Fig. 1

Fig. 14.

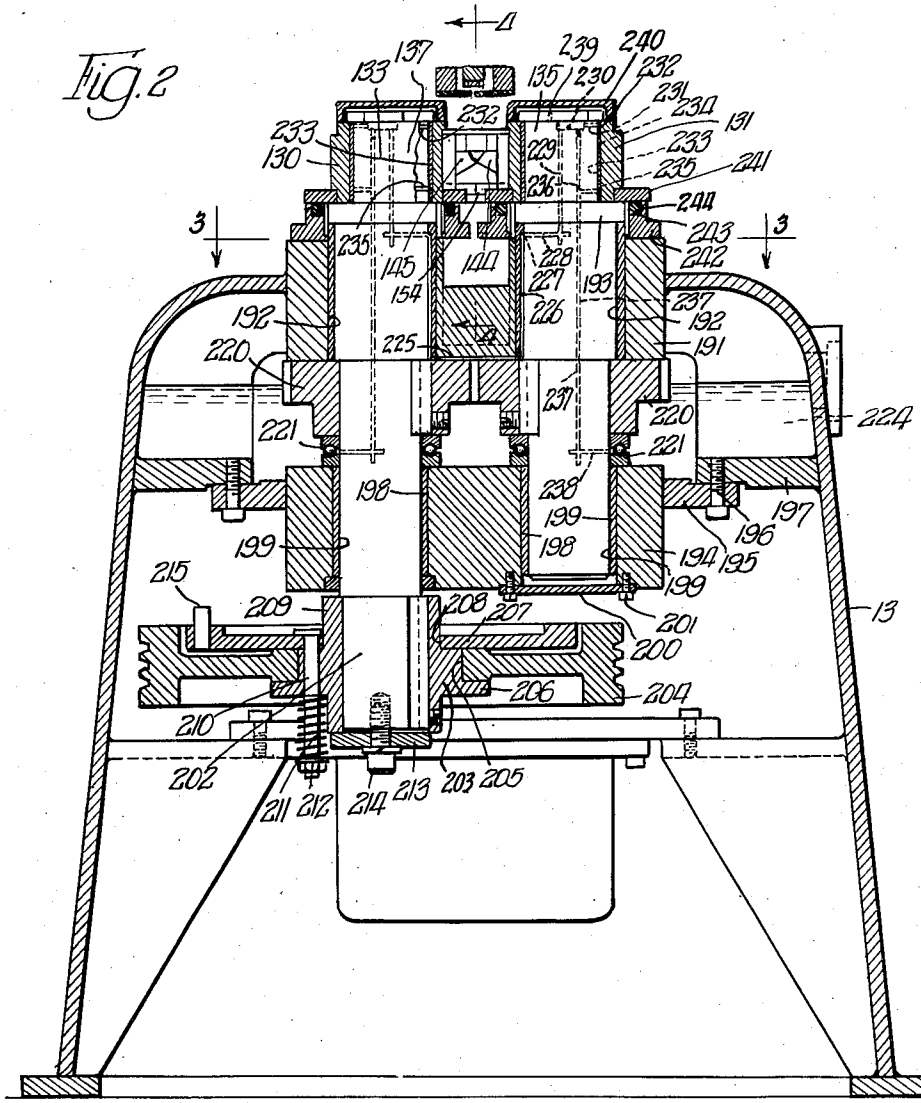
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Attys

May 6, 1958 E. A. TESCH 2,832,971

PINCH POINTING MACHINE

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Fig. 2



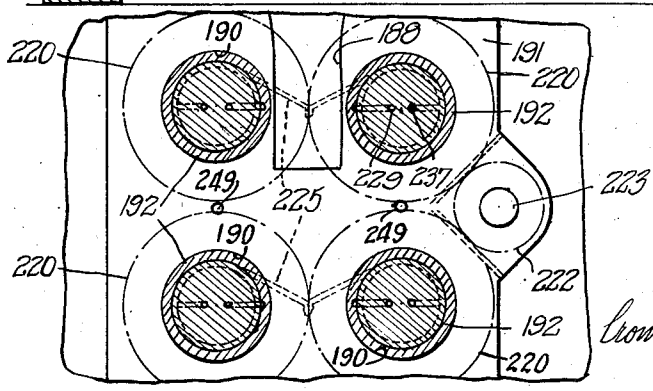


Fig. 3.

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PINCH POINTING MACHINE

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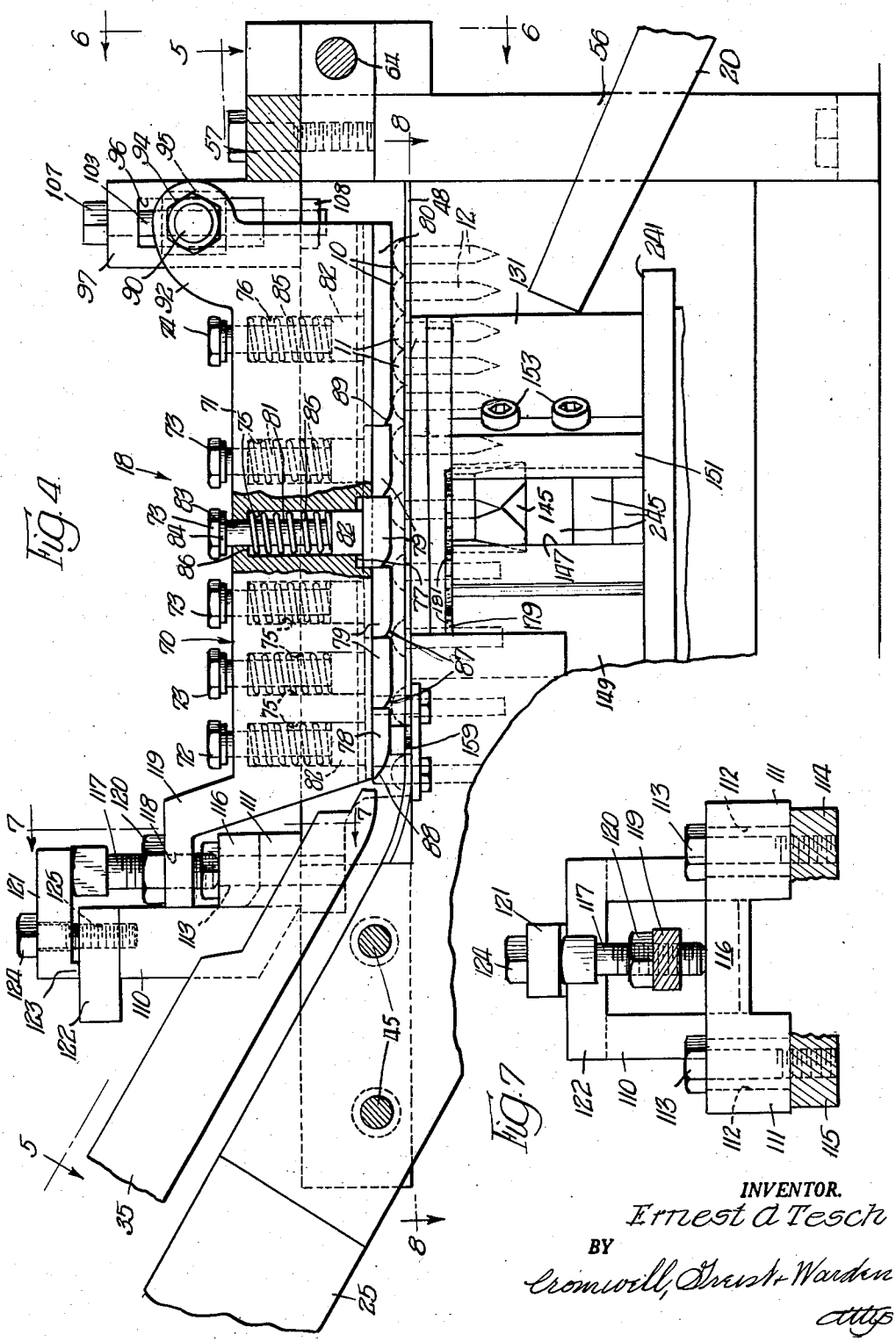


Fig. 4

Fig. 7

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PINCH POINTING MACHINE

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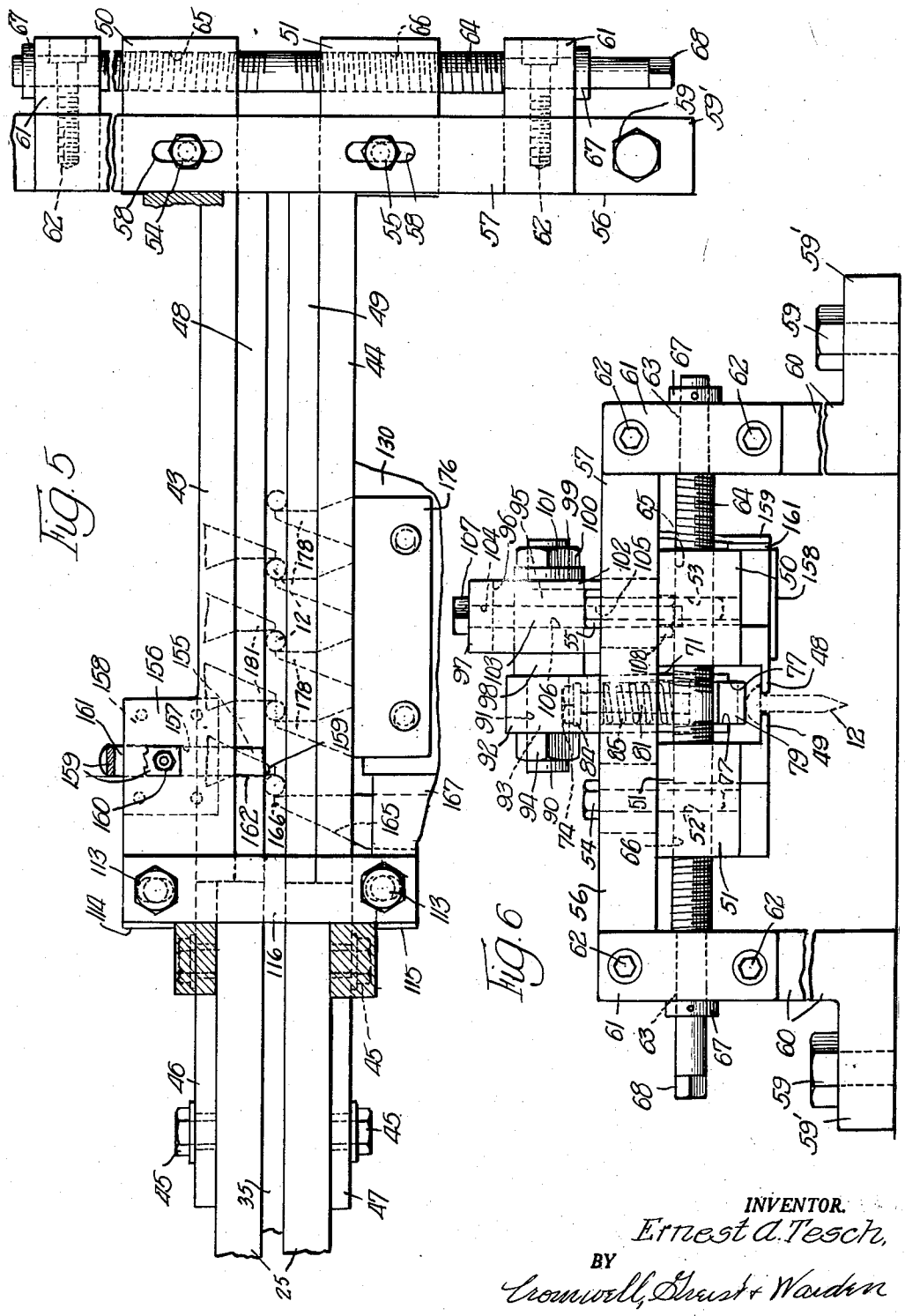


