W. F. GROENE & H. C. PIERLE.

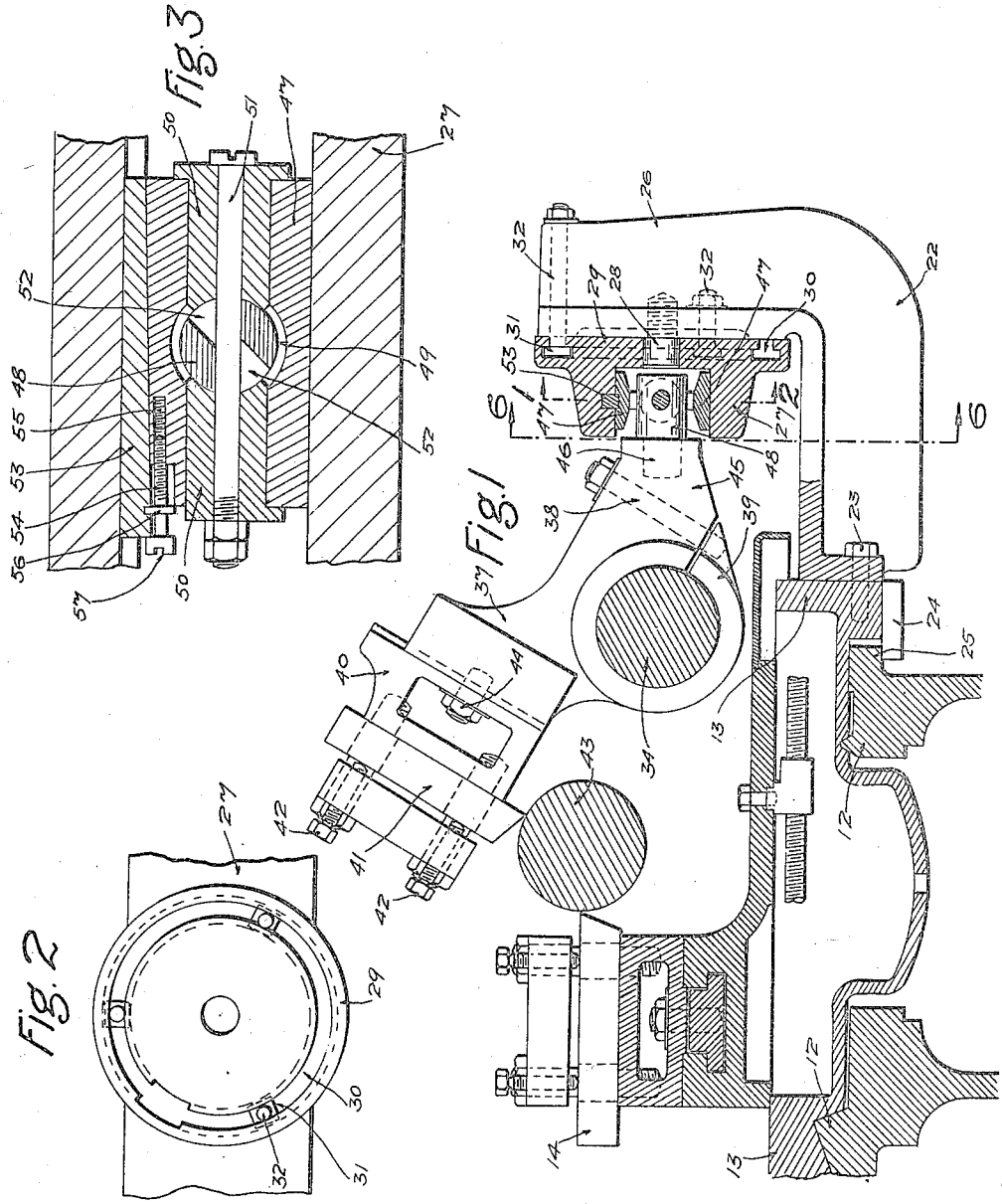
MACHINE TOOL.

APPLICATION FILED AUG. 3, 1915.

1,248,317.

Patented Nov. 27, 1917.

