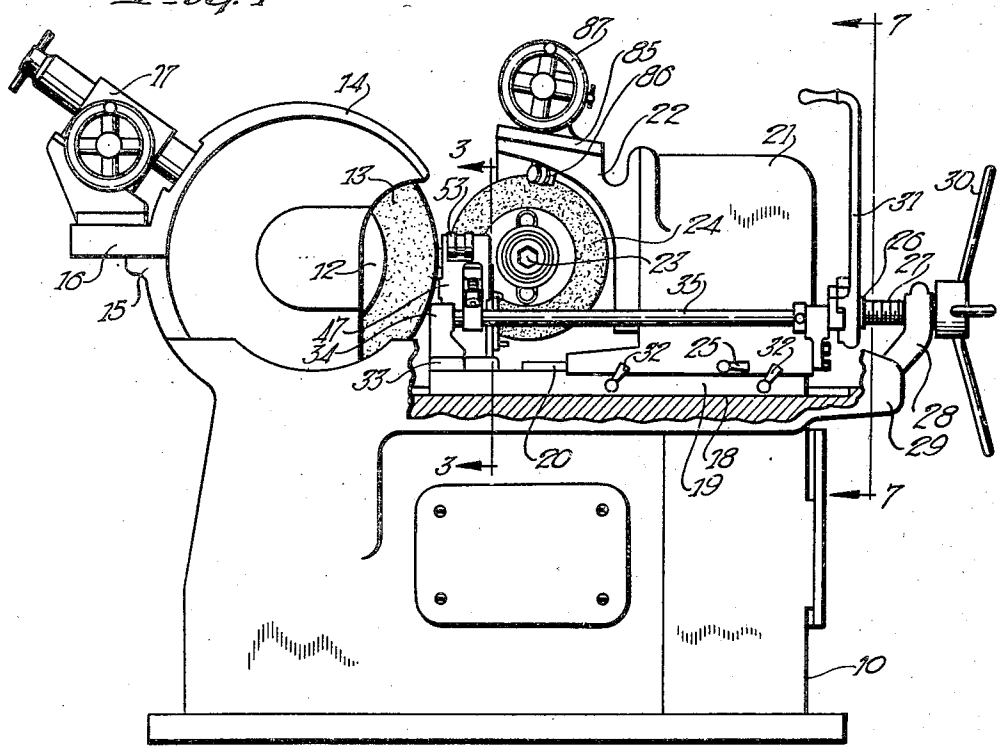
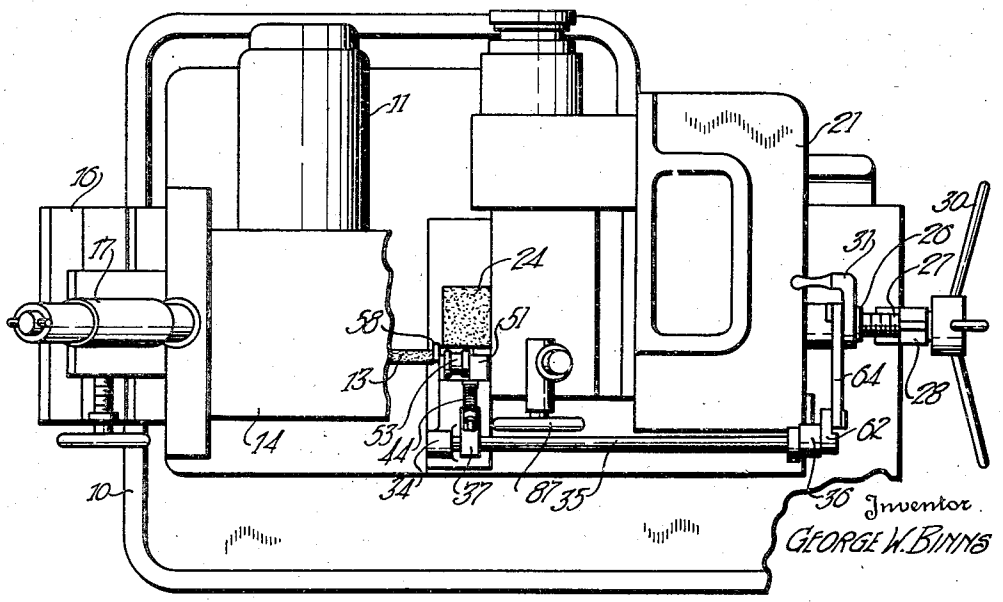
Oct. 9, 1934. G. W. BINNS 1,976,112