Fig. 5

Fig. 6

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PINCH POINTING MACHINE

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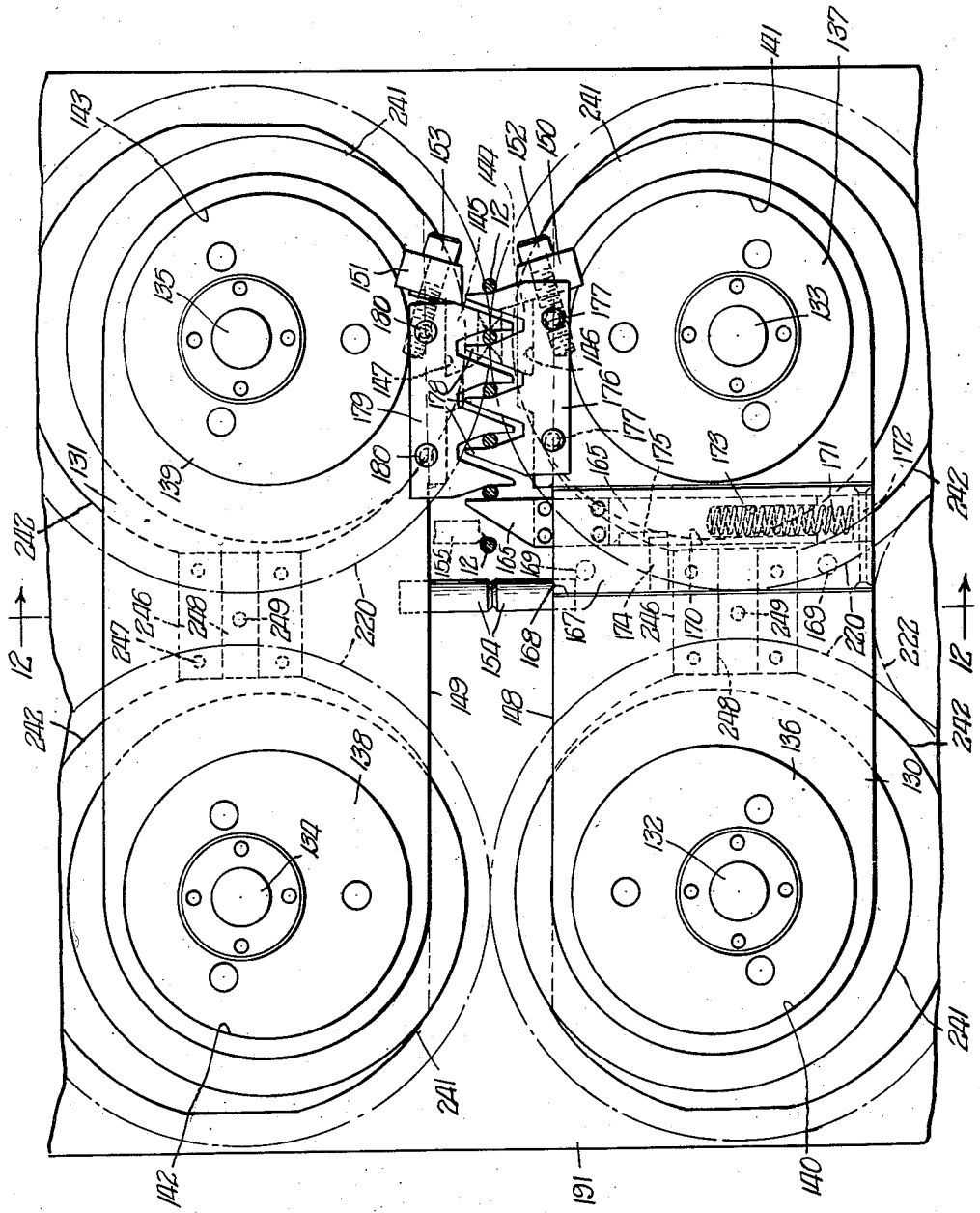


Fig. 8.

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PINCH POINTING MACHINE

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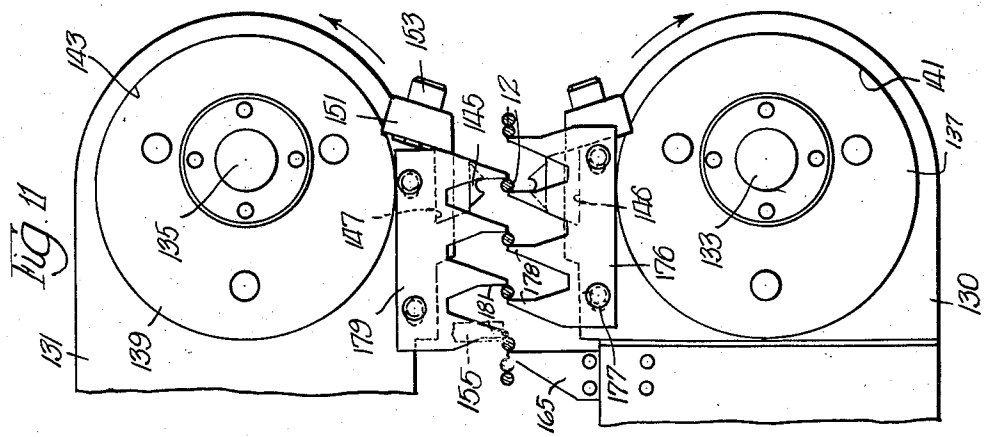


Fig. 11

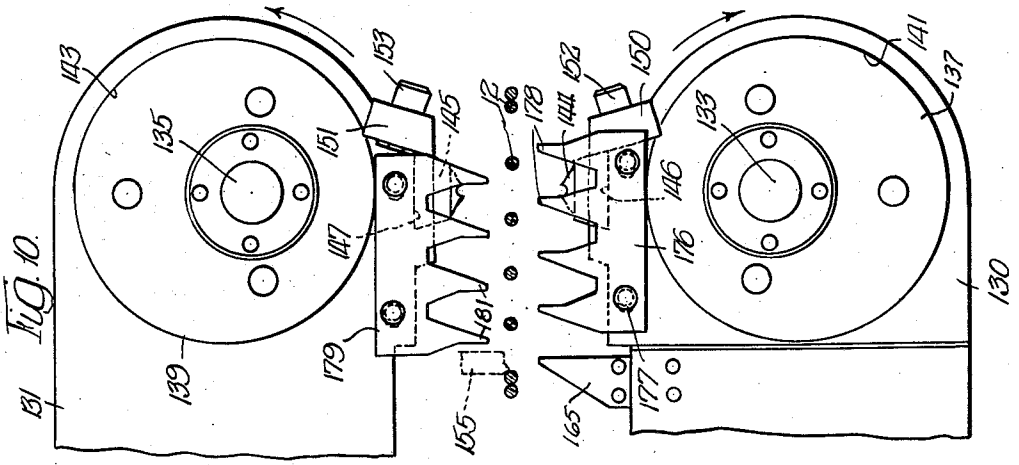


Fig. 10

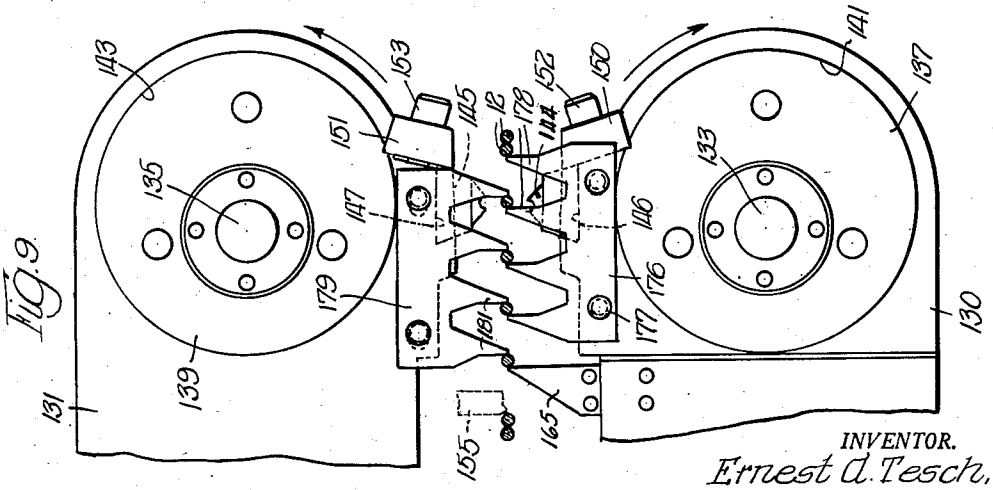


Fig. 9

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PINCH POINTING MACHINE

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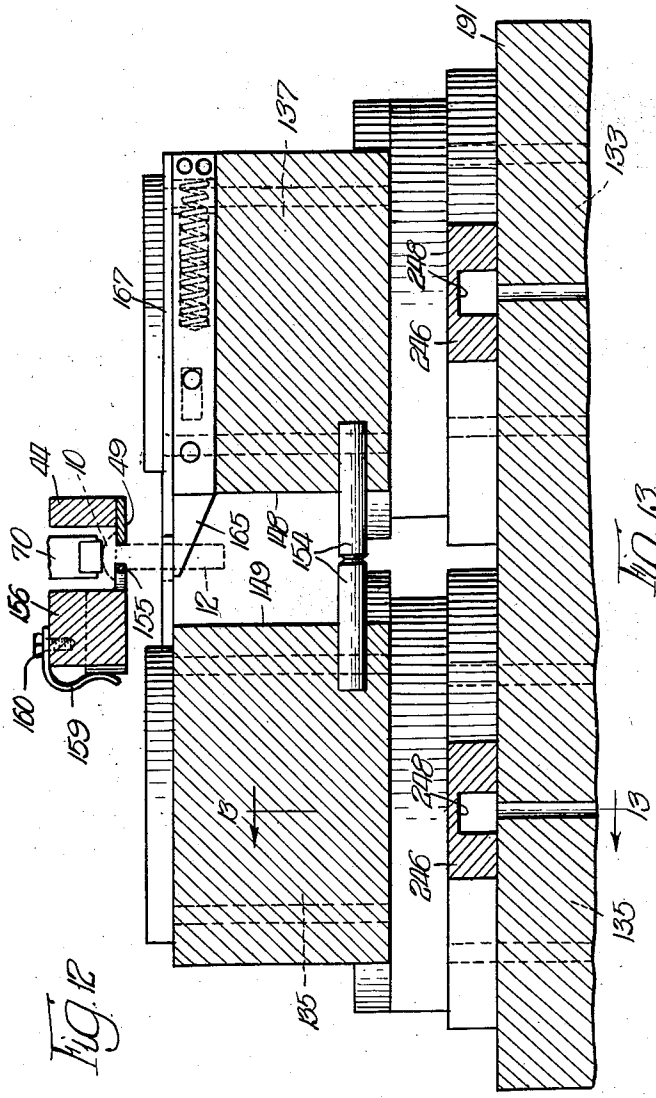


Fig. 12

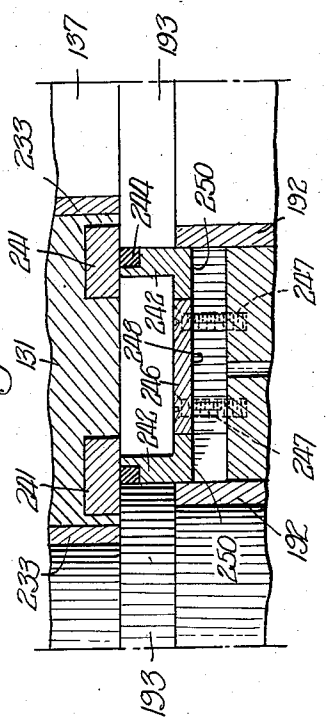


Fig. 13

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PINCH POINTING MACHINE

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Fig. 15.

