May 13, 1947. E. T. NORD 2,420,613

WORK-MARKING ASSEMBLY FOR MACHINE TOOLS

Original Filed July 26, 1943 3 Sheets-Sheet 1

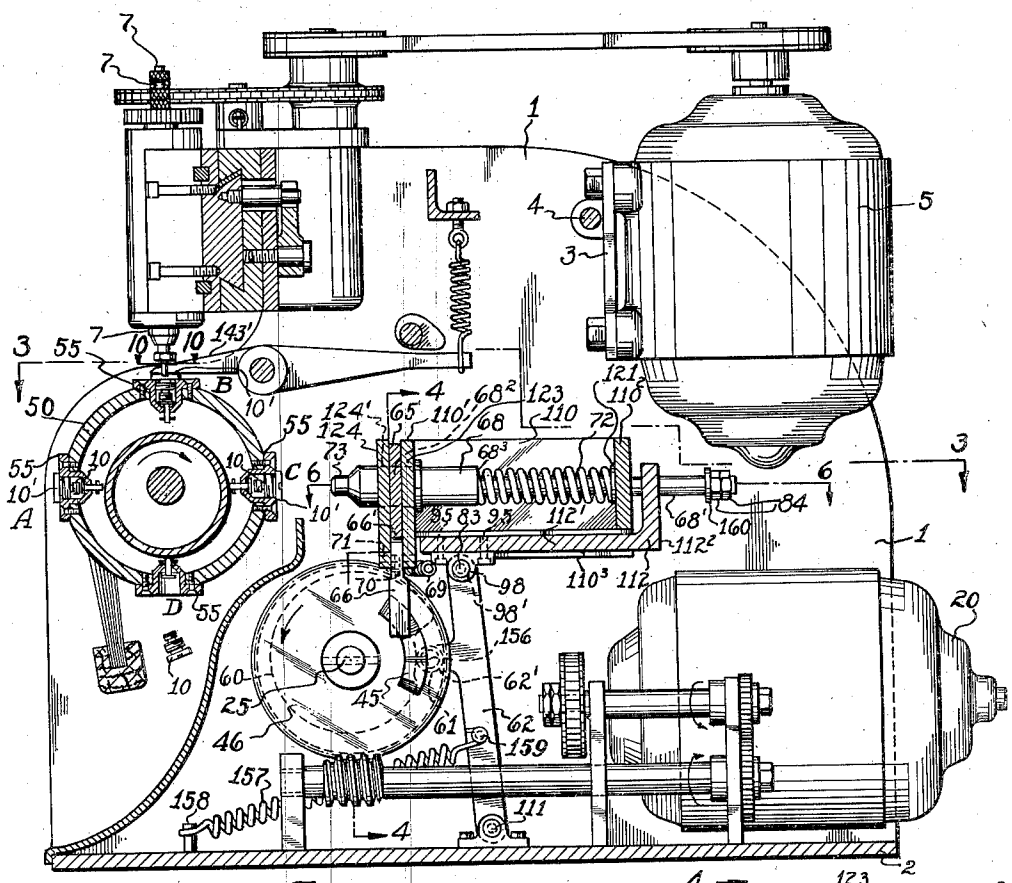


FIG. 1

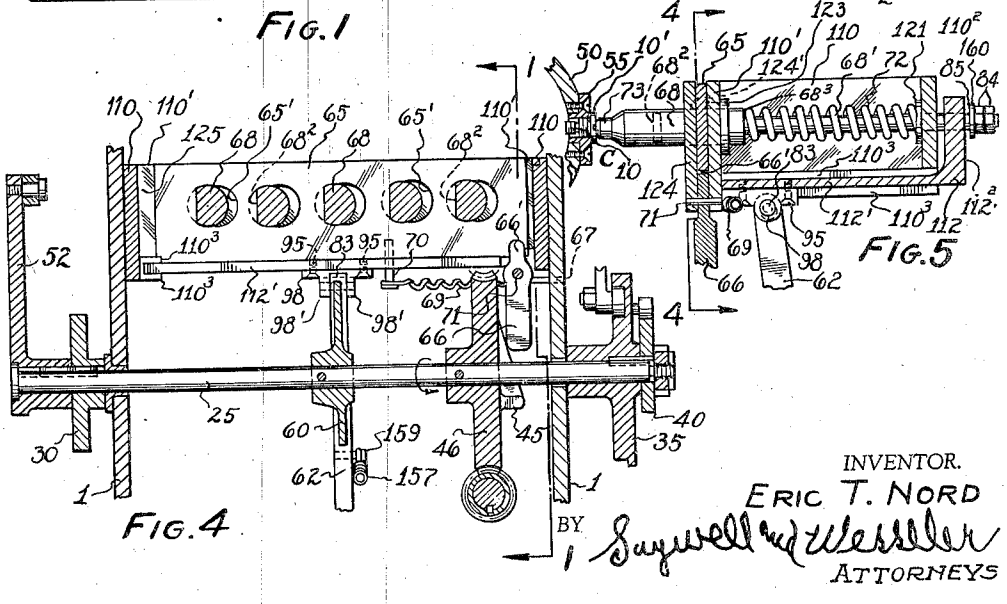


FIG. 4

FIG. 5

INVENTOR.