GRINDING MACHINE

Filed Jan. 22, 1932 3 Sheets-Sheet 1

Fig. 1





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Fig. 2

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GRINDING MACHINE

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Fig. 3

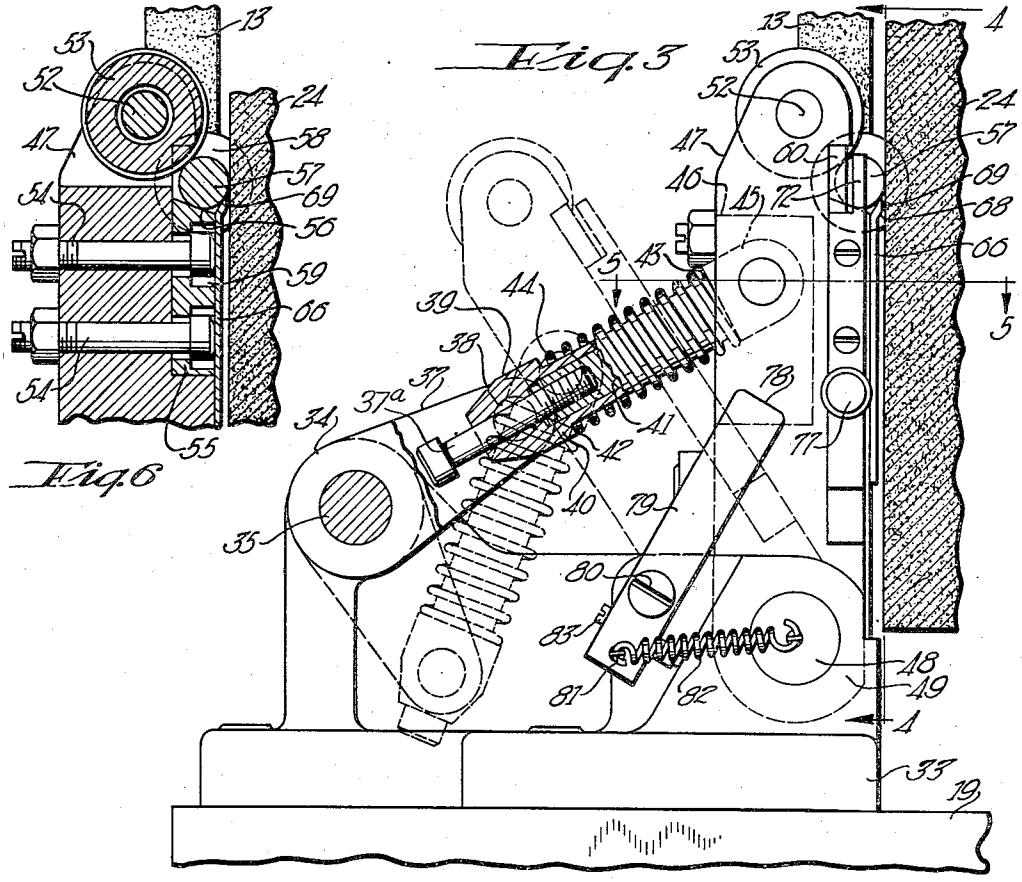


Fig. 6

Fig. 4

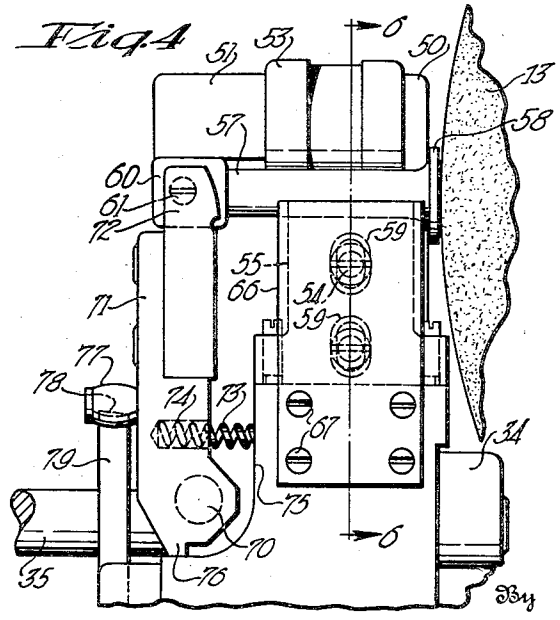
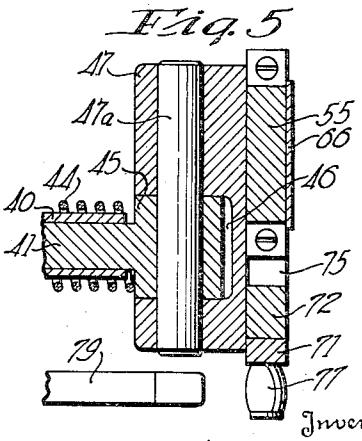


Fig. 5



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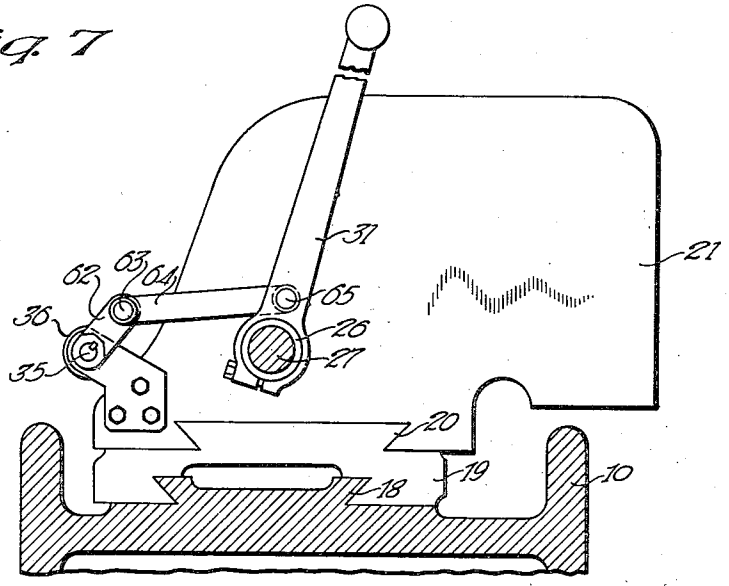
Attorney