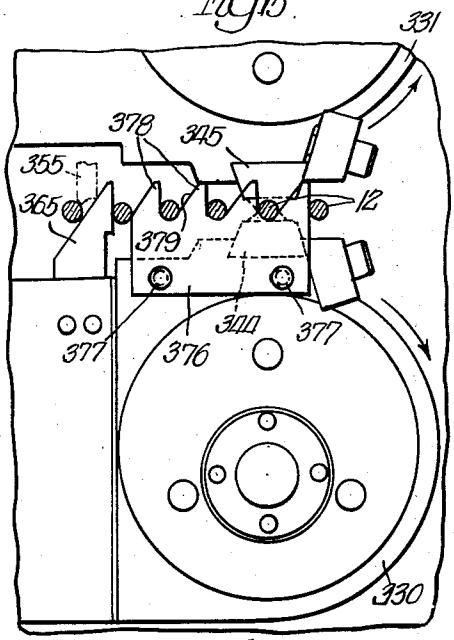


Fig. 16.

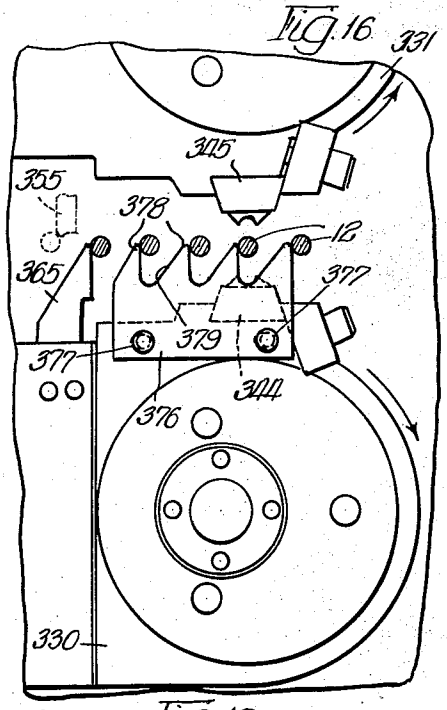


Fig. 17.

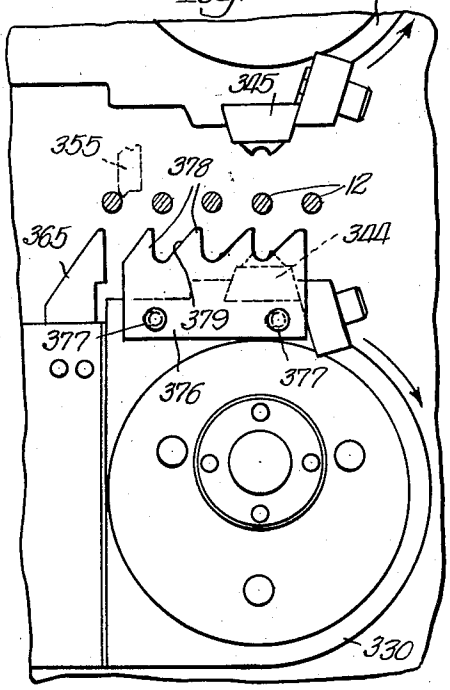
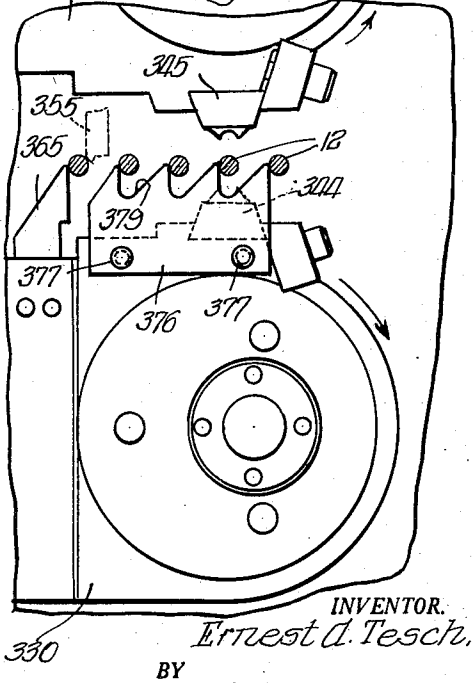


Fig. 18.



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United States Patent Office

2,832,971

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2,832,971

PINCH POINTING MACHINE

Ernest A. Tesch, Chicago, Ill., assignor to Pheoll Manufacturing Company, Chicago, Ill., a corporation of Illinois

Application June 21, 1955, Serial No. 516,953

35 Claims. (Cl. 10—21)

This invention relates to metal working machines and is more particularly concerned with improvements in a machine for pointing the shank end of a screw blank or similar workpiece.

It is a general object of the invention to provide an improved machine for forming a point at the end of the shank of a headed blank of the type which is employed in the manufacture of screws, nails or similar devices, which machine is adapted to operate at a rate of speed several times greater than any of the machines heretofore developed for this purpose.

It is a more specific object of the invention to provide a machine which comprises mechanism for feeding metal blanks or workpieces of the type which consist of a shank portion and a head portion, mechanism for separating the blanks into predetermined spaced relation and for advancing the same in spaced single file formation and mechanism for pinching the ends of the shanks of successive blanks between a pair of movable dies to form thereon a point.

It is a further object of the invention to provide in a machine for forming a point on the shank end of a workpiece of the type which comprises a head and an integral shank, mechanism for delivering the workpieces in side-by-side single file relation, a guideway for supporting the workpieces in aligned relation as they are advanced to a pointing station, mechanism for separating the workpieces and for advancing them along the guideway in spaced relation to the pointing station, a pair of forming dies mounted at the pointing station, mechanism for imparting relative movement to the dies to intermittently bring them into pointing engagement with the ends of the shanks of successive workpieces.

It is another object of the invention to provide a machine for forming a point on the shank end of a workpiece which is characterized by a head portion and a shank portion, said machine comprising mechanism for feeding the workpieces in single file arrangement toward a work station, mechanism for separating the workpieces in predetermined spaced relation as they advance toward the work station, a pair of forming dies which are mounted at the work station for movement in closed paths on opposite sides of the path of movement of the workpieces and mechanism for moving the dies in their respective paths to bring them into opposed relation and into engagement with the end of the shank portion of the workpiece and form thereon a point.

It is another object of the invention to provide in a metal working machine having mechanism for feeding in single file formation successive workpieces which are characterized by a head portion and a depending shank portion, mechanism for advancing the workpieces in predetermined spaced relation toward and past a work station, a pair of pointing dies mounted for movement on opposite sides of the work station and mechanism for moving the dies toward and from engagement with the end of the shank portion of successive workpieces to point

the ends of successive workpieces as they are advanced relative to the work station.

It is a further object of the invention to provide in a pinch pointing machine a pair of pointing dies which are mounted on opposite sides of the path of movement of successive workpieces, and eccentrically mounted holders for the dies which are operative to continuously move the dies in oppositely disposed paths which brings them into engagement with successive workpieces for forming a point thereon.

It is another object of the invention to provide a machine for pointing the ends of blanks of the type employed in the manufacture of screws which machine comprises a mechanism for feeding the workpieces in a single line formation, a pair of pointing dies, a pair of oppositely disposed holders for the dies which are eccentrically mounted on pairs of rotating shafts, a blank separating and conveying mechanism for separating the advancing blanks and for carrying them forward in predetermined spaced relation to a predetermined position between the dies and mechanism for operating the shafts and the blank spacing and conveying mechanism in timed relation whereby successive blanks are pointed by engagement with the dies as they are carried between the same by the separating and conveying mechanism.

It is another object of the invention to provide a machine for pointing the ends of screw blanks or similar workpieces which comprises mechanism for feeding the blanks in single file formation with the heads thereof supported on guide members, cooperating pointing dies mounted on movable holders which are positioned on opposite sides of the blank supporting guide members, mechanism for operating the die holders continuously to move the dies in laterally extending paths toward and from pinch pointing engagement with successive blanks and mechanism mounted on the die holders and movable with the dies to intermittently engage the blanks and to advance successive blanks along the guide members and into position for engagement by the dies.

It is a further object of the invention to provide in a machine of the type described a hold-down mechanism for resiliently holding each of the workpieces against upward movement away from the guide members on which they are supported as successive workpieces are advanced to the proper position between the dies and the dies are operated to engage and point the same.

It is still a further object of the invention to provide a lubricating system for a machine of the type described wherein the vertical shafts and their associated bearing members are provided with connecting oil passageways extending to the upper ends of the shafts and the drive means for the shafts comprises one or more pairs of interengaging helical gears around which an oil chamber is formed and which pump the oil from the chamber into the passageways and circulate it through the same.

These and other objects and advantages of the invention will be apparent from a consideration of the machine which is shown by way of illustration in the accompanying drawings, wherein:

Fig. 1 is a side elevation of a pinch pointing machine having incorporated therein the principal features of the invention;

Fig. 2 is a cross section taken on the line 2—2 of Fig. 1, to an enlarged scale and with portions broken away;

Fig. 3 is a cross section taken on the line 3—3 of Fig. 2, with portions broken away;

Fig. 4 is a sectional view taken on the line 4—4 of Fig. 2, to an enlarged scale and with portions of the mechanism shown in elevation and other portions broken away;

Fig. 5 is a section taken on the line 5—5 of Fig. 4 with portions of the mechanism broken away or omitted;

Fig. 6 is a partial end elevation with portions broken away, the view being taken on the line 6—6 of Fig. 4;

Fig. 7 is a cross section taken on the line 7—7 of Fig. 4;

Fig. 8 is a section taken on the line 8—8 of Fig. 4;

Figs. 9, 10 and 11 are sectional views similar to Fig. 8 illustrating successive positions of the blank forwarding and pinching die members;

Fig. 12 is a cross section taken on the line 12—12 of Fig. 8;

Fig. 13 is a cross section taken on the line 13—13 of Fig. 12;

Fig. 14 is a cross section taken on line 14—14 of Fig. 1 to an enlarged scale;

Fig. 15 is a sectional view corresponding to Fig. 8 and illustrating an alternative form of the machine; and

Figs. 16, 17 and 18 are sectional views, corresponding to Figs. 9, 10 and 11, and illustrating successive positions of the blank forwarding and pinching die members, which are shown in Fig. 15.