ERIC T. NORD
BY Sayrell and Wessler
ATTORNEYS

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WORK-MARKING ASSEMBLY FOR MACHINE TOOLS

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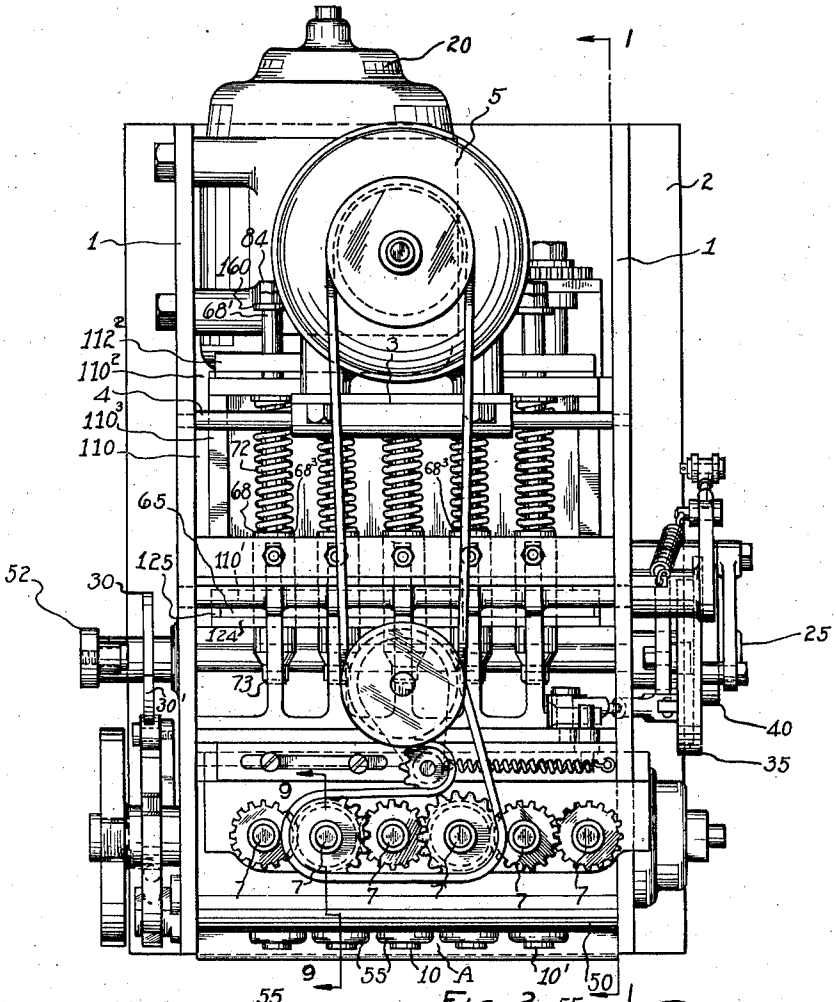