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GRINDING MACHINE

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Fig. 7



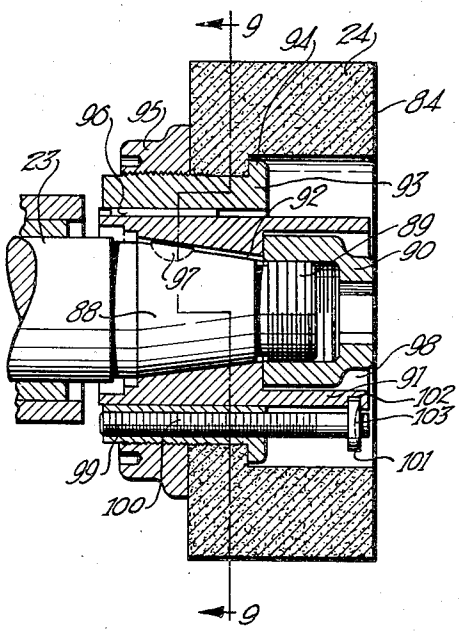
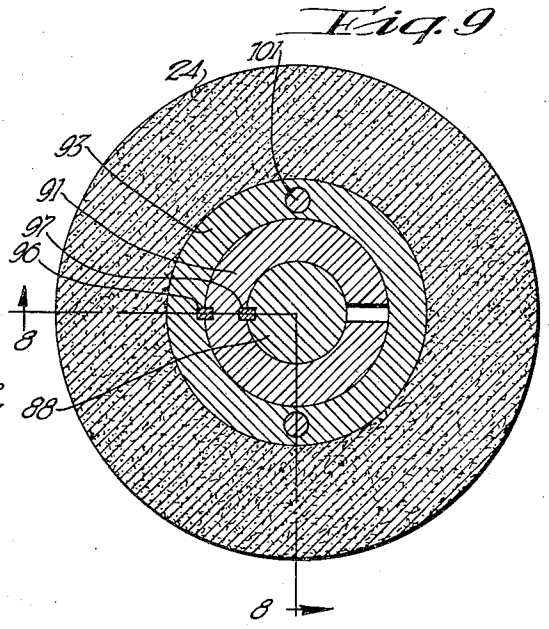


Fig. 8

Fig. 9



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Patented Oct. 9, 1934 1,976,112

UNITED STATES PATENT OFFICE

1,976,112

GRINDING MACHINE

George W. Binns, Cincinnati, Ohio, assignor to Cincinnati Grinders Incorporated, Cincinnati, Ohio, a corporation of Ohio

Application January 22, 1932, Serial No. 588,168

19 Claims. (Cl. 51—103)

This invention relates to improvements in grinding machines and especially to improvements in a centerless grinder.

An object of this invention is the provision of an improved centerless grinder for grinding the terminal surface of small headed objects.

Another object of the invention is the provision of improved means for loading, presenting and ejecting work pieces of an irregular shape.

A further object of the invention is the provision of improved means for automatically adjusting the members of the grinding throat of a centerless grinder for holding, rotating and ejecting headed articles such as studs, tappets and the like which require the flat headed surface thereof to be ground or finished.

Other objects and advantages of the present invention should be readily apparent by reference to the following specification taken in conjunction with the accompanying drawings and it is to be understood that any changes may be made in the exact structural details there shown and described within the scope of the appended claims without departing from or exceeding the spirit of the invention.

In the drawings:

Figure 1 is an elevational view of a centerless grinder embodying the improvements of this invention.

Figure 2 is a top plan view of the machine illustrated in Figure 1.

Figure 3 is a fragmentary sectional view taken on line 3—3 of Figure 1.

Figure 4 is a fragmentary sectional view taken on line 4—4 of Figure 3.

Figure 5 is a sectional view taken on line 5—5 of Figure 3.

Figure 6 is a sectional view taken on line 6—6 of Figure 4.

Figure 7 is a fragmentary elevational view of the machine shown in Figures 1 and 2 and as seen particularly from line 7—7 of Figure 1.

Figure 8 is a sectional view through the regulating wheel substantially on line 8—8 of Figure 9.

Figure 9 is a sectional view on line 9—9 of Figure 8.

Throughout the several views of the drawings, similar reference characters are employed to denote the same or similar parts.

A machine of this invention is particularly adapted for the grinding of the flat terminal surface of headed articles such as headed studs, tappets or the like. The flat surface of these items is at right angles to the axis of revolution of the stem or body portion of the article extending from the heads. In the past, difficulty has been experienced in properly positioning or mounting the work for proper presentation to the operative surface of a grinding wheel. By this invention, these difficulties are obviated and work pieces of this nature produced in an expeditious manner.