Referring to the drawings there is illustrated a machine which embodies therein the principal features of the invention and which is particularly adapted to point the ends of metal workpieces, such as, screw blanks **10** (Fig. 14), which are characterized by a head forming portion **11** and an integral stem or shank portion **12**, the latter having a smaller cross section than the head **11**.

In general the machine illustrated comprises a supporting frame or base structure **13** (Fig. 1) having mounted at one end on its upper face or top surface **14** a feed mechanism **15** which is adapted to receive a quantity of the workpieces **10** and which arranges the same in single file, depending stem relation on the upper portion **16** of an inclined feed chute **17**. The inclined feed chute **17** extends to a work station **18** at the other end of the top surface **14** of the supporting frame **13**. A pinch pointing die mechanism **19** is located at the work station **18** and also mechanism cooperating therewith for advancing the workpieces **10** in timed relation to the pinching operation of the pointing die mechanism **19** so that each successive workpiece **10** is pointed and then delivered to the discharge chute **20** which conveys the finished pieces to the receptacle or pan **21**, the latter being supported on the shelf formation **22** at the other or forward end of the frame structure **13**.

The mechanism **15** which is provided for orienting and feeding the work blanks **10** to the machine is preferably of the rotating drum type and, for example, may be the construction shown in Henderson Patent No. 2,531,099 granted November 21, 1950. It comprises an open hopper or scuttle portion **23** into which a quantity of the work blanks **10** are deposited and from which they are delivered to the inside of a bucket carrying drum **24** in the main portion of the mechanism **15** which carries the workpieces **10** upwardly to the top of its orbit and deposits them on the inclined upper portion or section **16** of the discharge or feed chute **17**. The workpieces are oriented as they are dropped onto the supporting chute section **16** so that they are arranged in depending stem, single line relation as they leave the mechanism **15** and move down the feed chute **17** toward the work station **18**.

The feed or delivery chute **17** includes a pair of spaced vertical plates or rails **25** which extend at a downwardly inclined angle from the mechanism **15** and are supported on a bracket **26** which is attached by welding or the like to the forward face of the feed mechanism **15**. The bracket **26** (Figs. 1 and 14) carries a pair of adjusting wedge brackets **27**, the latter being laterally spaced and extending upwardly from an upstanding central rib formation **28** on the bracket **26** which has side faces **29** tapering downwardly and inwardly in the lengthwise direction thereof. The wedge brackets **27** have tapered inside

faces **30** with the taper extending lengthwise thereof which are adapted to engage with the tapered side faces **29** of the rib **28**. The rib **28** is provided with longitudinally spaced elongate slots **31** and the brackets **29** are clamped to the rib **28** by bolts **32** extending through the slots **31** so that they may be moved lengthwise of the rib **28** to adjust within certain limits the space between them. The adjusting brackets **27** have upstanding leg portions which are connected to the plate-like supporting rails **25** of the chute **17** by bolts **33** which are received in elongate slots **34** in the brackets **27**. The rails are adjusted laterally to provide the proper space for movement therein of the stem portion **12** of the workpiece **10** with the head portion **11** of the latter being supported on the top edges of the side rails **25**. The workpieces **10** are held against upward movement away from the side rails **25** by a top guide bar **35** which is supported in vertically adjusted position on the rails **25** by means of upstanding brackets **36** which are spaced longitudinally of the rails **25** and attached thereto by bolts or other fasteners **37**. The brackets **36** are provided in the upper ends thereof with upwardly opening slots **38** for receiving centering bolts **39**. The bolts **39** are arranged to permit the top guide bar **35** to be centered above the space between the support rails **25** so as to properly engage the head portion **11** of each workpiece **10**.

The blank supporting rails **25** (Figs. 4 and 5) extend to a point adjacent the work station and support on their ends right and left chute extension members **43** and **44** which are attached to the rails **25** by bolts or other fasteners **45** extending through upright flange portions **46** and **47**, respectively. The chute extension members **43** and **44** extend forwardly of the ends of the chute rails **25** in a generally horizontal plane and are arranged in laterally spaced relation with confronting horizontal flanges **48** and **49** which are in the same horizontal plane and which form extensions of the top edges of the chute rails **25** to receive thereon the heads **11** of the work blanks **10**. The chute extensions **43** and **44** are provided at their forward ends with oppositely disposed laterally extending block formations **50** and **51** which have vertically extending threaded apertures **52** and **53** for receiving bolts **54** and **55** which secure the same to a front support member **56**.

The support member **56** is in the form of an inverted U-shaped bracket which extends transversely of the machine and has a top cross piece **57** provided with elongate apertures **58** and **58'** for receiving in adjusted relation therein the bolts **54** and **55**. The support bracket **56** is secured to a portion of the top **14** of the main frame **13** by means of bolts **58** which extend through suitable apertures in oppositely disposed flanges **59'** at the bottom ends of the vertical leg members **60**. The support bracket **56** carries at the upper ends of the legs **60** thereof a pair of bearing brackets **61** which are secured to the forward faces of the legs **60** by bolts **62** or other fastener members and which are provided with transversely aligned apertures **63** for receiving an adjusting screw **64** for the chute extensions **43** and **44**. The adjusting screw **64** is provided at its opposite ends with right and left hand threads which are received in the transversely extending threaded apertures **65** and **66** in the end block portions **50** and **51** of the chute extensions **43** and **44** with the block portions **50** and **51** being positioned between the bearing brackets **61**. The adjusting screw **64** is held in position by collars **67** and provided on its end with a nut-like head formation **68** for receiving a suitable tool for rotating the same to adjust the chute extensions **43** and **44** toward and from each other. Operation of the adjusting screw **64**, of course, adjusts the space between the work blank supporting flanges **48** and **49** of the chute extensions **43** and **44** only at the forward end of the same. The chute extensions **43** and **44** are attached at their other ends to the inclined chute rails **25** which are adjusted laterally by adjusting the wedge

brackets 27. The work blanks 10 move from the chute rails 25 directly onto the head supporting flanges 48 and 49 of the chute extensions 43 and 44 which are curved upwardly at their ends into alignment with the top edges of the chute rails 25.

Mechanism is provided for interrupting the movement of the work blanks 10 as they advance on to the supporting flanges 48 and 49 and for separating the blanks into predetermined spaced relation. The mechanism, which will be described subsequently, also advances the blanks 10 in spaced relation to the work station 18, where the pinching operation is accomplished, and thereafter advances the finished blanks 10 in contacting relation to the forward or discharge end of the blank supporting flanges 48 and 49.

While the blanks 10 are moved along the supporting flanges 48 and 49 they are held in proper position by a hold-down mechanism 70 (Figs. 4 and 6) which comprises an elongate hold-down bar 71 and a plurality of spring loaded tappets or hold-down devices 72, 73 and 74. The bar 71 is of rectangular cross section and is arranged in upright horizontal position above the blank supporting flanges 48 and 49. The bar 71 is provided with a plurality of longitudinally spaced vertical recesses 75, which are shown as five in number and which are separated an equal distance from each other and an end recess 76 which is separated from the adjacent recess 75 by a somewhat greater distance. The recesses 75 and 76 are all the same size and communicate at their lower ends with a downwardly opening longitudinally extending channel-shaped slot or groove 77 in the lower face of the bar 71. The recesses 75 and 76 are adapted to receive the hold-down devices 72, 73 and 74 which differ only in the construction of the lower head portions or shoes 78, 79 and 80. Each hold-down device 73 (Fig. 4) comprises an upstanding stem or shank portion 81, and a lower head portion 82 of somewhat larger cross sectional diameter than the shank portion 81. The head portion 82 is slidably received in the lower portion of the recess 75 while the stem 81 is of sufficient length to permit the upper end thereof to extend through the upper end portion 83 of the recess 75 which is of smaller cross sectional diameter than the main portion thereof. A washer and nut 84 are secured on the upper end of the stem 81 which limits the downward movement of the latter while a compression spring 85 is provided between the head portion 82 and the internal shoulder 86 in the recess 75 which urges the stem 81 and the head 82 in the downward direction to hold the shoe member 79 in engagement with the heads 11 of the work blanks 10 as they are moved along the supporting members 48 and 49 beneath the same. The shoe 79 which forms the bottom portion of the head 82 is elongate and is seated in the bottom groove 77 in the bar 71. The rearward edge of the shoe 79 is beveled at 87 to insure that the heads 11 of the blanks 10 will slide beneath the same as they are moved forward. The shoe 78 on the first hold-down device 72 which is at the feed-in end of the bar 71 has a beveled or curved surface 88 on the lower face for the same purpose. The shoes 79 on the next four hold-down devices 73 are identical and the shoe 80 on the endmost hold-down device 74 is elongated to extend over and hold down the heads 11 of a plurality of the blanks 10 which are moved beyond the point at which the end pointing or pinching operation is accomplished. The rearward edge of shoe 80 is beveled at 89 in the same manner as shoes 79.

The hold-down bar 71 is adjustably supported at its forward end on a pivot member 90 (Figs. 4 and 6) which extends through a bearing aperture 91 in an upward extension 92 on the forward end of the bar 71. The pivot member 90 includes a pivot forming portion 93 which is threaded at its one end to receive a clamp nut 94. The member 90 has an intermediate portion 95 which is rectangular in cross section and which is adapted to be received in sliding relation in a rectangular guideway forming aperture 96 in an upstanding bracket member 97 which extends rearwardly from the top cross bar 57 of the U-shaped support bracket 56. The pivot member 90 also has a squared portion 98 adjacent the rectangular portion 95 which forms a spacer between the bracket 97 and the pivot bearing portion 92 of the bar member 71. At its other end the pivot member 90 has a threaded shank portion 99 which is adapted to receive the clamp nut 100 and a clamp washer 101, the latter having a squared portion 102 extending into the guideway 96 so that when the nuts 94 and 100 are drawn tight the pivot 90 is clamped relative to the bar 71 and the support bracket 97. A height adjusting screw 103 is provided which is received in vertically aligned top and bottom bearing apertures 104 and 105 in the bracket 97 and which has screw threaded engagement in a vertically extending aperture 106 in the intermediate slide forming portion 95 of the pivot member 90. The adjusting screw 103 has a tool receiving head 107 and a lock nut 108 on its lower end to permit it to be rotated for adjusting the pivot 90 and thereafter to be held or locked in adjusted position.