FIG. 2

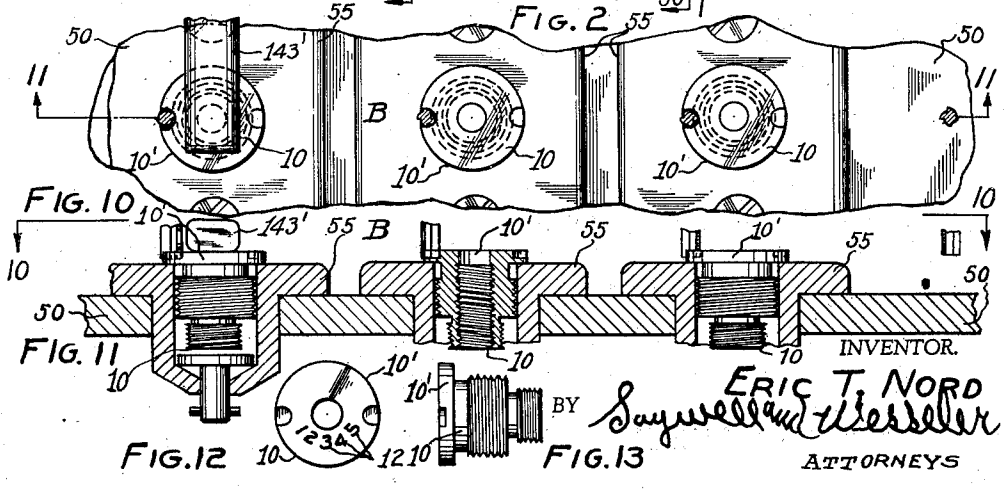


FIG. 10

FIG. 11

FIG. 12

FIG. 13

INVENTOR.
ERIC T. NORD
BY Sayre, Williams & Wesseler
ATTORNEYS

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WORK-MARKING ASSEMBLY FOR MACHINE TOOLS

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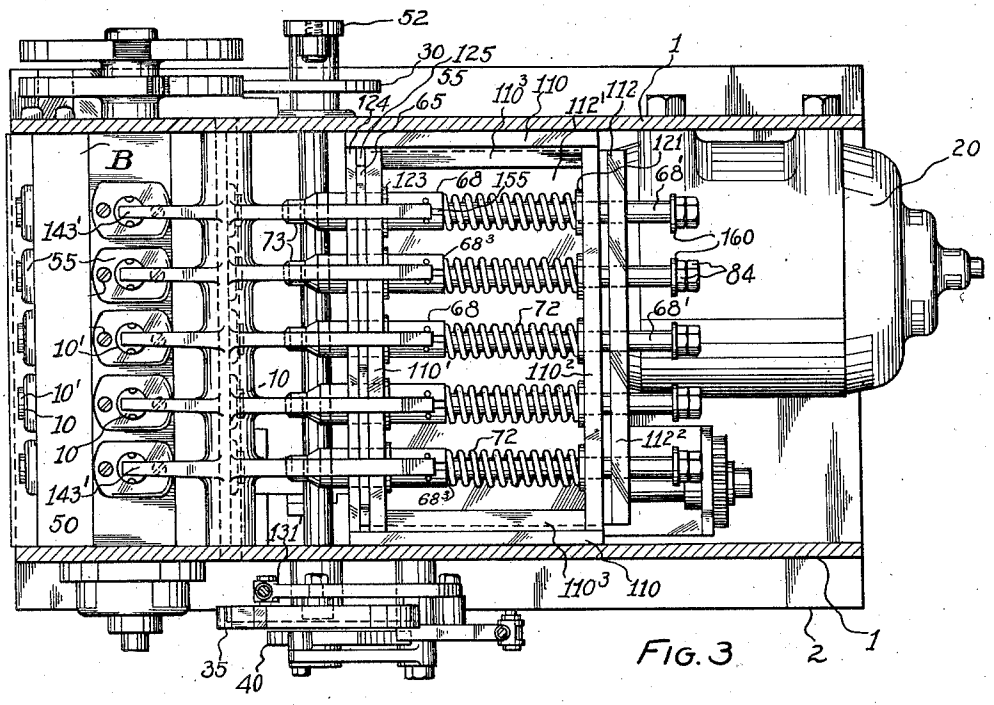