A machine embodying the improvements of this invention may comprise a bed 10 having rising therefrom at one end a pedestal bearing 11 in which is journaled a spindle 12 for a grinding wheel 13. The wheel 13 is inclosed within a suitable guard or housing 14 which provides a ledge 15 for the truing tool bracket 16. The truing tool 17 is supported by and actuated relative to the base 16. The grinding wheel is adapted to be rotated in a clockwise direction at a high or grinding rate of speed.

The bed 10 is further provided on its upper surface with ways 18 for a slide 19 shiftable longitudinally of the bed toward and from the grinding wheel. The slide 19 provides additional guideways 20 for an upper slide or housing 21 which is movable relative to the lower slide 19 as well as therewith. Secured to the housing 21 is a head 22 in which is journaled a spindle 23 for a regulating wheel 24. The wheel 24 is mounted on the spindle for adjustment relative thereto which will be described in detail later. It will be noted that the side or lateral face of this regulating wheel is employed for controlling the rotation of the work.

The upper and lower slides 19 and 21 are adapted to be shifted as a unit relative to the bed toward the grinding wheel for effecting a feed between the work piece supported by the slides in a manner that will be described in detail later. The slides are clamped to one another by means of a clamp 25 and the upper slide or housing 21 has oscillatably journaled therein a swivel nut 26 which is in threaded engagement with an adjusting screw 27. The outer end of the screw 27 is rotatably mounted in a bracket 28 secured to an extending portion 29 of the bed. A hand wheel 30 is secured to the screw 27 at a point beyond the bracket 28 whereby the said screw may be rotated for effecting the axial travel of the nut 26 and parts actuated thereby. In the normal use of the machine the slides 19 and 21 are cyclically fed toward and from the grinding wheel thereby reducing the work to the desired size and with the proper finish. For this purpose the swivel nut 26 has secured to it an operating lever or

handle 31 which is oscillatable through an arc of 90 degrees from the position shown in Figure 1 at which time the slides are in a retracted position. In order that the slides may be independently adjusted for set-up purposes and the like, the lower slide 19 is provided with clamps 32 which secure the lower slide to the bed and upon release of clamp 25 the upper slide or housing 21 may be moved relative thereto.

The inner or forward end of the slide 19 has secured to it a bracket 33 which carries the work support and loading and ejecting mechanism. The bracket 33 is provided with a bearing portion 34 in which is journaled one end of the shaft 35 which extends along the front side of the machine from the said bracket to the rear end of the machine where it is again journaled in a bracket 36 secured in any desirable manner to the rear surface of the housing or upper slide 21. Secured to the shaft 35 adjacent the bearing 34 is a toggle arm 37 having a pivoted connection at 38 with a second toggle arm indicated in its entirety by the numeral 39. The toggle arm 39 is formed in two telescoping members 40 and 41, the former extending about the latter. The member 40 at the point of pivotness 38 is provided with an enlarged head which forms a shoulder 42 and the member 41 is likewise formed on one end with an enlarged head to provide a shoulder 43. Surrounding the arm 39 and abutting on opposite ends with the shoulders 42 and 43 is a spring 44 tending to axially shift the members 40 and 41 relative to each other. To prevent inadvertent disassociation of the telescoping members 40 and 41 the head of the member 40 is provided with an aperture through which passes a bolt or the like 37*a* having on its outer end a head engageable with the end of the outer surface of the head of member 40. The threaded end of the bolt 37*a* is received in a threaded aperture formed in the inner end of the member 41. By reference to Figure 3 it will be noted that oscillation of the toggle arm 37 will first take up the lost motion between the bolt head and head of member 40, whereupon the members 40 and 41 will move in unison. The head 45 of the member 41 is received in a recess or opening 46 formed in a work rest block 47, and has passing therethrough a pivot 47A whereby the block 47 is pivoted to the arm 39. The block 47 is provided at its lower end with a perforation through which passes the pivot shaft 48 having its opposite ends secured in bearings 49 extending upwardly from the bracket or plate 44. The upper end of the block 47 is furcated to provide ears 50 and 51 in which is mounted a shaft 52 for lateral or pressure roller 53. On the forward face of the block 47 there is secured as by screws or bolts 54 a work rest blade 55. The upper supporting surface of the blade 55 is inclined as shown at 56 in Figure 6. The blade 56 inclines in the direction of the regulating wheel 24 and forms with the operative surface thereof a work supporting trough in which the stem 57 of the work piece is positioned. By reference to Figure 4 it will be noted that the head 58 of the work piece lies beyond the vertical edge of the work rest blade 55. It will also be noted by reference to Figures 4 and 6 that the blade 55 is provided with elongated apertures 59 through which the clamping bolts 54 extend and whereby the said blade may be vertically adjusted relative to the block 47 for properly positioning the axis of the work with the axis of the grinding and regulating wheels.

The block 47 has also secured to its inner face a stop 60 which engages the terminus of the work piece and establishes the size between the said terminus of the work and the portion of the head being ground. By reference to Figure 4 it will be noted that screw 61, whereby the stop 60 is secured to the block 47, is not centrally of the length of said block so that if the block were turned end for end a different size or measurement will exist between the terminus of the work that engages the block and the terminus being ground. In this way it is possible to grind two sizes of work pieces by simply reversing the position of the stop 60 relative to the block 47.