The hold-down bar 71 is supported at its other end on a bracket 110 which is in the form of an inverted U with forwardly and outwardly extending flanges 111 at the bottom ends of the legs which are provided with vertically extending slots 112 for receiving clamp bolts 113 which extend upwardly of laterally extending bracket members or formations 114 and 115 on the chute extensions 43 and 44, respectively. The slots 112 are elongate in the direction transverse of the machine so that they permit adjustment of the chute extensions 43 and 44 and rails 25 relative to the support bracket 110. The attaching flanges 111 on the bracket 110 are bridged by a cross piece 116 which extends across the top of the end of the guide bar 35 and provides a bearing for the lower end of the height adjusting screw 117 for the hold-down bar 71. The screw 117 is engaged in threaded relation in an aperture 118 provided in an upwardly extending end attaching portion 119 on the hold-down bar 71 and is provided with a lock nut 120 for locking it in position after adjustment. The adjustment screw 117 is held with its end in engagement with the cross bar 116 by means of a clamp plate 121 which extends between the head of the adjusting screw 117 and a top cross bar portion 122 of the bracket 110 and which has a rear shoulder 123 providing a pivot point about which the clamp plate 121 is drawn into tight engagement with the head of the screw 116 by a clamp bolt 124 which engages in threaded relation in an aperture 125 provided in the top cross bar portion 122 of the bracket 110. The position of the hold-down bar 71 is, of course, first adjusted by rotation of the adjusting screw 117 and thereafter the screw 117 is locked in position relative to the bar 71 by the lock nut 120. The clamp plate 121 is then positioned in bridging relation between the top of the head of the screw and the top cross bar 122 of the bracket 110 and securely fastened by the stud bolt or clamp screw 124.

The blanks 10 are advanced beneath the hold-down mechanism 70 with the depending shank portions 12 moving in a linear path which is in a vertical plane between a pair of oppositely disposed die holders or carrier members 130 and 131. The die holders or carriers 130 and 131 are in the form of elongate blocks of generally rectangular cross section which are arranged in oppositely disposed relation on opposite sides of the path of movement of the blanks 10 and which are mounted for movement on pairs of upright shafts 132, 133 and 134, 135 which shafts are arranged in generally rectangular relation. The respective shafts of each pair are aligned in the direction longitudinally of the ma-

chine and extend in parallel vertical planes which are equally spaced on opposite sides of the vertical plane in which the blanks 10 are advanced. The shafts of each pair are connected to the opposite ends of the die holders 130 and 131 by eccentric bearing members 136, 137 and 138, 139 which eccentric members are formed on the upper ends of the shafts 132, 133 and 134, 135 and are received in bearing apertures 140, 141 and 142, 143 in the respective die holders 130 and 131.

Cooperating pinching dies 144 and 145 are supported, in oppositely disposed relation on opposite sides of the path of movement of the blanks 10, in vertically extending recesses 146 and 147 in the opposed faces 148 and 149 of the die holders 130 and 131 and are clamped in fixed relation therein by means of vertically extending clamp plates 150 and 151, the latter being secured by means of clamp bolts 152 and 153, respectively. The pinching dies 144 and 145 are provided on their opposed faces with cooperating recesses which are in the form of inwardly and upwardly opening cone-shaped sections and which pinch or shape a point on the end of the shank portion 12 of the blanks 10 when the die holders 130 and 131 are reciprocated by rotation of the eccentrics 136, 137 and 138, 139 and the dies 144 and 145 are moved into engagement with the ends of the respective blanks as they are advanced intermittently to the pinching position between the same. The die holders 130 and 131 carry on their opposed faces 148 and 149 projecting dowel pins 154 which are aligned transversely and serve as bumper members to limit the movement of the die holders toward each other and prevent possible injury to the dies 144 and 145 due to any looseness or give which may develop and which would otherwise cause the die faces to contact with sufficient force to damage them.

The blanks 10 are advanced from the delivery chute 17 to the proper position for engagement by the pointing dies 144 and 145 by mechanism which includes a stop finger member 155 which is supported on the chute extension 43. The latter is provided with a block portion 156 which may be integral with the bracket forming portion 114 and which has a downwardly opening groove or recess 157 in its lower face. The open face of the recess is closed by a bottom cover plate 158 to form an open ended guideway for receiving the stop finger 155. The stop finger 155 is in the form of an elongate plate or bar member with a wedge formation 159 on the inner end and is mounted in slidable relation in the guideway 157 in the bottom of the chute extension 43 adjacent the lower end of the chute rails 25. The blank stop finger 155 is retained in the guideway 157 by a leaf spring 159 which is secured to the top of the chute extension 43 by a bolt 160 with the end of the spring extending downwardly and curved to engage the outer end of the blank stop finger 155. The spring 159 urges the finger 155 inwardly toward the path of the blanks 10 so that the wedge shaped end 159 projects into the path of the blanks 10 and forms a retractable stop for the same. The finger 155 has an enlarged outer end portion 161 which limits its inward movement and the blank supporting flange 48 is cut out at 162 to accommodate the inner end of the same.

The blanks 10 are in single file side-by-side relation as the leading blank engages with the stop finger 155. Each successive blank is separated from the following blanks and advanced one at a time to a point beyond the stop finger 155 by a spacer or starter finger 165. The starter finger 165 is in the form of a plate of generally rectangular section having two sides of its inner end beveled to form thereon a pointed end 166 for engaging between the leading blank 10 and the next adjacent blank. The starter finger 165 (Fig. 8) is mounted for sliding movement in a transversely extending guide member or housing 167 which is in the form of a rectangular block seated in a transversely extending recess 168 in the top surface of the die holder 130 and secured therein by screws 169. The guide member 167 is provided with a guideway forming recess 170 which receives the spacer finger 165 in sliding relation therein and which also receives a compression spring 171 engaging a stop block 172 in the outer end of the recess and having its inner end extending into a recess 173 in the inner end of the spacer finger 165 for urging the same toward the path of movement of the blanks 10. A pin 174 is provided in the housing 167 which projects into a small slot or recess 175 in the side wall of the finger 165 and limits the movement of the latter relative to the housing 167. The starter finger 165 moves with the die holder 130 and as it is carried inwardly and forwardly relative to the path of movement of the blanks 10 it engages the rear of the leading blank 10 which is resting against the projecting end of the blank stop member 155 and forces the blank forwardly to a point in advance of the blank stop 155 where it is picked up for further advancing movement by a feed member 176. The feed member 176 is in the form of a generally rectangular plate which is secured on the top of the die holder 130 by screws 177. The inner edge of the feed plate 176 is provided with a plurality of spaced projecting teeth or finger members 178 which are separated by inwardly extending generally V-shaped slots, which finger members 178 are adapted to engage behind advancing blanks 10 as the eccentric movement of the die holder 130 carries the plate 176 inwardly into the path of the blanks and then forwardly in the direction of advance thereof. The feed plate 176 is mounted adjacent the forward end of the die holder 130, near the axis of the supporting shaft 133, and the eccentric movement of the die holder 130 carries it in a relatively small closed path or orbit. In a full cycle of operation the fingers 178 advance laterally outwardly away from the path of the blanks 10 then rearwardly and inwardly thereof for engaging each finger 178 with a blank 10, and forwardly to advance the blanks.

A plate member 179 of similar configuration is mounted on the die holder 131 opposite the feed plate member 176 by means of screws 180. The plate member 179 has its inner edge slotted to provide a series of spaced finger members 181 which move into and out of the path of the blanks 10, in response to the eccentric movement of the die holder 131. The fingers 181 are positioned to move into engagement with the blanks 10 so that the three leading fingers 181 are paired with the three trailing fingers 178 to hold a blank 10 between the opposed edges of each pair of fingers as the plates 176 and 179 advance through the positions shown in Figs. 8 to 11. The blank 10 between the leading pair of fingers 178 and 181 in Fig. 8 is at the point where the pinching operation is performed on the end of the shank 12. The leading finger 178 is advancing a pointed blank 10 toward the discharge end of the machine and the trailing finger 181 engages with a blank 10 between its trailing edge and the leading edge of the starter finger 165. With this arrangement the blanks 10 are held in alignment as they pass beneath the hold-down mechanism 70 and between the pointing dies 144 and 145. The completed or pointed blanks 10 are moved into engagement with each other beneath the hold-down shoe 80 at the end of the supporting flanges 48 and 49 of the chute extensions 43 and 44 and finally are delivered to a discharge chute 20 which is supported on the forward edge of the main frame 13 by means of a supporting bracket 185 which is secured by bolts 186 to the frame 13. Any waste which may result from the pinching operation is dropped upon the opening of the pinching dies 145 and 146 into a waste discharge chute 187 which is mounted in a suitable recess 188 in the forward end of the main frame 10 and conveys the waste to an accumulating pan 189 suported on the ledge 22 at the front of the frame 13.

The die carrying members 130 and 131 are supported on the upper ends of the vertical crank shafts 132, 133 and 134, 135 by the eccentric formations 136, 137 and 138, 139, respectively, the latter being formed as integral portions of the crank shafts. The crank shafts 132, 133 and 134, 135 are mounted in laterally and longitudinally spaced bearing apertures 190 in a bearing block 191 which is secured in the top of the main frame 13. Each of the crank shafts 132, 133 and 134, 135 is mounted in an identical manner and the detailed description will refer to shafts 133 and 135 as shown particularly in Fig. 2, it being understood that corresponding mounting structure is provided for the other two shafts 132 and 134. Each shaft is mounted in an upper bearing sleeve 192 which extends a short distance above the top surface of the bearing block 191 and engages with the bottom surface of a shoulder formation 193 on the respective crank shaft below the eccentric forming portion thereon. Each crank shaft is also supported by a lower bearing in a block 194 which is mounted in a plate 195 which is attached by bolts 196 or other suitable fasteners to inwardly extending flange formation 197 on the main frame 13. The block 194 is provided with spaced bearing apertures 198 which are aligned with the bearing apertures 190 in the upper bearing block 191 and in each aperture 198 there is provided a bearing sleeve 199. Three of the apertures 198 which receive crank shafts 132, 134 and 135 are closed on the bottom by a cover plate 200 secured to the block 194 by bolts 201 or other fasteners.

The crank shaft 133 forms the driving shaft and is provided with an end portion 202 of reduced section which extends through the open lower end of the aperture 198 in the bearing block 194 which receives this shaft. The shaft end 202 receives in keyed relation thereon the hub portion 203 of a driving flywheel 204. The flywheel 204 is provided with a central aperture 205 which receives the hub 203 and which is held in frictional engagement with a peripheral flange 206 thereon by a clamp plate 207. The clamp plate 207 is provided with a central aperture 208 which fits over the upper portion 209 of the hub 203 and a portion of its lower face is held in frictional engagement with a portion of the upper face of the flywheel 204 by means of a series of peripherally spaced spring pressed bolts 210 which extend through aligned apertures in the clamp plate 207 and the hub 203 and which receive on their lower ends compression springs 211, the latter being held thereon by a washer and nut 212. The hub 203 is restrained against axial movement on the end 202 of the crank shaft by a cap plate 213 and an attaching stud bolt 214 which is secured in threaded engagement in an aperture in the crank shaft. The clamp plate 207 is provided with an upstanding pin 215 to facilitate turning the shaft 133 manually. The flywheel 204 is connected by suitable drive belts or chains 216 with the pulley 217 on the drive shaft of an operating motor 218 which is mounted on a supporting structure indicated at 219 within the rear end of the main frame 13.

The crank shaft 133 is connected in driving relation with the oppositely disposed crank shaft 135 by means of a pair of helical gears 220 (Figs. 1, 2, 3 and 8) which are keyed to the shafts 133 and 135, respectively, above thrust bearings 221, the latter being provided between the top of the lower bearing block 194 and the lower faces of the gears 220. The shafts 132 and 134 are connected in driving relation by another pair of helical gears 220 and the paired gears are interconnected in driving relation by a pinion 222 (Figs. 1 and 3) which is rotatably mounted on a pinion shaft 223 which is secured in vertically extending relation in a side portion of the upper bearing block 191.