2 SHEETS—SHEET 1.



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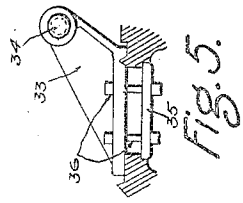


Fig. 5.

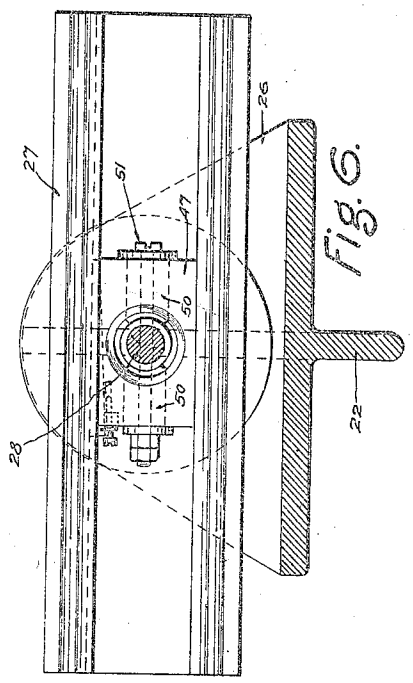


Fig. 6.

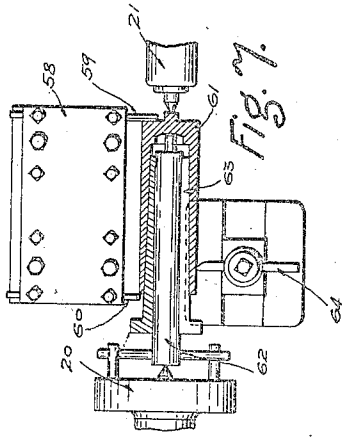


Fig. 1.

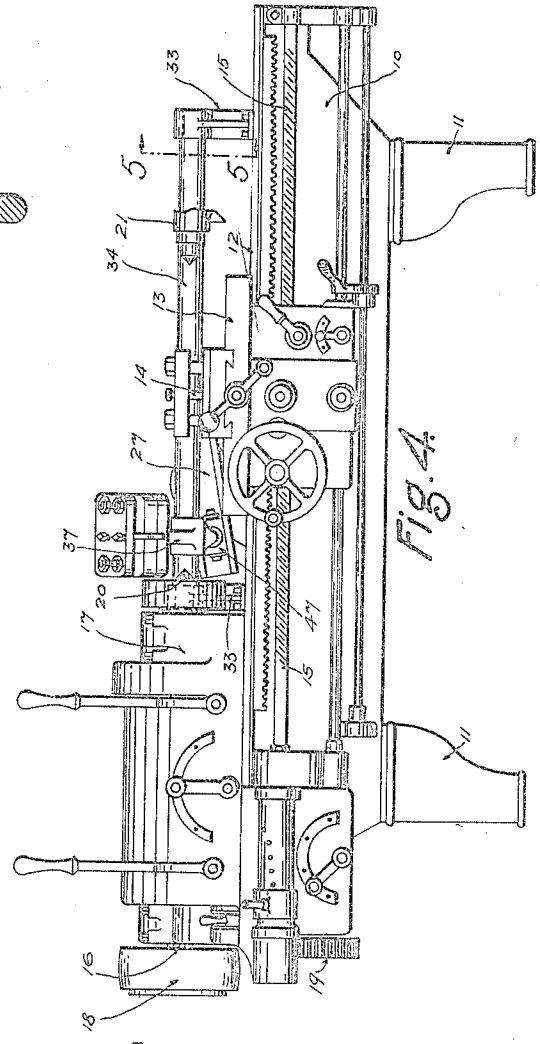


Fig. 4.

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UNITED STATES PATENT OFFICE.

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MACHINE-TOOL.

1,248,317. Specification of Letters Patent. Patented Nov. 27, 1917.

Application filed August 3, 1915. Serial No. 43,361.

To all whom it may concern:

Be it known that we, WILLIAM F. GROENE and HENRY C. PIERLE, citizens of the United States, residing in Cincinnati, county of Hamilton, and State of Ohio, have invented an Improvement in Machine-Tools, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

The invention to be hereinafter described relates to machine tools, and more particularly to that class wherein blanks are treated longitudinally and transversely for the production of the finished article.