As was noted above the shaft 35 extends from the support or bracket 33 to one end of the bed where it is mounted in the bearing 36. This shaft 35 has secured to it beyond the bearing 36 an arm 62 which is pivoted at 63 to one end of a link 64. The other end of the link 64 is pivoted at 65 to the operating handle or lever 31 intermediate its ends. From this it will be seen that oscillation of the lever 31 for effecting movement of the regulating wheel and work will likewise effect oscillation of the shaft 35.

In normal operation with the handle 31 in the position shown in Figure 1, the wheels are then retracted from one another and the work supporting block 47 and toggle mechanism are in the position shown in dotted outline in Figure 3. In this position the work is mounted on the blade. In order to prevent the work from rolling off the inclined face 56 of the blade, there is provided a spring finger 66 secured as by cap screws or the like 67 to the forward face of the block 47 below the lower edge of the work rest blade. It will be noted that the finger 66 is provided at its upper end with an outwardly projecting lip 68 having the surface 69 thereof formed parallel with the adjacent face of the regulating wheel 24, and that when in operative position this face 69 is free of the operative face of the regulating wheel 24. After the work piece has been placed on the blade 55 the handle 31 is oscillated in a counter-clockwise direction for shifting the slides 19 and 21 toward the grinding wheel to operatively associate the work and wheel. Simultaneously with this movement of the handle 31 the shaft 35 is oscillated in a counter-clockwise direction thereby raising the arm 37 from the dotted line position in Figure 3 to the solid line position therein and thereby shifting the members 40 and 41 relative to one another compressing the spring 44 and placing the stem of the work into operative engagement with the face of the wheel 24. This movement of the parts takes place during the first half of the oscillatory movement of the handle 31 from the vertical position shown in Figure 1 whereupon the parts are fed toward the grinding wheel to effect the stock removal from the work. In other words, after the work is brought into operative engagement with the regulating wheel, the spring 44 is merely compressed for maintaining a yielding action on the block and yieldingly holding the work in frictional engagement with the wheel.

After the work has been reduced to the desired size and finish the handle 31 is reversely actuated, thereby retracting the work from the grinding wheel and shifting the toggle arms from

the solid line to the dotted line position. After the work has passed the active face of the grinding wheel, it is desired to eject same from the work rest blade. For this purpose the block 47 has pivoted to it at 70 the ejector arm 71 which is adapted to oscillate along the said front face of the block 47. The ejector arm 71 has secured to its upper end the head 72 which is adapted to engage the end of the work contacting with the stop block 60. By reference to Figure 3 it will be noted that the block 60 contacts with the work along one edge of the terminus of the work and that the head 72 lies in a plane parallel with the stop block 60 in a position to engage the said terminus of the work at a point laterally spaced from its point of contact with the stop block. The ejector arm 71 is oscillated to and held in its normal position by means of a spring 73 received in a socket 74 formed in the arm and abutting with a shoulder 75 formed on the block 47. The movement of the arm 71 is limited under the influence of the spring by means of a lug 76 formed on the lower end thereof and engaging with the raised portion or lug 75. Secured rotatably to one side of the arm 71 is a barrel shaped roller 77 which engages the tapered cam shaped face 78 of ejector arm actuating cam 79. This cam 79 is pivoted at 80 to the bracket 33. The cam 79 has secured to it at 81 one end of a spring 82, the other end of which is secured to the shaft 48. An adjustable stop screw 83 carried by the cam 79 limits its movement about the pivot 80 under the influence of the spring 82.

The operation of the ejector is as follows: As the block 47 is oscillated away from the active face of the regulating wheel 24 it carries with it the ejector arm 71. As soon as the work has passed the lateral limit of the grinding wheel the barrel shaped roller 77 engages with the cam face 78 of cam 79 which oscillates the ejector arm 71 in a clockwise direction as seen in Figure 4 thereby bringing the head 72 into contact with the end of the work piece and shifting said work piece axially off of the work rest blade into a suitable receptacle placed for receiving same. As the arm nears the limit of its movement away from the face of the regulating wheel the roller snaps over the end of the cam and the arm is returned to its normal position by means of the spring 73. After a new work piece has been placed on the work rest blade and the parts again operated toward their working position the roller 77 engages with the cam 79 oscillating same in a clockwise direction as seen in Figure 3 expanding the spring 82. Just before the parts are in their normal operative position the roller 77 rides off of the cam 79 where upon the spring 82 returns it to its normal position.

From the foregoing it will be noted that there has been provided a machine for semi-automatically grinding the flat terminal portion of headed articles such as tappets and the like and that this machine is substantially automatically operated for properly positioning the work relative to the wheels, feeding the work into the grinding wheel and ejecting same from the machine.

It will be noted that the work piece contacts with the lateral or side face of the regulating wheel which extends in a plane at right angles to the axis of rotation of the spindle 23. This wheel is made of suitable abrasive material for affording the proper frictional grip between the work and wheel. In order that the wheel may efficiently function, it is necessary that its active face 84 be periodically trued or re-surfaced. For this reason the head 22 carries a bracket 85 supporting a truing tool or diamond 86, a hand wheel 87 being provided for vertically shifting the tool 86 across the active face of the regulating wheel.