The space between the upper and lower bearing blocks 191 and 194 constitutes a crank case in which there is maintained a supply of lubricating oil indicated at 224. Each pair of the helical gears 220 functions to pump lubricating oil upwardly from the supply 224 and distribute it throughout the operating parts. Oil grooves 225 are provided in the lower face of the bearing block 191 (Fig. 3) which extend from the pitch lines at the point of contact of the helical gears 220, where they receive oil from the gears, to the bearing sleeves 192 where they connect with grooves 226 which extend axially of the sleeves and which connect with circumferential oil grooves 227 on the internal surface at the upper end of the bearing sleeves 192. The crank shafts are each provided with oil passageways which include a radial passageway 228 and a connecting axial passageway 229 which connects the oil groove 227 in the bearing sleeve 192 with an axial recess 230 at the upper end of the shaft. The recess 230 is in turn connected by a radially extending passageway 231 with a circumferential groove 232 on the upper internal surface of a bushing 233 which is provided between the eccentric and the bearing aperture in the respective die holder in which it is seated. The bushing 233 has a vertical oil groove 234 and a lower circumferential groove 235 which provides a passageway for the oil, the groove 235 connecting with a radial passageway 236 in the shaft. The radial passageway 236 connects with an axial passageway 237 in the shaft which connects with a lower radial passageway 238 and through the latter returns the oil to the crank case through the thrust bearing 221. The passageway 237 is bored from the upper end of the shaft 139 and its entrance end is plugged or otherwise closed to prevent it from draining the recess 230. Each shaft 232, 233, 234 and 235 has an upper end cap 239 and also a cover member 240 which will retain oil escaping from the recess 230.

The die holders 130 and 131 are provided at their opposite ends with flat ring members 241 which are rigidly secured by welding or the like in suitable grooves provided in the bottom faces of the die holders. Each of the rings 241 forms part of an oil seal between the moving die holders 130 and 131 and the stationary bearing block 191. The other parts of the seal are fixed on the block 191 around the top of each of the shaft bearing sleeves 192. Oil retainer members 242 are secured to the top surface of the bearing block 191 and surround the projecting upper edge of the bearing sleeves or bushings 192. Retainer members 242 are each provided with a groove or recess 243 in the upper edge for receiving a wiper ring 244 which engages with the bottom surface or overlying portions of the ring member 241 and prevents leakage of oil between the moving die holders and the bearing block 191.

The ring members 241 also extend over the bottom ends of the die receiving recesses 146 and 147 in the inner faces of the die holders 130 and 131 and form a bottom support for the dies 144 and 145 (Fig. 4). One or more spacer blocks 245 may be positioned beneath the dies to adjust the height of the same as required by the length of the shank portion 12 of the blank 10.

A channel-shaped block 246 (Fig. 13) is secured by bolts or other fasteners 247 to the top of the bearing block 191 between each pair of longitudinally aligned ring members 241 with its open face engaged against the top surface of the bearing block 191 to form a passageway 248 for any oil which escapes around the top of sleeves 192 and vertical holes 249 are provided in the block 191 which connect the passageway 248 with the crank case for return of the oil to the latter, the sealing ring members being provided with radial passageways 250 connecting with passageway 248.

In operating the machine a supply of work blanks 10 is dumped into the hopper 23 of the feed mechanism 15 in scrambled condition. The feed mechanism 15 unscrambles the blanks 10 and arranges them in row formation on the guide rails 25 of the feed chute 17. As the blanks move down the inclined chute 17 in abutting relation the blank stop member 155 adjacent the foot of the chute 17 interrupts the movement of the blanks while preceding blanks are being forwarded to the pointing dies 144 and 145 by the spacer finger 165 and the feed plates

176 and 179 which advance successive blanks in spaced relation beyond the blank stop member 155. The spacer finger 165 is moved by operation of the die carrier 130 in a path which brings it to the rear of the blank stop 155 and into engagement with the blank 10 which is engaged with the blank stop. The spacer finger 165 is moved forwardly and advances the blank 10 past the blank stop 155, forcing the latter out of its way. The finger 165 moves the blank to a position where it is spaced the required amount ahead of the blank stop 155 to be picked up by the rearmost finger 178 on the feed plate 176 as the latter is moved in its orbit by the die holder 130. The blanks 10 are held against upward movement by the shoes 78, 79 on the hold-down device 70 which resiliently engage the head portions 11 on the blanks as they are advanced beneath the same. The pointing dies 144 and 145 are carried towards each other and point the end of the shank 12 of a blank 10 when they are in a plane extending through the axes of the forward crank shafts 133 and 135. They are positioned relative to the path of the blanks 10 so that they engage with the shank ends of successive blanks 10 as the latter are moved into proper position for the pointing operation by the feed plate 176 and held against upward movement by the shoe 79. As the dies 144 and 145 advance in their orbits the foremost finger 178 on the feed plate 176 moves the finished blank 10 forward and the latter is discharged into the chute 20 which carries it to the finished blank pan 21. The mechanisms are operated at a relatively high speed to point successive blanks as they are automatically moved through the same in a continuous stream.

An alternative form of blank spacing and forwarding mechanism is illustrated in Figs. 15 to 18, inclusive. In this form of the machine the die holders or support members 330 and 331 and the pinching die members 344 and 345 are identical with the corresponding members 130, 131 and 144, 145 in the form of the machine previously described. Also they are located in the same position relative to the blank supporting devices and operated in the same manner so that rotation of the vertical crank shafts on which the die holders 330 and 331 are mounted moves the die members 344 and 345 continously in closed paths on opposite sides of the path of movement of the shank or stem portions 12 of the blanks and intermittently positions the dies 344 and 345 in cooperating pinching engagement with the ends of successive blanks for forming points on the same. The position of the dies 344 and 345 at which the pinching occurs is illustrated in Fig. 14 while succeeding positions of the same in the direction of advancing movement thereof, as they travel in their respective orbits, are illustrated in Figs. 16, 17 and 18.

The blanks are fed to the machine and advanced toward the pointing station in the same manner as previously described. They are spaced relative to each other along the blank guiding and supporting members below which the shanks 12 extend by a spacing finger 365 which is resiliently mounted on the die holder 330 in the same manner as the spacer finger 165 and moves with the die holder 330 in an identical path to engage the rear of the shank 12 of the blank which is temporarily stopped by the spring pressed blank stop member indicated at 355. The spacer finger 365 moves each successive blank a predetermined distance to a position in advance of the blank stop member 355 where it is picked up and carried forward by a single feed plate 376. The feed plate 376 is similar to feed plate 176 and is secured to the top surface of the die holder 330 immediately above the die 344 by bolts 377 or other fasteners. The inner edge of the feed plate 376 is provided with spaced fingers 378 which are separated by inwardly extending generally V-shaped recesses or slots 379. The forward edges of the fingers 378 which are adapted to engage with the blanks extend transversely of the path of advancing movement of the blanks and in all but the leading finger 378 terminate at their inner ends in a rounded edge portion forming the bottom or apex of the V-shaped slot 379 which separates it from the next adjacent finger 378. The plate 376, of course, moves with the die holder 330 and the spacer finger 365, in a closed path, and in each cycle of movement advances the spaced blanks a distance corresponding to the space between the blanks, the leading finger 378 engaging the blank which has been pointed during the previous cycle of operation and moving it away from the pinching position and the next finger 178 engaging the following blank and moving it into pinching position. In this form of the machine the blanks are forwarded or advanced at the pinching station by a single feed plate 376 carried on the die holder 330, the shanks 12 of the blanks being otherwise held in alignment by the hold-down devices cooperating with the guideway forming chute extensions on which the blanks are supported and the feed plate 179 which is shown in the previously described machine is omitted. All other parts and operations of the machine are as in the previously described form thereof.

While specific details of construction have been referred to in describing the illustrated forms of the machine it will be understood that other details of construction may be resorted to within the spirit of the invention. Also it will be understood that while the machine is designed particularly to point screw blanks it may be employed with suitable adjustments to change the shape of any other blank of a similar character and of similar material which is capable of being shaped between cooperating die members.

I claim:

1. A machine for pointing workpieces which are characterized by a head portion and an integral shank portion, means for supporting a plurality of the workpieces for movement in a predetermined path, said workpieces being supported with the shank portion depending from the head portion, a pair of pointing dies mounted on movable die supporting members at opposite sides of the path of movement of said workpieces, means for reciprocating said die supporting members in oppositely disposed generally circular paths whereby to bring the dies thereon into cooperative engagement with successive workpieces, means associated with said die supporting members for separating the workpieces and spacing the same along said path as they approach the dies, and means mounted on said die supporting members for advancing the workpieces while they are in spaced relation between said dies.

2. A machine for pointing workpieces which are characterized by a head portion and an integral shank portion, guiding and supporting means for a plurality of the workpieces, said workpieces being arranged on said guiding and supporting means for advancing movement in single file relation, means cooperating with said supporting means for temporarily interrupting the advancing movement of said workpieces, cooperating pinching dies, movable supporting means for said pinching dies arranged on opposite sides of the path of movement of the workpieces, means for moving said die supporting means in generally circular paths to reciprocate the dies in timed relation to the advancing movement of the workpieces and means on said die supporting means for engaging a plurality of the workpieces and advancing the same simultaneously with the movement of the dies.

3. A machine for pointing workpieces which are characterized by a head portion and a shank portion, said machine comprising a supply device for unscrambling the workpieces and delivering the same in single file formation with the shanks thereof in depending relation, a pointing station, means for supporting the work pieces at said pointing station, a delivery chute for supporting and guiding the workpieces between the supply device and the pointing station, means at the pointing station for separating the workpieces as they advance toward the

same into longitudinally spaced single file relation, die pointing members, holders for said die pointing members, means at said pointing station and on opposite sides of the path of advancing movement of the workpieces for mounting the holders for movement in generally circular closed paths, and means for moving the holders in their paths whereby to engage the die pointing members with the shank ends of successive workpieces.

4. In a machine for pointing the ends of workpieces which are each characterized by a shank portion and a head portion of larger diameter than the shank portion, means for supporting the heads of a plurality of the workpieces for movement in single file formation along a predetermined horizontal path, a pair of pointing dies positioned laterally on opposite sides of said path, a pair of movably mounted supporting members for said dies, means for moving said die supporting members horizontally in non-linear closed paths to intermittently bring the dies toward each other into cooperative opposed pinching engagement with the depending ends of the shank portions of successive workpieces, and means for moving said workpieces along said supporting means in timed relation to the movement of said dies and into position for engagement between said dies.

5. In a machine for pointing the ends of workpieces which are each characterized by a shank portion and a head portion, means for supporting a plurality of the workpieces for movement in single file formation along a predetermined generally horizontal path with the shank portions in depending relation, a pair of pointing dies positioned on opposite sides of said path, a pair of supporting members for said dies mounted for movement in closed generally circular paths, eccentric means for moving said die supporting members to intermittently bring the dies into cooperative pinching engagement with successive workpieces, means along said supporting means for separating said workpieces into predetermined spaced relation and means connected with said die supporting members for moving said workpieces along said supporting means in timed relation to the movement of said dies whereby to position the shanks of successive workpieces between said dies.