FIG. 3

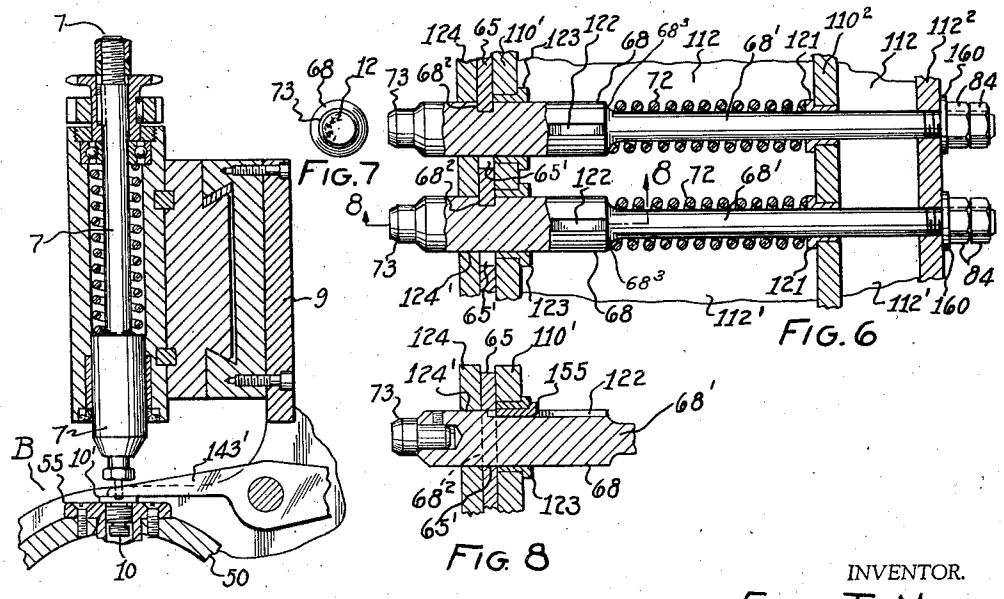


FIG. 7

FIG. 6

FIG. 8

FIG. 9

INVENTOR.
ERIC T. NORD
BY Sayrell and Wessler
ATTORNEYS

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UNITED STATES PATENT OFFICE

2,420,613

WORK-MARKING ASSEMBLY FOR MACHINE TOOLS

Eric T. Nord, Amherst, Ohio, assignor to U. S. Automatic Corporation, Amherst, Ohio, a corporation of Ohio

Original application July 26, 1943, Serial No. 496,169. Divided and this application June 27, 1944, Serial No. 542,413

8 Claims. (Cl. 101—4)

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The invention relates to work-marking assemblies for machine tools, and particularly to apparatus of this character for marking small metal shapes, the invention being particularly illustrated in the accompanying drawings and described in detail hereinafter by reference to a milling and marking machine forming the subject matter of Patent No. 2,381,921, of the application of which patent the instant application is a division, the instant improvements in work-marking assemblies constituting a part of the invention disclosed in said Patent No. 2,381,921.

The invention is particularly illustrated in the following description and accompanying drawings as applied to the marking of tubular end-flanged articles known as primer bodies.

The annexed drawings and the following description set forth in detail certain means illustrating the improved marking apparatus, such means constituting, however, only one of the various forms in which the principle of the invention may be embodied.

In said annexed drawings:

Figure 1 is a vertical longitudinal section of the milling and marking machine, of which the instant improvements form a part, the view being taken in the planes indicated by the line 1—1, Figures 2 and 4;

Figure 2 is a plan view of the milling and marking machine showing the improved work-marking assembly incorporated therein;

Figure 3 is a plan section, taken from the planes indicated by the line 3—3, Figure 1;

Figure 4 is a fragmentary transverse vertical section, taken from the planes indicated by the line 4—4, Figures 1 and 5, the position of a certain plunger-holding plate in Figure 4 corresponding to the position thereof shown in Figure 1 only;

Figure 5 is a fragmentary showing of certain elements appearing in Figure 1, particularly illustrating the marking position of one of certain spring-actuated plungers which is indicated in Figure 1 in its retracted position, the work piece being marked and the work holder and a fragment of the rotatable drum to which the holder is secured being also shown in this view;

Figure 6 is a fragmentary plan section, upon an enlarged scale, taken from the plane indicated by the line 6—6, Figure 1, and particularly illustrating the marking plungers, this view showing, however, several of the elements in positions different from those shown in Figures 1 and 5, as will be hereinafter fully explained;

Figure 7 is an end view of one of the plungers

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shown in Figure 6, particularly illustrating the indicia upon the marking or die face of the plunger;

Figure 8 is a fragmentary vertical longitudinal section, taken from the plane indicated by the line 8—8, Figure 6;

Figure 9 is a fragmentary vertical longitudinal section, taken from the plane indicated my the line 9—9, Figure 2, illustrating the route of the work piece to the marking station from a preceding station in the type of machine in which the instant improvements are incorporated for purposes of illustrating the invention;

Figure 10 is a fragmentary transverse plan view, upon an enlarged scale, taken from the plane indicated by the line 10—10, Figure 1, showing three of a bank of laterally aligned work pieces being subjected to a milling operation prior to their movement to a marking station, in the type of machine by means of which the operation of the instant improvements is illustrated;

Figure 11 is a fragmentary transverse vertical section, taken in the plane indicated by the line 11—11, Figure 10;

Figure 12 is an end view of one of the work pieces after the complete operations of milling and marking have been effected thereon, the apparatus for effecting the marking forming the subject matter claimed in the instant application; and

Figure 13 is a side elevation of the work piece shown in Figure 12.