As well understood by those skilled in the art, various means have heretofore been provided for treating or cutting the longitudinal surface of the blank and for facing or cutting grooves, shoulders, or the like, extending radially inward toward the axis of the blank. In these prior machines, however, the movement of the tools for treating the longitudinal surface of the blank and those for treating it diametrically have either been independently actuated or have required substitution and reorganization of parts in order to vary the action of the tools upon the bracket.

The aims and purposes of the present invention are to provide a machine tool with means whereby a blank may have its longitudinal surface treated or cut and its end or intermediate portions diametrically treated or cut simultaneously, the diametrical action of the one tool being controlled by the longitudinal movement of the other.

An important feature of the present invention consists in a carriage for supporting a turning tool for acting along the longitudinal surface of the blank, a carrier for supporting a tool for acting diametrically upon the blank and connections between the carriage and carrier whereby longitudinal movement of the carriage effects diametrical movement of the carrier relative to the blank.

Another important feature of the invention consists in an adjusting guide and a block or slide movable relatively thereto, one of said parts being connected to the carriage and the other of said parts being connected to the carrier so that by longitudinal movement of the carriage diametrical movement of the tool mounted on the carrier may be effected in suitable amounts.

Another important feature of the invention consists in mounting the carrier for adjustment to different positions longitudinally of the machine bed and effecting movement of the tool supported thereby in a direction diametrically of the work by adjustable connections between said carrier and the turning tool carriage.

A still further important feature of the invention consists in the connection between the adjustable guide and slide block, one being mounted on the carriage and the other connected to the carrier so that diametrical movement relative to the tool supported by the carrier may be effected by longitudinal movement of the carriage.

Another important feature of the invention consists in the construction of the tool carrier and support and the connections between the carriage and carrier for effecting diametrical movement of the carrier by longitudinal movement of the carriage, said parts being capable of ready attachment to and detachment from the ordinary lathe.

The above and various other features of the present invention will be hereinafter more fully described in connection with the accompanying drawings, which show a good, practical form of the invention, it being understood that in its true scope the invention is definitely set forth in the claims.

For convenience of description hereinafter, the part for supporting the tool which acts diametrically of the blank either to face, shoulder, or groove the blank, will hereinafter be designated "the carrier", and the part for supporting the tool which acts upon the exterior longitudinal surface of the blank, and performs its cut during longitudinal movement thereof, will be designated the "carriage", as usual.

In the drawings:—

Figure 1 is a transverse section on a large scale, of the machine tool indicated in Fig. 4, showing the carriage, the carrier support and the connections between the carriage and carrier in section, and some of the parts in elevation;

Fig. 2 is a face view at the back of the guide, shown detached;

Fig. 3 is a section on the line 1—2, of Fig. 1;

Fig. 4 is a side elevation of a machine tool or lathe embodying the present invention;

Fig. 5 is a section on the line 5—5, Fig. 4;

Fig. 6 is a section on the line 6—6, Fig. 1; and

Fig. 7 shows the present invention applied to the formation of shrapnel casings.

The machine tool to which the present invention may be conveniently applied, may be of any suitable character, and as herein shown comprises the machine bed 10 mounted on suitable supports or legs 11, and provided with longitudinal guides or ways 12, Fig. 1, on which is mounted to slide longitudinally of the machine bed, the carriage 13. The carriage 13 may be of any usual character adapted for the support of a turning tool 14, Fig. 1, and since such carriage and the means for holding the turning tool in its cutting or active position are well understood by those skilled in the art, further description of this feature of the machine is unnecessary. The carriage, as hereinbefore noted, is mounted for longitudinal movement along the machine bed and any suitable means may be employed for imparting such movement. In the illustrated form of the invention the screw 15 may be conveniently used and be driven from the main spindle shaft 16 mounted in the head stock 17, and actuated from any suitable source of power through the belt pulley 18. Motion may be preferably transmitted to the bed screw through gearing connections between the main spindle shaft 16 as at 19, and if desired, change speed gearing, now well understood in the art, may be employed to effect the desired longitudinal movement of the carriage.