6. In a machine for pinchpointing the ends of work blanks which are each characterized by a shank portion and a head portion, means for supporting a plurality of the work blanks for movement in single file formation along a predetermined path with the shank portions in depending relation therefrom, a pointing station, a pair of pointing dies positioned on opposite sides of said pointing station, a pair of supporting members for said dies, means for moving said supporting members in oppositely disposed curved paths to intermittently bring the dies into cooperative pinching engagement with the shanks of successive work blanks at the pointing station, means at the pointing station for spacing the work blanks on said supporting means and for advancing said work blanks toward said pointing station in spaced relation, and means for operating said work blank advancing means in synchronized relation with the movement of said die supporting members.

7. In a machine for pointing the ends of work blanks which are each characterized by a shank portion and a head portion, means for supporting a plurality of the work blanks for movement in a single file formation along a predetermined path with the shank portions in depending relation, a pair of pointing dies positioned on opposite sides of said path below said supporting means, a pair of die holders, means for supporting said die holders for movement in closed generally circular paths, means for moving said die holders continuously to intermittently bring the dies into cooperative pinching engagement with successive work blanks, a work blank separating member mounted on one of said die holders and movable therewith intermittently into the path of movement of the work blanks to separate the work blanks and space the same in the direction of the advancing movement thereof, and finger means on one of said die holders for engaging intermittently with the spaced work blanks and for advancing the same to position successive blanks for engagement between said dies.

8. In a machine for pointing the ends of work blanks which are each characterized by a shank portion and a head portion, a pair of spaced supporting rails for guiding and supporting the work blanks as they advance in single file formation along a predetermined path, a pair of pointing dies positioned on opposite sides of said path for movement beneath said rails, die holders mounted for reciprocation in oppositely disposed closed generally circular paths, means for reciprocating said die holders to intermittently bring the dies into cooperative pinching engagement with successive work blanks, a spring pressed finger mounted on one of said die holders for intermittently engaging with successive work blanks and for separating the same to align them in spaced relation along said path, a plate member having a plurality of projecting fingers mounted on said die holder and movable into and out of the path of movement of said work blanks to advance the same in spaced relation along said path whereby to position successive work blanks for engagement between said dies.

9. In a machine for forming the point on the ends of work blanks which are each characterized by a head and a depending shank portion, a pointing station, a pair of supporting rails for guiding and supporting the heads of a plurality of the work blanks as they advance in single file formation toward the pointing station, a pair of dies mounted at the pointing station beneath said rails, a pair of die holders mounted for movement in closed generally circular paths on opposite sides of said rails, means for moving the die holders to intermittently engage the dies in pinching relation with a work blank positioned at said pinching station, a resilient stop member mounted on one of said rails and projecting between said rails for temporarily stopping the movement of the work blanks, a separating finger on one of said die holders which is intermittently movable into the path of movement of the work blanks to separate successive blanks and space the same along said supporting rails, a multiple finger forwarding plate mounted on one of said die holders and movable into the path of movement of the work blanks for advancing a plurality of the work blanks in spaced relation along said rails whereby to position successive blanks at the pointing station for the pointing operation and thereafter to move the completed blank forwardly away from the pointing station.

10. In a machine for pinch pointing work blanks which have a head portion and a shank portion, a pointing station, a pair of supporting members for guiding and supporting the heads of a plurality of the blanks as they are advanced to the pointing station, a pair of pointing dies mounted for movement at said station on opposite sides of the path of movement of the work blanks, a pair of movable holder members for said dies, means for moving said holder members in a closed generally circular path to intermittently bring the dies into cooperative pinching engagement with successive work blanks positioned at the pinching station, a blank separating member mounted on one of said holders for separating the blanks and spacing the same along said supporting members, a blank advancing member mounted on one of said holder members, said blank advancing member having a plurality of projecting fingers which are adapted to move into the path of the blanks and to advance a series of the spaced blanks to and beyond the pinching station, a hold-down device having a plurality of hold-down shoes engaging the tops of the blanks as they advance through the pinching station.

11. In a machine for pointing headed screw forming blanks, a work station, a feed mechanism for delivering blanks to the work station in single file relation, a slotted

blank supporting and guiding device extending along said work station, means for advancing the blanks in predetermined spaced relation through the slot in said supporting and guiding device, a pair of pinch pointing dies arranged at said work station in laterally disposed relation beneath said blank supporting and guiding device for movement in a plane normal to the long axis of the blanks, die carriers mounted at said work station for orbital movement on opposite sides of the slot in said blank supporting and guiding device, and means for moving said die carriers in timed relation to the movement of the blanks to engage the depending ends of successive blanks between said pointing dies.

12. In a machine for pointing work blanks of the head and shank type, a work station, a feed mechanism for delivering blanks in a single line, a slotted blank supporting and guiding device for said blanks at said work station, means for advancing the blanks in predetermined spaced relation through the slot in said supporting and guiding device, a pair of relatively movable pinch pointing dies arranged adjacent said blank supporting and guiding device, die carriers, means for moving said carriers in orbital paths which are oppositely disposed relative to each other and to the slot in said blank supporting and guiding device, and an eccentric connection between said rotatable means and said die carriers whereby to intermittently engage said pointing dies with the depending ends of successive blanks.

13. A machine for pointing blanks of the head and shank type comprising a work station, a feed mechanism for delivering blanks in single file relation toward the work station, a slotted blank supporting and guiding device at said work station, means for arranging the blanks in predetermined spaced relation and for advancing the blanks through the slot in said supporting and guiding device, a pair of pinch pointing dies arranged adjacent said supporting and guiding device, die carriers mounted for movement in laterally disposed closed circular paths on opposite sides of the slot in said blank supporting and guiding device, means for moving said die carriers in timed relation to the movement of said blank advancing means, and means along said blank supporting and guiding device for holding said blanks in alignment at said work station whereby the ends of successive blanks are engaged between said pointing dies and a point is formed thereon.

14. A machine as recited in claim 13 wherein said means for holding said blanks in alignment comprises a plurality of hold-down shoes mounted adjacent said blank supporting and guiding device in position for engaging the heads of the blanks which are supported on the latter.

15. A machine as recited in claim 14 wherein said hold-down shoes have resilient means for urging the same toward said blank supporting and guiding device.

16. A machine for pointing workpieces which are characterized by a head portion and an integral shank portion, said machine comprising a work station, means for supporting a plurality of the workpieces for movement to said work station in a predetermined horizontal path with the shank portions thereof in depending relation, a pair of pinching dies at said work station, holders for said dies mounted for movement in a horizontal plane on opposite sides of the path of movement of said workpieces, means for continuously moving said die holders in closed generally circular paths to intermittently bring said dies into point forming engagement with the shank ends of successive workpieces, and means for advancing said workpieces intermittently in predetermined spaced single file relation along said supporting means to said work station whereby to position successive workpieces between said dies for engagement thereby.

17. A machine for pointing work blanks which are characterized by a head portion and an integral shank portion extending therefrom, means for supporting a plurality of the work blanks with their shank portions in depending relation therefrom, pinching dies arranged on opposite sides of the work blank supporting means, holders for said pinching dies, means supporting said holders for generally circular movement to intermittently bring the pinching dies into cooperative point forming relation, means for advancing the blanks along the path provided by said supporting means to position successive blanks for engagement of the ends of the shank portions by the pinching dies, and resilient means along said blank supporting means for engaging the heads of the blanks to maintain the same in proper alignment while they are being advanced to and beyond said pinching dies and means to operate the blank advancing means and the die holders in synchronized relation.

18. A machine for pointing work blanks which are characterized by a head portion and an integral shank portion extending therefrom, means forming a guideway for supporting a plurality of the work blanks with their shank portions extending in depending relation therein, pinching dies arranged in laterally disposed relation beneath said guideway forming means, holders for said pinching dies, means supporting said holders for predetermined movement in curved paths to intermittently bring the pinching dies into cooperative point forming relation, means for advancing the work blanks along said guideway forming means to position the shanks of successive blanks for engagement of the ends thereof by the pinching dies, and resilient means above said guideway forming means for engaging the work blanks to maintain the shanks in proper vertical alignment while they are being advanced and pointed and means to operate the die holders in synchronized relation with the work blank advancing means.

19. A machine for pointing work blanks which are characterized by a head portion and an integral shank portion extending therefrom, means engaging the heads of a plurality of the work blanks for supporting the same with their shank portions in depending relation therefrom, pinch pointing dies arranged adjacent the blank supporting means, holders for said pointing dies, means supporting said holders for movement in a plane normal to the long axis of the shank portions of said blanks to intermittently bring the pointing dies into opposed cooperative point forming relation, means for advancing the work blanks to position successive blanks for engagement of the shank ends between the pointing dies, and means along the blank supporting means for resiliently engaging the heads of the work blanks to maintain the shanks thereof in proper alignment while they are being advanced to and beyond said pointing dies and means to operate the die holders in synchronized relation with the work blank advancing means.

20. A machine for pointing work blanks which are characterized by a head portion and an integral shank portion, means for supporting a line of the work blanks with their shank portions extending laterally of the direction of movement thereof and in parallel planes, pinching dies arranged adjacent the blank supporting means, holders for said pinching dies, continuously rotating means connected with said die holders for moving the same in oppositely disposed generally circular closed paths to intermittently bring the dies into cooperative blank pinching relation, means for advancing the blanks along said supporting means to position successive blanks for engagement of the ends of the shank portions by the dies, means for engaging the heads of the blanks to maintain the same in alignment as they are advanced to and between the dies and means to operate the blank advancing means and the die holder rotating means in synchronized relation.

21. In a machine for forming points on the ends of work blanks which are each characterized by a head and a shank portion extending therefrom, a pointing station, a pair of laterally spaced supporting rails for guiding and supporting a plurality of the blanks as they advance in

single file formation toward the pointing station, a pair of dies mounted at the pointing station adjacent said rails, a pair of die holders, means for moving the die holders in closed circular paths which extend at the pointing station on opposite sides of the path of movement of said blanks for intermittently engaging the dies in pinching relation with a work blank positioned at said station, a resilient stop member mounted on one of said rails for temporarily stopping the movement of the work blanks, a starter finger on one of said die holders which is intermittently movable into engagement with successive blanks to resume the movement of the blanks and to space the same along said supporting rails, a pair of multiple finger forwarding plates mounted on said die holders and movable therewith into the path of movement of the work blanks for advancing a plurality of the spaced work blanks simultaneously along said rails whereby to position successive blanks at the pointing station for the pointing operation and thereafter to move the completed blanks forwardly towards the discharge end of the machine.

22. In a machine for forming points on the ends of work blanks which are each characterized by a head and a shank portion, a pointing station, a pair of spaced supporting members for guiding and supporting a plurality of the blanks as they advance in single file formation toward the pointing station, a pair of dies mounted at the pointing station adjacent said members, a pair of die holders mounted for movement in closed circular paths on opposite sides of the path of said blanks, means for moving the die holders to intermittently engage the dies in pitching relation with a work blank positioned at said station, a retractable stop member resiliently mounted on one of said blank supporting members and projecting between the same for temporarily stopping the movement of the blanks, a separating finger on one of said die holders which is intermittently movable therewith into the path of movement of the work blanks to move successive blanks into spaced relation along said supporting members, a forwarding plate having spaced grooves on its inner end mounted on one of said die holders and movable into the path of movement of the work blanks for engaging a plurality of the work blanks in said grooves and for advancing the same in spaced relation along said supporting members whereby to position successive blanks at the pointing station for the pointing operation and thereafter to move the completed blanks forwardly away from the pointing station.