Referring to the annexed drawings in which the same parts are indicated by the same respective numbers in the several views, a brief description will first be given of the milling and marking machine of which the instant improvements form a part and by an application to which they are illustrated. The main frame of the improved milling and marking machine includes opposed side plates 1 erected upon a base 2, Figures 1, 2, 3, and 4. Supported by a bracket 3 pivotally mounted on a transverse shaft 4 supported in the upper portion of the side plates 1 at the rear of the machine is a motor 5, and supported on the lower portion of the left side plate 1 at the rear of the machine is a motor 20. The motor 5 actuates a plurality of rotatable spindles 7, Figures 1, 2, and 9, to effect desired milling operations and the motor 20 actuates a cam shaft 25, Figures 1, 2, and 4, to which are secured, on the left side of the machine, a lever 52, Figures 2, 3, and 4, for effecting certain indexing movements of a drum 50, Figures 1 and 2,

upon which the work pieces 10 are mounted, and a cam 30 for controlling the locking of the drum 50 between indexing movements thereof; upon the right side of the machine, a cam 35, Figures 2, 3, and 4, for effecting transverse movements of the rotatable milling spindles 7, a cam 40, Figures 2, 3, and 4, for actuating certain work-clamping fingers 143', Figures 1, 3, 9, 10, and 11; and, intermediate the width of the machine, a worm wheel 46, Figures 1 and 4, having a cam portion 45 secured to one face thereof for releasing certain spring-actuated marking plungers 68 from a holding plate, the marking apparatus of which these plungers are a part forming the subject matter claimed in the instant invention, and a cam 60, Figures 1 and 4, for effecting the retraction of the spring-actuated marking plungers 68.

That part of the subject matter of the parent application which issued as Patent No. 2,381,921, which relates to the milling mechanisms, is particularly shown, described and claimed in my pending application Serial No. 542,412, which application is also a divisional application of the afore-mentioned parent application.

The means for marking the work pieces 10 with identifying indicia at a station C of the rotatable drum 50 are particularly shown in Figures 1, 2, 3, 4, 5, 6, 7, and 8. These marking means constitute the invention to which the claims of the instant application are particularly directed. The particular work pieces 10 upon which the marking operation is effected, and the character of the marking, are shown in Figures 12 and 13. The marking is done by spring-actuated longitudinal plungers 68 having rear stem portions 68' and provided at their front ends with die members 73. The plungers 63 are slidably mounted in the front plate 110' of a fixed bed member 110, and the stem portions 68' thereof are slidably mounted in the rear plate 110^2 of the bed member 110 and in the vertical leg 112^2 of a longitudinally movable angular member 112 having a longitudinal base portion 112' slidable on inwardly-extending base flanges 110^3, Figure 4, of the bed 110. The base portion 112' of the member 112 forms, in effect, a slidable bottom member for the bed 110. Compression springs 72 are mounted in the bed 110 around the plunger stems 68' between a rear abutment face 68^3 of the plunger body 68 and the inside rear face of the rear bed plate 110^2. The springs 72 are under compression when the longitudinally movable plungers 68 are in their rear position, such as shown in Figure 1 but, when these springs 72 are free to act, they drive the plungers 68 rapidly forward to cause the dies 73 to make the desired marking 12, Figures 7 and 12, upon the flanges 10' of the work pieces 10 secured in the work holders 55 at the station C, Figures 1 and 5.

The means for holding the plungers 68 in their rearmost position and thus keeping the springs 72 compressed is a transversely movable plate 65, Figures 1, 2, 3, 4, 5, 6, and 8, which, in one transverse position, its right-hand position as shown in Figure 4, engages notches 68^2, Figures 4 and 6, formed in the left side faces of the plungers 68 and which, in its left-hand position, is disengaged from said notches. 125, Figures 2, 3, and 4, indicates a free space adjacently forwardly of the front bed plate 110' into which the plate 65 can move transversely to its plunger disengaging position. This plate 65 is formed with enlarged generally elliptical holes 65' through which the plungers 68 can slide except when the left-hand walls of the holes engage the notches 68^2 of the plungers 68 in the right-hand position of the plate 65. The rear face of this plate 65 is aligned flush with the front face of the front end member 110' of the bed 110 and its front face with the rear face of a transverse support plate 124 mounted between the front ends of the side plates of the bed 110 and over which the plate 65 slides. The support plate 124 is formed with holes 124', Figure 1, through which the plungers 68 slide.

Annular metal bushings 121 and 123, respectively, Figures 6 and 8, are driven into or otherwise fastened in the rear bed plate 110^2 and the front bed plate 110' of the bed member 110. A key 155, Figure 8, is fixed in the bore of the bushing 123, which key 155 engages a keyway 122 in the plunger 68. The bushings 121 and 123 provide sliding surfaces for the plunger stems 68' and the plunger bodies 68. The keys 155 and the keyways 122 serve to rotatably fix the plungers 68 so that the location of the indicia 12, Figures 7 and 12, on the work piece 10 may be controlled.