Operatively connected with the main spindle shaft 16 is the head center 20 and opposed thereto, as at 21, Fig. 4, is the tail stock center, the blank to be treated being supported between such center and given rotary movement. These features of the construction may be as usual, and as they are well understood by those skilled in the art, they are not further herein described.

Detachably connected to the carriage 13, preferably at the rear of the machine bed, is the bracket arm 22, Fig. 1, such detachable connection with the carriage being effected by suitable means such as the bolt 23, the construction being such that the bracket may be readily attached to or detached from the carriage. The portion of the carriage adjacent the bracket arm 22 is provided with a lug 24 which rides beneath the ledge 25 at the rear of the machine to insure that the carriage shall not be lifted from the machine bed. Such feature, however, may not always be essential.

The bracket arm 22 has an upwardly-extending portion 26 to which is adjustably connected a guide. In the present instance, the guide is formed as an elongated U-shaped trough 27 pivotally connected at 28 to the upwardly-extending portion 26 of the bracket arm, but it is to be understood, of course, that the guide 27 while thus conveniently shown as of U-shape in cross section, may be variously formed, the construction being such that the said guide 27 shall be adjustably supported upon the upwardly-extending portion 26 secured for movement to the carriage 13.

Centrally of the guide 27 and at the rear thereof or at the right looking at Fig. 1, said guide is provided with a circular portion 29 having a circular recess 30 in which are engaged the heads 31 of securing bolts 32 which pass through the upwardly-extending portion 26 of the bracket arm 22, the construction being such that when the guide 27 has been turned about its pivotal mounting 28 by which it is connected to the carriage, it may be secured in adjusted position by the securing bolts 32.

Detachably secured to the machine bed, as indicated in Fig. 5, are the supports 33, one only being shown in Fig. 5, for rotatably supporting the carrier shaft 34. Said supports 33 may be appropriately secured to the bed as by the cross bars 35 and bolts 36, the construction being such that upon release of the bolts 36 in the manner well understood by those skilled in the art, the supports 33, together with the carrier shaft 34, may be readily removed from its association with the machine frame.

Mounted for longitudinal adjustment upon the carrier shaft 34 is the carrier 37 which, when adjusted to the desired position longitudinally of the carrier shaft 34, may be appropriately secured in position by suitable means such as the draw bolt 38 acting upon the split hub portion 39 of the carrier. Any suitable means may be employed for securing the carrier 37 in adjusted position on the shaft 34, but the draw bolt herein described forms a convenient means for this purpose.

The carrier 37 is provided with a tool supporting head 40, Fig. 1, on which is detachably secured the tool 41 by means similar to that employed for securing the turning tool to the carriage. In the present instance the tool 41 is held to the head 40 by means of the clamp screws 42. The head 40 may, if desired, be adjusted to position the tool 41 toward or from the blank 43, Fig. 1. Such adjustment in the present illustration of the invention is effected by the clamping bolt 44, as will be clearly understood from the construction illustrated in Fig. 1. The tool 41 may be either a facing tool to face down the end portions of the blank, or it may be a tool to provide a circumferential groove in the surface of the blank, or a

shoulder circumferentially thereof; but for the purpose of convenient reference, the said tool 41 will hereinafter be termed the "facing tool," it being understood that this term is not intended as a limitation to the character of work done by the tool, but rather as a means of convenient distinction from the turning tool or tools or tools mounted upon the carriage.

Extended from the carrier 37, Fig. 1, is the tail portion 45 suitably recessed to receive the end 46 of a pin 48, the outer end portion of which is connected by a universal joint to a shoe or block 47 which is adapted to move longitudinally of the slide 27, the construction being such that when the slide 27 is adjusted to an inclined position such as indicated in Fig. 4, and as heretofore explained, the carrier 27 and the facing tool mounted thereon will be given movement diametrically of the work or blank as the carriage moves longitudinally of the machine bed, and the amount of such diametrical movement of the carrier 37 about its axis will depend upon the amount of inclination given to the guide 27, thus varying at will the amount of diametrical movement of the facing tool as the carriage moves longitudinally of the work.