23. In a machine as recited in claim 22 and said separating finger being retractably mounted in a recess in said die holder and having resilient means for urging it toward the path of movement of said blanks.

24. In a machine for pinch pointing work blanks of the type which have a head portion and a shank portion, a supporting frame providing a pointing station, a pair of supporting bar members for guiding and supporting a plurality of the blanks as they are advanced to the pointing station, a pair of pointing dies mounted for movement at said station on opposite sides of the path of movement of the work blanks, a pair of holder members for said dies, means mounting said die holder members for movement in generally circular closed paths to intermittently bring the dies into cooperative pinching engagement with successive work blanks positioned at the pointing station, means for supplying blanks to said supporting bar members, a blank separating member mounted on one of said die holders for separating the blanks and spacing the same along said supporting bar members, blank advancing means including a plurality of projecting fingers which are adapted to move into the path of the blanks and to advance a series of the spaced blanks to and beyond the pointing station, and an adjustably mounted hold-down device above said blank supporting bar members for engaging the tops of the blanks as they advance along the same through the pointing station.

25. In a machine for pinch pointing work blanks which have a head portion and a shank portion, a pointing station, a pair of supporting members for guiding and supporting a plurality of the blanks as they are advanced to the pointing station, a pair of pointing dies mounted for movement at said station on opposite sides of the path of movement of the work blanks, a pair of holder members for said dies, means mounting said die holder members for movement in oppositely disposed generally circular closed paths to intermittently bring the dies into cooperative pinching engagement with successive work blanks positioned at the pointing station, a blank separating member mounted on one of said holders for separating the blanks and spacing the same along said supporting members, a blank advancing member mounted on one of said holder members and having a plurality of spaced projecting fingers which are adapted to move into the path of the blanks and to advance a series of the spaced blanks to and beyond the pointing station, and a hold-down device for engaging the blanks as they advance through the pointing station, said hold-down device comprising a bar adjustably mounted above said blank guiding and supporting members and having spaced vertical recesses therein, a plurality of pins mounted in said recesses, spring members urging said pins toward said blank supporting members and shoes on said pins for engaging with the heads of the blanks on said supporting members.

26. In a metal working machine for shaping workpieces, a pair of shaping dies, a pair of carrier members for movably mounting said dies, a pair of vertical shafts for each of said carriers, a frame having spaced upper and lower bearing blocks, means cooperating with said bearing blocks to form an oil chamber between the same, bearing sleeves in said bearing blocks for receiving said vertical shafts, means to rotate one of said shafts, connecting drive means between said shafts, said connecting drive means comprising pairs of helical gears, said helical gears being mounted on said shafts in the space between said bearing blocks and each pair thereof being arranged to force oil upwardly between their contacting teeth, and connecting oil passageways in said shafts and said bearing sleeves above said pairs of helical gears which receive oil from said gears and provide circulation thereof upwardly out of the oil chamber to the top of the shafts and then downwardly to the oil chamber.

27. In a machine having pairs of shafts journaled in spaced bearing blocks which form therebetween a lubricating oil supply chamber, each pair of said shafts being connected by a pair of helical drive gears mounted thereon, said pair of gears being rotated to pick up oil in the supply chamber and force the same upwardly between the working surfaces of the teeth, connecting oil passageways in the upper bearing block and the shafts for receiving the oil from the helical gears and for conveying the same to the journals of the machine.

28. In a machine having a frame provided with a bearing block, vertical bearing formations in said bearing block, means forming a lubricating oil chamber beneath said bearing block, vertical shafts mounted in said bearing formations, a pair of helical drive gears on said shafts and engaging with the lower face of said bearing block, said bearing block having oil grooves in the face engaging with said gears, and connecting passageways in said bearing formations and said shafts forming a circulating system for lubricating said shafts, said helical gears operating as a pump to force oil from said chamber through said circulating system.

29. In a machine for forming points on the ends of work blanks which are each characterized by a head and a shank portion extending therefrom, a pointing station, a pair of laterally spaced supporting rails for guiding and supporting a plurality of the blanks as they advance in single file formation toward the pointing station, a pair of dies mounted at the pointing station adjacent said rails, a

pair of die holders, means for moving the die holders in closed generally circular paths which extend at the pointing station on opposite sides of the path of movement of said blanks for intermittently engaging the dies in pinching relation with a work blank positioned at said station, a resilient stop member mounted on one of said rails for temporarily stopping the movement of the work blanks, a starter finger on one of said die holders which is intermittently movable into engagement with successive blanks to resume the movement of the blanks and to space the same along said supporting rails, a multiple finger forwarding plate mounted on one of said die holders and movable therewith into the path of movement of the work blanks for advancing a plurality of the spaced work blanks simultaneously along said rails whereby to position successive blanks at the pointing station for the pointing operation and thereafter to move the completed blanks forwardly towards the discharge end of the machine.

30. In a machine for forming points on the ends of work blanks which are each characterized by a head and a shank portion extending therefrom, a pointing station, a pair of laterally spaced supporting rails for guiding and supporting a plurality of the blanks as they advance in single file formation toward the pointing station, a pair of dies mounted at the pointing station adjacent said rails, a pair of elongated die holders, pairs of vertical shafts for supporting the die holders, eccentric connections between the vertical shafts and the ends of the die holders whereby upon rotation of the shafts the die holders move in closed paths which extend at the pointing station on opposite sides of the path of movement of said blanks for intermtitently engaging the dies in pinching relation with a work blank positioned at said station, a resilient stop member mounted on one of said rails for temporarily stopping the movement of the work blanks, a starter finger on one of said die holders which is intermittently movable into engagement with successive blanks to resume the movement of the blanks and to space the same along said supporting rails, a multiple finger forwarding plate mounted on one of said die holders and movable therewith into the path of movement of the work blanks for advancing a plurality of the spaced work blanks simultaneously along said rails whereby to position successive blanks at the pointing station for the pointing operation and thereafter to move the completed blanks forwardly towards the discharge end of the machine.

31. In a machine for forming points on the ends of work blanks which are each characterized by a head and a shank portion extending therefrom, a pointing station, a pair of laterally spaced supporting rails for guiding and supporting a plurality of the blanks as they advance in single file formation toward the pointing station, a pair of dies mounted at the pointing station adjacent said rails, a pair of elongate die holders, parallel vertical shafts for supporting said die holders, said shafts being arranged in generally rectangular formation with a shaft extending through a bearing aperture at each end of a die holder, eccentric bearing connections between the shafts and the die holders, means for rotating the shafts simultaneously to move the die holders in closed paths which extend at the pointing station on opposite sides of the path of movement of said blanks whereby to intermittently engage the dies in pinching relation with a work blank positioned at said station, a resilient stop member mounted on one of said rails for temporarily stopping the movement of the work blanks, a starter finger on one of said die holders which is intermittently movable into engagement with successive blanks to resume the movement of the blanks and to space the same along said supporting rails, a multiple finger forwarding plate mounted on one of said die holders and movable therewith into the path of movement of the work blanks for advancing a plurality of the spaced work blanks simultaneously along said rails whereby to position successive blanks at the pointing station for the pointing operation and thereafter to move the completed blanks forwardly towards the discharge end of the machine.

32. In a machine for forming points on the ends of work blanks which are each characterized by a head and a shank portion extending thereform, a pointing station, a pair of laterally spaced supporting rails for guiding and supporting a plurality of the blanks as they advance in single file formation toward the pointing station, a pair of dies mounted at the pointing station beneath said rails, a pair of elongate die holders of generally rectangular cross section, oppositely disposed pairs of vertical shafts, each pair of shafts having eccentrics on their upper ends which connect with the opposite ends of a die holder whereby rotation of the shafts moves the die holders in closed paths which extend at the pointing station on opposite sides of the path of movement of said blanks for intermittently engaging the dies in pinching relation with a work blank positioned at said station, a resilient stop member mounted on one of said rails for temporarily stopping the movement of the work blanks, a starter finger on one of said die holders which is intermittently movable into engagement with successive blanks to resume the movement of the blanks and to space the same along said supporting rails, a multiple finger forwarding plate mounted on one of said die holders and movable therewith into the path of movement of the work blanks for advancing a plurality of the spaced work blanks simultaneously along said rails whereby to position successive blanks at the pointing station for the pointing operation and thereafter to move the completed blanks forwardly towards the discharge end of the machine.

33. In a machine for forming points on the ends of work blanks which are each characterized by a head and a shank portion extending therefrom, a pointing station, a pair of laterally spaced supporting rails for guiding and supporting a plurality of the blanks as they advance in single file formation toward the pointing station, a pair of dies mounted at the pointing station adjacent said rails, a pair of die holders, means for moving the die holders in closed generally circular paths which extend at the pointing station on opposite sides of the path of movement of said blanks for intermittently engaging the dies in pinching relation with a work blank positioned at said station, a resilient stop member mounted on one of said rails for temporarily stopping the movement of the work blanks, a starter finger on one of said die holders which is intermittently movable into engagement with successive blanks to resume the movement of the blanks and to space the same along said supporting rails, blank forwarding plates mounted in opposed relation on said die holders, said plates each having a plurality of blank engaging fingers adapted to move into the path of advancing movement of the spaced blanks, the fingers on one of said plates being staggered relative to the fingers on the opposed plate so that a plurality of the blanks are engaged between cooperating pairs of said fingers and said blanks are advanced simultaneously along said rails whereby to position successive blanks at the pointing station for the pointing operation and thereafter to move the completed blanks forwardly towards the discharge end of the machine.

34. In a machine for forming points on the ends of work blanks which are each characterized by a head and a shank portion extending therefrom, a pointing station, a pair of laterally spaced supporting rails for guiding and supporting a plurality of the blanks as they advance in single file formation toward the pointing station, a pair of dies mounted at the pointing station adjacent said rails, a pair of die holders, means for moving the die holders in closed generally circular paths which extend at the pointing station on opposite sides of the path of movement of said blanks for intermittently engaging the dies in pinching relation with a work blank positioned at said station, a resilient stop member mounted on one

of said rails for temporarily stopping the movement of the work blanks, a starter finger on one of said die holders which is intermittently movable into engagement with successive blanks to resume the movement of the blanks and to space the same along said supporting rails, a plurality of opposed blank engaging fingers mounted on the respective die holders and movable with the latter into the path of movement of the blanks, the fingers on one of said die holders being movable into engagement with the trailing sides of a plurality of the spaced blanks and the fingers on the other one of said die holders being movable into engagement with the leading sides of the spaced blanks whereby to hold the blanks between the fingers while advancing the same along said rails to position successive blanks at the pointing station for the pointing operation and thereafter to move the completed blanks forwardly towards the discharge end of the machine.

35. In a machine for pointing workpieces, a pointing station, means for advancing workpieces to the pointing station, die pointing members, holders for said die pointing members, and means for moving the holders in orbital paths on opposite sides of workpieces at the pointing station whereby to move the die pointing members intermittently into cooperative relation for engaging successive workpieces to point the same.

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