The transversely movable holding plate 65 is retracted or moved to the left by a trigger 66, Figures 1, 4, and 5, which is pivoted intermediate its ends on a pin 71 mounted in the support plate 124. This trigger 66 has an upper nose portion 66' which engages the plate 65 adjacent the right-hand end of the latter and thus moves the plate 65 to the left into the space 125, Figures 3 and 4, against the action of a tension spring 69, Figure 4, when the lower end of the trigger 66 is engaged by the beveled cam portion 45 provided upon the right-hand face of the worm wheel 46, secured to the cam shaft 25. Such left-hand movement of the holding plate 65 releases the plungers 68 and thus permits the marking operation by the dies 73 of the plungers 68 under the impulse of the springs 72. The identifying indicia 12 marked on the flanges 10' of the work pieces 10 by the plunger die 73 is indicated in Figures 7 and 12. As soon as the cam portion 45 passes the trigger 66, the plate 65 is moved to the right by the spring 69 so that the plate 65 can again engage the notches 68^2 of the plungers 68 and lock the latter when they are retracted. The spring 69 is secured at one end to a pin 70, Figure 4, depending from the base of the plate 65 and at its other end to a pin 67 secured in the right-hand frame member 1.

The retraction of the plungers 68 to permit their being locked and to effect the compression of the springs 72 is effected from the cam 60, Figures 1 and 4, which is engaged by a roller 61 rotatably mounted on a pin 156 fixed in a short rearwardly extending ear 62' of an actuating lever 62 pivoted at its lower end upon a pin 111 fixedly supported on the base 2, which lever 62 has loose pivotal connection at its upper end with a pin 83 secured in opposed ears 98' of a bracket 98 fastened by screws 95 to the under face of the base 112' of the angular member 112. As soon as the roller 61 is released from the high point of the cam 60, i. e., as soon as the springs 72 are fully compressed and the plungers 68 locked by movement to the right of the plate 65, the lever 62 is pulled forwardly by a tension spring 157, Figure 1, secured at one end by a pin 158 to the base 2 and at its opposite end to a pin 159 mounted in the lever 62. This action pulls the angular member 112 forwardly from the position shown in Figure 6 to the position shown in Figure 1. The plungers 68 are not affected by

this last-mentioned movement of the member 112.

The plunger stems 68' are provided at their rear ends with fixed abutments 160, Figures 1, 5, and 6, which, however, can be adjustably fixed by means of the nuts 84, against which abutments 160 the upright portion 112^2 of the angular member 112 presses when the plungers 68 are being retracted to compress the springs 72. As before stated, the base 112' of the member 112 slides on the base of the fixed bed 110 and forms a bottom member for the latter.

The retracting movement of the plungers 68 causes the keyways 122 thereof, Figure 8, to slide through the bushings 123 and, when the portion 112^2 of the member 112 reaches the abutment 160 and carries it rearwardly to the position shown in Figure 6 and, hence, the retractive movement is finished, the front end of the keyway 122 is closely adjacent the front of the bushing 123, as shown in Figure 8. The showing in Figure 6 is one of the respective positions of the several elements when the plungers 68 are fully retracted but before the angular member 112 moves forwardly to the position shown in Figure 1 in the manner hereinbefore mentioned. Thus, as soon as the high portion of the cam 60 has completely passed the roller 61, the pivoted lever 62 and, hence, the angular member 112, is pulled forwardly by the spring 157 and the several elements assume the respective positions shown in Figure 1; whereas, as stated, the complete rearward movement of the member 112 is shown in Figure 6. The abutments 160 are so adjusted that the stroke of the plungers 68 during their marking action does not cause the abutments 160 to contact the portion 112^2 of the member 112, as is indicated by the space 65, Figure 5, which view is a showing of the positions of the several elements at the time of marking.

In the milling and marking machine of which the improvements claimed herein form a part, after the work pieces 16 have been marked at the station C, in the manner and by the apparatus hereinbefore described, they are automatically ejected from the work holders 55 during the indexing of the drum 50 from the right-hand station C, Figure 1, to the lowermost station D.

What I claim is:

1. A work-marking assembly for a machine tool comprising a frame, a bed secured therein having end members, a plunger-holding plate slidable transversely of the bed, a plunger slidable through the end members of the bed and the holding plate, the plunger being formed with a notched portion engageable by the holding plate and at one end with a die, and also with an abutment intermediate its ends within the confines of the bed, a spring surrounding the plunger and held in compression between the plunger abutment and one end member of the bed when the plunger is retracted, periodically effective means mounted in the frame for sliding the plunger-holding plate in one direction to release the notched portion of the plunger therefrom, periodically effective means mounted in the frame for retracting the plunger and compressing the spring, periodically effective means mounted in the frame for moving the plunger-holding plate into holding position when the plunger is retracted, and means for coordinating the functions of the aforesaid elements in timed relation.