The universal joint connection between the pin 48 connected to the carrier 37 and the block or shoe 47 extends longitudinally of the guide 27, and is of novel construction, as will now be explained. The shoe or block 47 is bored longitudinally as indicated in Fig. 3, and has a centrally enlarged portion 49 to receive the end of the pin 48 against the curved walls of which bear the ends of the bushings 50 which may be clamped in desired position by the clamping bolt 51 passed longitudinally through the bushings 50 and through an aperture formed in the pin 48. From the construction thus far described, it will be apparent that the bushings 50 may turn in the block or shoe 47 about their longitudinal axes. It is also desirable, however, that the pin 48 be permitted movement about its longitudinal axis, and to this end the portion of the pin penetrated by the bolt 51 and recessed as at 52 in substantial fan shape, to permit the pin 48 to turn about its longitudinal axis within the limits afforded by the walls of the recess 52, all as will be clearly apparent from the construction illustrated by Fig. 3.

As the shoe or block 47 moves longitudinally relative to the guide 27, a certain amount of wear is likely to occur; and to counteract this conveniently, the present invention provides a sliding wedge 53, Fig. 3, interposed between the guide 27 and the shoe or block 47, see Figs. 1 and 3. In order to take up wear and force the wedge longitudinally for this purpose, suitable means may be employed which, in the present form of the invention, comprises a pin 54 threaded into a portion 55 of the shoe or block 47, said pin being provided with an integral collar 56 which engages a recess in the wedge as indicated in Fig. 3, the construction being such that as the pin 54 is screwed in or out relatively to the shoe or block 47, the wedge 53 will be moved longitudinally. If desired, the pin 54 may be provided with a head 57 by which it may be readily manipulated.

From the construction thus far described, it will be apparent that when a blank to be treated is centered and rotated by the head and tail stock centers, the turning tool 14 mounted upon the carriage will be moved gradually in a direction longitudinally of the blank and treat the longitudinal surface thereof during its reciprocation in one direction, and as such turning tool thus acts upon the blank, the facing tool 41 will be caused to move toward the axis of the blank to the longitudinal movement of the carriage and by reason of the connections between the carriage and carrier hereinbefore described. The amount of diametrical movement or movement toward the axis of the blank by the tool 41 may obviously be varied by adjusting the inclination of the guide 27 and the tool 41 may be either caused to act upon the face of the blank as a facing tool or upon the blank between its ends portions to form either grooves, shoulders, or the like.

In Fig. 7, has been illustrated the application of the present invention to the manufacture of shrapnel cases; and in this case the carrier head 58 may be provided with a facing tool 59 to face down one end portion of the blank and a cutting tool 60 for acting upon another portion of the blank. In this case the shrapnel casing 61 is mounted upon a mandrel 62 which is held for rotary movement with the head center 20 as indicated in Fig. 7. The mandrel 62 preferably has mounted thereon the split bushing 63, whereby a proper grip and turning action can be effected between the shrapnel case and the mandrel. As the facing tool 59 and the cutting-off tool 60 which are mounted upon the carrier act upon the respective portions of the blank in a direction diametrically thereof, the turning tool 64, in the modification shown by Fig. 7, will progressively move longitudinally of the blank and treat the longitudinal surface thereof.

Obviously, more than one turning tool may be mounted upon the carriage and similarly, more than one facing or other tool may be mounted upon the carrier, but as these features are well understood by those familiar with this character of work, further elucidation thereof is unnecessary.

When it is desired to equip a machine tool such as a lathe, with the present invention, the supports 33 for rotatably mounting the

carrier shaft 34 are secured to the machine bed, the carriage has connected thereto the bracket arm 22 and its attached parts, and the carrier is mounted upon the carrier shaft 34 and connected to the block 47, as hereinbefore described. Thus, without alteration of the already constructed machine, the present invention may be readily applied thereto or detached therefrom.

A machine constructed in accordance with the illustrated form of the invention, presents a convenient and practical embodiment thereof; but it is to be understood, of course, that many of the details may be varied within the true scope of the actual invention, which is defined by the claims. Thus, the adjustable guide may be varied in form or character, and instead of being mounted on the carriage and movable therewith while the carrier has connected to it the block for engaging the guide, a reverse arrangement might be employed, all of which will be clearly understood by those skilled in the art.