As the face 84 is trued or re-surfaced it recedes from its original position thereby throwing the alignment of the machine out and to compensate for this mis-alignment the wheel 24 is adapted to be axially shifted relative to its spindle. For this purpose the spindle 23 is provided with a tapered nose 88 terminating in a threaded portion 89 on which is threadingly mounted a nut 90. A split sleeve 91 is provided having a tapered bore 92 adapted to receive the tapered nose 88 of the spindle. The outer surface of the sleeve 91 is plane and forms a bearing for a wheel collet 93 on which the regulating wheel 24 is mounted. The wheel being clamped between a collar or flange 94 formed integral with the collet 93 and a clamp nut 95 threadingly mounted thereon. The collet 93 and sleeve 91 are keyed to one another as at 96 to prevent any relative rotative movement but permit axial shifting one with respect to the other. Likewise the sleeve 91 and spindle nose 88 are keyed to one another at 97 for preventing any relative rotative movement while permitting an axial shifting of one with respect to the other. The sleeve 91 is further provided in its forward end with an enlarged counterbore 98 in which is positioned the nut 90 which is also adapted to contact with the base or shoulder formed in the end of the counterbore 98 and whereby the sleeve 91 is shifted relative to the nose 88 of the spindle. The collet 93 is provided with threaded bores 99 receiving the threaded end of bolts 100. The bolts are provided on their outer end with cylindrical heads 101 partially received in sockets 102 formed in the split sleeves near their outer ends and at points diametrically opposite one another. The bolts are further provided with screw driver slots 103 whereby they may be rotated.

By this construction and after retruing the active face 84 of the regulating wheel, the nut 90 is loosened or backed away from the shoulder of the counter-bore 98 thereby permitting the sleeve to be shifted slightly relative to the tapered nose 88 of the spindle for breaking the joint between them. This permits the sleeve to contract thereby reducing its outer diameter and loosening the joint between itself and the collet 93. The screws 100 are then rotated which effects the shifting of the collet along the outer plane surface of the sleeve either toward the work or away from the work depending upon the direction of actuation of said screws. After the regulating wheel has been adjusted to the desired point the nut 90 is again actuated for forcing the sleeve 91 on to the tapered nose of the spindle causing an expansion of the said sleeve to take place for clamping the collet and sleeve to one another and thereby locking the regulating wheel in its adjusted position.

What is claimed is:

1. In a grinding machine of the class described, the combination of a bed, a grinding wheel rotatably mounted thereon, a friction drive wheel rotatably mounted on the bed, a work rest blade for supporting a work piece and oscillatable toward the friction drive wheel for operatively engaging the work with the friction drive wheel

whereby it is rotated while in operative engagement with the grinding wheel, means supporting the regulating wheel and oscillatable work rest for movement relative to the bed toward the grinding wheel for effecting stock removal from the work, the work rest blade being oscillatable from a position remote from the friction drive wheel to permit replacement of the work to a position adjacent the wheel, and a single means for effecting the oscillation of the work rest blade and movement of the unit toward and from the grinding wheel in sequential order.

2. In a grinding machine for grinding the terminal portion of headed articles the combination of a bed, a grinding wheel rotatably mounted thereon, a slide supported by the bed for movement toward and from the grinding wheel, a friction drive wheel rotatably mounted on the slide and movable therewith, a work rest blade oscillatably mounted on the slide for movement toward and from the friction drive wheel, an oscillatable ejector arm adjacent the work rest blade, and means for oscillating the blade toward the friction drive wheel to operatively associate the work supported thereby with the wheel and to oscillate the blade from the wheel and operate the ejector arm to discharge the work from the blade.

3. In a grinding machine for grinding the terminal portion of headed articles the combination of a bed, a grinding wheel rotatably mounted thereon, a slide supported by the bed for movement toward and from the grinding wheel, a friction drive wheel rotatably mounted on the slide and movable therewith, a work rest blade oscillatably mounted on the slide for movement toward and from the friction drive wheel, an oscillatable ejector arm adjacent the work rest blade, means for oscillating the blade toward the friction drive wheel to operatively associate the work supported thereby with the wheel and to oscillate the blade from the wheel and operate the ejector arm to discharge the work from the blade, lateral pressure rolls for engaging the work at a point on the other side of the center of the work from that which engages the friction drive wheel and for holding the work in proper peripheral engagement with the work rest blade and friction drive wheel, and a stop member adjacent the work rest for limiting the axial movement of the work along the blade.

4. In a grinding machine for grinding the terminal portion of headed articles the combination of a bed, a grinding wheel rotatably mounted thereon, a slide supported by the bed for movement relative thereto toward and from the grinding wheel, a friction drive wheel rotatably mounted on the slide, a bracket supported by the slide, a block for supporting a work piece pivotally mounted on the bracket for oscillation between two extreme positions and when in one position is adjacent the friction drive wheel and when in its second position is remote therefrom, a shaft oscillatably journaled on the slide, a toggle connection between the block and shaft whereby oscillation of the shaft effects corresponding oscillation of the block, and a manually actuable lever for effecting the oscillations of the shaft.