2. A work-marking assembly for a machine tool comprising a frame, a bed secured therein having end members, a plunger-holding plate slidable transversely of the bed on the exterior surface of one of the bed end members, a plunger slidable through the bed end members and the plunger-holding member, the plunger being formed with a notched portion engageable by the holding plate and at one end with a die and also with an abutment intermediate its ends within the confines of the bed, a spring surrounding the plunger and held in compression between the plunger abutment and the opposite end member of the bed when the plunger is retracted, periodically effective means mounted in the frame for sliding the plunger-holding plate in one direction to release the plunger therefrom, periodically effective means mounted in the frame for retracting the plunger, and periodically effective means mounted in the frame for moving the plunger-holding plate into holding position when the plunger is retracted, the coordination and the timed relation being such as to effect the sliding of the plunger-holding plate to release the plunger therefrom and the consequent marking stroke of the plunger, then retract the plunger and compress the spring, and then the sliding of the plunger-holding plate into holding position.

3. A work-marking assembly for a machine tool comprising a frame, a bed secured therein having base flanges and end members, a plunger-holding member slidable transversely of the bed on the exterior surface of one of the bed end members, a plunger slidable through the bed end members and the plunger-holding member, a member slidable on the bed base and having an angular end portion spaced from the opposite bed end member, the plunger also being slidable through said angular end portion, the plunger being formed at one end with a die, with an abutment intermediate its ends within the confines of the bed, and also with an opposite end adjustable abutment, a spring surrounding the plunger and held in compression between the intermediate plunger abutment and the second-mentioned bed end member when the plunger is retracted, periodically effective means mounted in the frame for sliding said plunger-holding member in one direction to release the plunger therefrom, periodically effective means mounted in the frame for sliding the angular end member to engage the plunger end abutment to retract the plunger and compress the spring, periodically effective means mounted in the frame for moving the plunger-holding member into holding position, the coordination and the timed relation being such as to effect the sliding of the plunger-holding member to release the plunger therefrom and the consequent marking stroke of the plunger, then the sliding movement of the angular end member to retract the plunger and compress the spring, then the sliding of the plunger-holding member into holding position, and means for then sliding the angular ended member away from the plunger end abutment.

4. A work-marking assembly for a machine tool, characterized as in claim 3, in which the means for sliding the angular ended member away from the plunger end abutment effects the sliding of the angular ended member away from the plunger end abutment a distance greater than the marking stroke of the plunger.

5. A work-marking assembly for a machine tool comprising a frame, a bed secured therein having base flanges and end members, a member slidable on the base flanges and having an angular end portion spaced from and exteriorly of one of the bed end members, a plunger-holding mem-

ber slidable transversely of the bed over the exterior surface of the opposite bed end member, a plunger slidable through the end members of the bed, the plunger-holding member and the angular end portion, the plunger being formed at one end with a die and, intermediate its ends, with an abutment within the confines of the bed, the plunger portion intermediate the abutment and the plunger end opposite the die end forming a plunger stem, an adjustable abutment mounted on the free end of the plunger stem, a spring surrounding the plunger stem and held in compression between the intermediate plunger abutment and the first-mentioned bed end member when the plunger is retracted, periodically effective means mounted in the frame for sliding the plunger-holding member in one direction to release the plunger therefrom, periodically effective means mounted in the frame for moving the angular end member against the adjustable abutment to retract the plunger and compress the spring, and periodically effective means for moving the plunger-holding member into holding position when the plunger is retracted, the coordination and the timed relation being such as to effect the sliding of the plunger-holding member to release the plunger therefrom and the consequent marking stroke of the plunger, then the sliding of the angular end member to effect the retracting movement of the plunger and the compression of the spring, and then the movement of the plunger-holding member into holding position, and means for then sliding the angular ended member away from the plunger end abutment.