What is claimed is:—

1. In a facing and turning machine, the combination of a bed, a head and tail stock for supporting and rotating the blank, a carriage for carrying turning tools, means for moving the carriage longitudinally of the bed, an adjustable U-shaped guide movable with the carriage, means for holding the guide in its adjusted positions, a slide mounted in said guide, a facing tool carrier and a universal joint connecting the carrier and the slide mounted in the guide.

2. In a facing and turning machine, the combination of a bed, a head and tail stock to support and rotate a blank, a carriage for carrying a turning tool, means to move said carriage longitudinally of the bed, a facing tool carrier, a support extending longitudinally of the bed upon which the facing tool carrier is secured in any adjusted position longitudinally thereof, bearings for said support connected to the machine independent of the head and tail stocks, to cause the support to revolve on its long axis in said bearings, and means between the facing tool carrier and the carriage and actuated by longitudinal movement of the carriage to cause the facing tool carrier to move about its pivot toward or away from the axis of the blank.

3. In a machine of the character described, the combination of the bed, head and tail stocks for supporting and rotating a blank, a carriage carrying a guide, a carrier, a block movable longitudinally of the guide, a pin extended from the carrier and having a universal joint connection with said block, and means for moving the carriage longitudinally of the bed.

4. In a machine of the character described, the combination of a bed, head and tail stocks for supporting and rotating a blank, a carriage movable longitudinally of the bed, a carrier, and connections between the carriage and carrier, comprising an adjustable guide, a block movable longitudinally of the guide, a pin extending longitudinally of the block, and a pin extending from the carrier and engaging said longitudinal pin.

5. In a machine of the character described, the combination of a bed, head and tail stocks for supporting a blank, a carriage movable longitudinally of the bed and carrying a turning tool, a carrier carrying a facing tool, an adjustable guide mounted for movement with the carriage, a block mounted for movement longitudinally of the adjustable guide, a pin extended from the carrier, and bushings carried by the block at each side of the pin permitting rocking movements of the pin relative to the block.

6. In a machine of the character described, the combination of a bed, a carriage supporting a turning tool, a tool carrier for supporting a facing tool, an adjustable guide movable with the carriage and provided with a sliding block or shoe having a longitudinal bore and a centrally enlarged recess, a pin extending from the carrier and entering the enlarged recess, and a bolt extending longitudinally of the sliding block or shoe and through the said pin.

7. In a machine of the character described, the combination of a bed, a carriage supporting a turning tool, a tool carrier for supporting a facing tool, an adjustable guide movable with the carriage and provided with a sliding block or shoe having a longitudinal bore and a centrally enlarged recess, a pin extending from the carrier and entering the enlarged recess, a bushing mounted in the sliding block or shoe at each side of the pin, and a bolt extending longitudinally of the sliding block or shoe and through the said pin.

8. In a machine of the character described, the combination of a bed, head and tail stock bearings, a carriage supporting a turning tool, a carrier for supporting a facing tool, a rock shaft along which the carrier is adjustable, means for clamping the carrier in adjusted position on the rock shaft, bearings for the rock shaft independent of the head and tail stocks, means for detachably securing the said bearings to the bed of the machine, an adjustable guide mounted for movement with the carriage, and connections between the guide and carrier.

9. In a machine of the character described, the combination of a bed, a carriage supporting a turning tool, a carrier supporting a facing tool, an adjustable guide movable with the carriage, a block or shoe mov-

able longitudinally of the guide, and having a longitudinal bore, a pin connected to the carrier and extending into the block or shoe, and connections between the pin ad block or shoe permitting axial turning movement of the pin in the block or shoe.

10. In a machine of the character described, the combination of a bed, a carriage supporting a turning tool, a carrier supporting a facing tool, an adjustable guide movable with the carriage, a block or shoe movable longitudinally of the guide, a bushing mounted for rocking movement in the longitudinally movable block or shoe, a pin extending from the carrier into engagement with the rocking bushing in the block or shoe and having a rocking movement about an axis substantially at right angles to the rocking axis of the bushing.

In testimony whereof, we have signed our names to this specification, in the presence of two subscribing witnesses,

WILLIAM F. GROENE.
HENRY C. PIERLE.

Witnesses:
GRACE A. PUGH,
EDWARD G. SCHULTZ.