5. In a grinding machine for grinding the terminal portion of headed articles the combination of a bed, a grinding wheel rotatably mounted thereon, a slide supported by the bed for movement relative thereto toward and from the grinding wheel, a friction drive wheel rotatably mounted on the slide, a bracket supported by the slide, a block for supporting a work piece pivotally mounted on the bracket for oscillation between two extreme positions and when in one position is adjacent the friction drive wheel and when in its second position is remote therefrom, a shaft oscillatably journaled on the slide, a toggle connection between the block and shaft whereby oscillation of the shaft effects corresponding oscillation of the block, a manually actuable lever for effecting the oscillations of the shaft, and an operative coupling between the lever and slide whereby the block is oscillated in timed sequence with the movement of the slide toward and from the grinding wheel.

6. In a grinding machine of the class described, the combination of a work rest blade, an oscillatable support therefore, a friction drive wheel adjacent the blade when in grinding position, the blade having an inclined operative surface inclining toward the operative surface of the friction drive wheel, and means preventing disassociation of the work and inclined surface of the blade prior to engagement of the work with the wheel.

7. In a grinding machine of the class described, the combination of a work rest blade, an oscillatable support therefore, a friction drive wheel adjacent the blade when in grinding position, the blade having an inclined operative surface inclining toward the operative surface of the friction drive wheel, means preventing disassociation of the work and inclined surface of the blade prior to engagement of the work with the wheel, pressure rolls carried by the blade support for engagement with the work for holding same against the inclined surface of the blade and friction drive wheel, and yielding means yieldably oscillating the blade support toward the friction drive wheel.

8. In a grinding machine of the class described, the combination of a work rest blade, an oscillatable support, a friction drive wheel adjacent the blade when in grinding position, the blade having an inclined operative surface inclining toward the operative surface of the friction drive wheel, means preventing disassociation of the work and inclined surface of the blade prior to engagement of the work with the wheel, pressure rolls carried by the blade support for engagement with the work for holding same against the inclined surface of the blade and the friction drive wheel, yielding means yieldably oscillating the blade support toward the friction drive wheel, a grinding wheel for operation on the terminal portion of the work while held in engagement with the work rest blade and friction drive wheel, means supporting the work rest blade support and friction drive wheel for movement as a unit toward the grinding wheel for effecting a stock removal from the work, and a common means for first oscillating the blade support to operatively associate the work thereon and friction drive wheel and to subsequently feed the unit toward the grinding wheel and effect the desired stock removal.

9. In a grinding machine of the class described for grinding the terminal portion of headed cylindrical work pieces, the combination of a work rest blade for engaging the cylindrical shank of the work piece and having the head thereof projecting beyond the work rest, a grinding wheel for operation on the head, a friction drive wheel for engaging the shank of the work

for effecting and controlling its rotation, an oscillatable support for the blade, means for oscillating the support toward and from the grinding wheel to operatively associate and disassociate the shank of the work and the friction drive wheel, and an ejector mechanism for discharging the work from the blade when the support is oscillated in a direction away from the friction drive wheel.

10. In a grinding machine of the class described for grinding the terminal portion of headed cylindrical work pieces, the combination of a work rest blade for engaging the cylindrical shank of the work piece and having the head thereof projecting beyond the work rest, a grinding wheel for operation on the head, a friction drive wheel for engaging the shank of the work for effecting and controlling its rotation, an oscillatable support for the blade, means for oscillating the support toward and from the grinding wheel to operatively associate and disassociate the shank of the work and the friction drive wheel, an ejector mechanism for discharging the work from the blade when the support is oscillated in a direction away from the friction drive wheel, said mechanism comprising an arm pivotally mounted on the support, a head on the arm in alignment with the terminal portion of the work, yieldable means for normally holding the ejector head out of engagement with the work, and means operable for shifting the arm against its yielding means for causing the head to engage the terminus of the work and shift same from the blade.

11. In a grinding machine of the class described for grinding the terminal portion of headed cylindrical work pieces, the combination of a work rest blade for engaging the cylindrical shank of the work piece and having the head thereof projecting beyond the work rest, a grinding wheel for operation on the head, a friction drive wheel for engaging the shank of the work for effecting and controlling its rotation, an oscillatable support for the blade, means for oscillating the support toward and from the grinding wheel to operatively associate and disassociate the shank of the work and the friction drive wheel, an ejector mechanism for discharging the work from the blade when the support is oscillated in a direction away from the friction drive wheel, said mechanism comprising an arm pivotally mounted on the support, a head on the arm in alignment with the terminal portion of the work, yieldable means for normally holding the ejector head out of engagement with the work, means operable for shifting the arm against its yielding means for causing the head to engage the terminus of the work and shift same from the blade including a barrel-shaped roller carried by the arm, and a cam mounted adjacent the work rest blade support for engagement with the barrel-shaped roller for effecting the movement of the ejector arm.

12. In a grinding machine of the class described, the combination of a bed, a grinding wheel rotatably mounted on the bed, a friction drive wheel rotatably supported by the bed, the grinding wheel being adapted to be rotated at a high rate of speed and utilizing its peripheral surface for effecting a stock removal from the work while the friction drive wheel is offset as respects the grinding wheel and adapted to be rotated at a slow work controlling rate of speed and utilizing its side face for frictionally controlling the rotation of the work, the grinding wheel and side face of the friction drive wheel bearing a definite relation to one another during the grinding operation and the said side face of the friction drive wheel being subject to wear, means supporting a work piece for proper engagement with the peripheral face of the grinding wheel and side face of the friction drive wheel, a spindle for the grinding wheel, a spindle for the friction drive wheel, and means for shifting the friction drive wheel relative to its spindle for maintaining the proper relationship between the operative faces of the grinding wheel and friction drive wheel.