6. A work-marking assembly for a machine tool comprising a frame, a bed secured therein having base flanges and side and end members, a support member mounted between side members of the bed exteriorly of one of the bed end members, a plunger-holding member slidable transversely of the bed side members upon opposed faces of the support member and said bed end member, a plunger slidable through the bed end members, the plunger-holding member and the support member, the plunger being formed at one end with a die, the plunger having a stem with a stem end portion opposite the die end and forming a plunger body abutment encircling the inner end of the plunger stem within the confines of the bed, a compression spring encircling the plunger stem and bearing at one end against the abutment and at its opposite end against the opposite bed end member, a plunger-retracting member slidably mounted on the base flanges and having an angular end portion through which the plunger stem is slidable exteriorly of said opposite bed end member, the plunger stem being provided adjacent its end opposite the die end with an adjustable abutment, a tension spring secured at one end to the plunger-holding member and at its opposite end to the frame and tending to hold the plunger-holding member in a plunger-holding position, the plunger-holding member being formed with an enlarged hole through which the plunger is slidable and the plunger being formed with a notch with which the plunger-holding member engages to perform its holding function, a trigger pivotally mounted intermediate its ends on the support member and having an end nose portion engaging the plunger-holding member, means engaging the opposite end of the trigger to cause the latter to move the plunger-holding member into a position to release the plunger therefrom, means for moving the plunger-retracting member to cause its angular

end portion to engage the adjustable stem abutment and retract the plunger and compress the spring, means periodically actuating said plunger-retracting and spring compression means, and means periodically moving the angular end member on the stem away from the adjustable stem abutment, the coordination and timed relation being such as to effect the releasing of the plunger from the holding means and the consequent marking stroke of the plunger, then the retracting movement of the plunger and the compression of the compression spring, then the movement of the plunger-holding member into engaged position with the plunger, and then the movement of the angular ended member away from the adjustable stem abutment.

7. A work-marking assembly for a machine tool comprising a frame, a shaft rotatably mounted therein, a worm wheel and a cam rotatably secured to the shaft, means for rotating the shaft, a bed secured in the frame having base flanges and side and end members, a support member mounted between side members of the bed exteriorly of one of the bed end members, a plunger-holding member slidable transversely of the bed side members upon opposed faces of the support member and said bed end member, a plunger slidably mounted in the bed end members, the plunger-holding member and the support member, the plunger being formed at one end with a die, the plunger having a stem with a stem end portion opposite the die end, which stem forms the part of the plunger slidable in the opposite bed end member, the plunger body and plunger stem forming a plunger abutment encircling the inner end of the plunger stem, a compression spring encircling the plunger stem and bearing at one end against the abutment and at its opposite end against the bed end member in which the stem is slidable, a plunger-retracting member slidably mounted on the base flanges and having an angular end portion through which the plunger stem is slidable exteriorly of said opposite bed end member, the plunger stem being provided adjacent its end opposite the plunger die end with an adjustable abutment, a tension spring secured at one end to the plunger-holding member and at its opposite end to the frame and tending to hold the plunger-holding member in a plunger-holding position, the plunger-holding member being formed with an enlarged hole through which the plunger is slidable and the plunger being formed with a notch with which the plunger-holding member engages to perform its holding function, a trigger pivotally mounted intermediate its ends on the support member and having an end nose portion engaging the plunger-holding member, the worm wheel being formed with a face lug adapted to engage the opposite end of the trigger to move the plunger-holding member into a position to release the plunger therefrom, a lever pivotally mounted at one end on the frame and having a roller mounted therein intermediate its ends, the roller being engaged by the cam, the opposite end of the lever being pivotally secured to the plunger-retracting member whereby the engagement of the roller by the cam moves the plunger-retracting member to cause its angular end member to engage the end abutment upon the plunger stem and retract the plunger and compress the spring, and a tension spring secured at one end to the lever and at its opposite end to the frame and effective to slide the angular ended member on the plunger stem away

from the stem abutment when the roller passes the high point of the cam, the coordination and the timed relation being such as to effect the release of the plunger from the plunger-holding member by the engagement of the worm wheel lug with the trigger and the consequent marking stroke of the plunger, then the engagement of the roller by the cam to effect the retracting movement of the plunger and the compression of the compression spring, the release of the plunger-holding member from the trigger and its movement under spring action into holding position, and then the sliding under spring action of the plunger-retracting member away from the adjustable stem abutment.

8. A work-marking assembly for a machine tool comprising a bed-like frame, a spring-actuated plunger slidably mounted in the frame and having an end die portion, a part of the frame being slidably mounted on the remaining frame part and forming a bed bottom, means adapted to engage the plunger to hold the latter in a retracted position with the spring under compression, the plunger being formed with an abutment portion and the spring being disposed between said abutment portion and the fixed part of the frame, means adapted to release the plunger from the holding means, the slidable part of the frame being formed to engage the plunger to retract the latter and compress the spring, means to actuate the slidable frame part to engage the plunger, means adapted to effect the engagement

of the holding means with the plunger when the latter is retracted, means for moving the slidable part of the frame out of engagement with the plunger when the latter is retracted, and means for coordinating the functions of the aforesaid elements in timed relation.

ERIC T. NORD.

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