13. In a grinding machine of the class described, the combination of a bed, a grinding wheel rotatably mounted on the bed, a friction drive wheel rotatably supported by the bed, the grinding wheel being adapted to be rotated at a high rate of speed and utilizing its peripheral surface for effecting a stock removal from the work while the friction drive wheel is offset as respects the grinding wheel and adapted to be rotated at a slow work controlling rate of speed and utilizing its side face for frictionally controlling the rotation of the work, the grinding wheel and side face of the friction drive wheel bearing a definite relation to one another during the grinding operation and the said side face of the friction drive wheel being subject to wear, means supporting a work piece for proper engagement with the peripheral face of the grinding wheel and side face of the friction drive wheel, a spindle for the grinding wheel, a spindle for the friction drive wheel, means for shifting the friction drive wheel relative to its spindle for maintaining the proper relationship between the operative faces of grinding wheel and friction drive wheel, said means comprising a wheel collet, a sleeve on the spindle supporting the collet, and means for shifting the collet relative to the sleeve and clamping said collet in its adjusted positions to the sleeve.

14. In a mechanism for operatively associating a work piece with a friction drive wheel the combination with the friction drive wheel, of a work rest blade, a pivotally mounted support for the blade oscillatable toward the friction drive wheel for operatively associating the work on the blade with the wheel and oscillatable from the friction drive wheel to disassociate the work and wheel and to effect a replacement of the work on the blade, and means for effecting the oscillation of the support, said means including an oscillatable shaft, and a toggle connection between the shaft and support whereby said support is locked in either of its operative positions.

15. In a mechanism for operatively associating a work piece with a friction drive wheel the combination with the friction drive wheel, of a work rest blade, a pivotally mounted support for the blade oscillatable toward the friction drive wheel for operatively associating the work on the blade with the wheel and oscillatable from the friction drive wheel to disassociate the work and wheel and to effect a replacement of the work on the blade, and means for effecting the oscillation of the support, said means including an oscillatable shaft, a toggle connection between the shaft and support whereby said support is locked in either of its operative positions, and yielding means associated with the toggle connection whereby the work is yieldably held in engagement with the friction drive wheel.

16. In a mechanism for operatively associat-

ing a work piece with a friction drive wheel the combination with the friction drive wheel, of a work rest blade, a pivotally mounted support for the blade oscillatable toward the friction drive wheel for operatively associating the work on the blade with the wheel and oscillatable from the friction drive wheel to disassociate the work and wheel and to effect a replacement of the work on the blade, means for effecting the oscillation of the support, and work ejecting means carried by the support operable during the oscillation of the support from the friction drive wheel for ejecting the work from the blade.

17. In a mechanism for operatively associated a work piece with a friction drive wheel the combination with the friction drive wheel, of a work rest blade, a pivotally mounted support for the blade oscillatable toward the friction drive wheel for operatively associating the work on the blade with the wheel and oscillatable from the friction drive wheel to disassociate the work and wheel and to effect a replacement of the work on the blade, means for effecting the oscillation of the support, and work ejecting means carried by the support operable during the oscillation of the support from the friction drive wheel for ejecting the work from the blade including a lever pivotally mounted on the carrier and forming a stop for the work during its engagement with the friction drive wheel, a fixed cam, and an abutment on the lever for engagement with the cam to effect the movement of the lever relative to its pivot.

18. In a mechanism for operatively associating a work piece with a friction drive wheel the combination with the friction drive wheel, of a work rest blade, a pivotally mounted support for the blade oscillatable toward the friction drive wheel for operatively associating the work on the blade with the wheel and oscillatable from the friction drive wheel to disassociate the work and wheel and to effect a replacement of the work on the blade, means for effecting the oscillation of the support, and work ejecting means carried by the support operable during the oscillation of the support from the friction drive wheel for ejecting the work from the blade including a lever pivotally mounted on the carrier and forming a stop for the work during its engagement with the friction drive wheel, a fixed cam, an abutment on the lever for engagement with the cam to effect the movement of the lever relative to its pivot, and means mounting the cam to render same inoperative during reverse movement of the support.

19. In a mechanism for operatively associating a work piece with a friction drive wheel the combination with the friction drive wheel, of a work rest blade, a pivotally mounted support for the blade oscillatable toward the friction drive wheel for operatively associating the work on the blade with the wheel and oscillatable from the friction drive wheel to disassociate the work and wheel and to effect a replacement of the work on the blade, means for effecting the oscillation of the support, work ejecting means carried by the support operable during the oscillation of the support from the friction drive wheel for ejecting the work from the blade including a lever pivotally mounted on the support and forming a stop for the work during its engagement with the friction drive wheel, a fixed cam, an abutment on the lever for engagement with the cam to effect the movement of the lever relative to its pivot, means mounting the cam to render same inoperative during reverse movement of the support, and means associated with the friction drive wheel for maintaining the proper relationship between the said wheel and work rest blade.

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