June 14, 1932. H. FRITSCHI 1,862,850

GRINDING MACHINERY

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Fig. 1

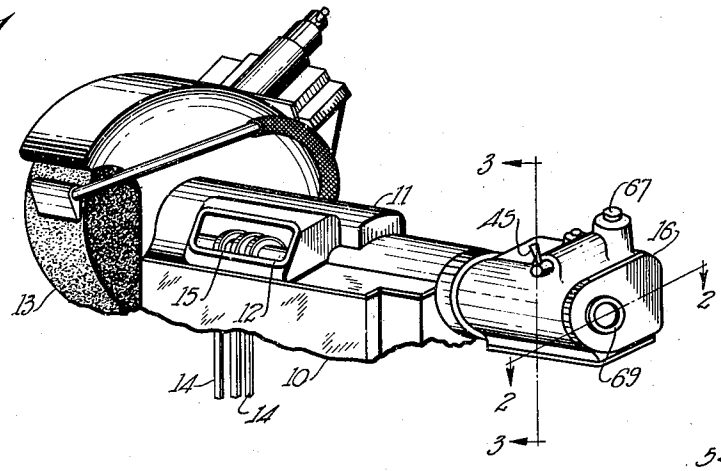

Fig. 2

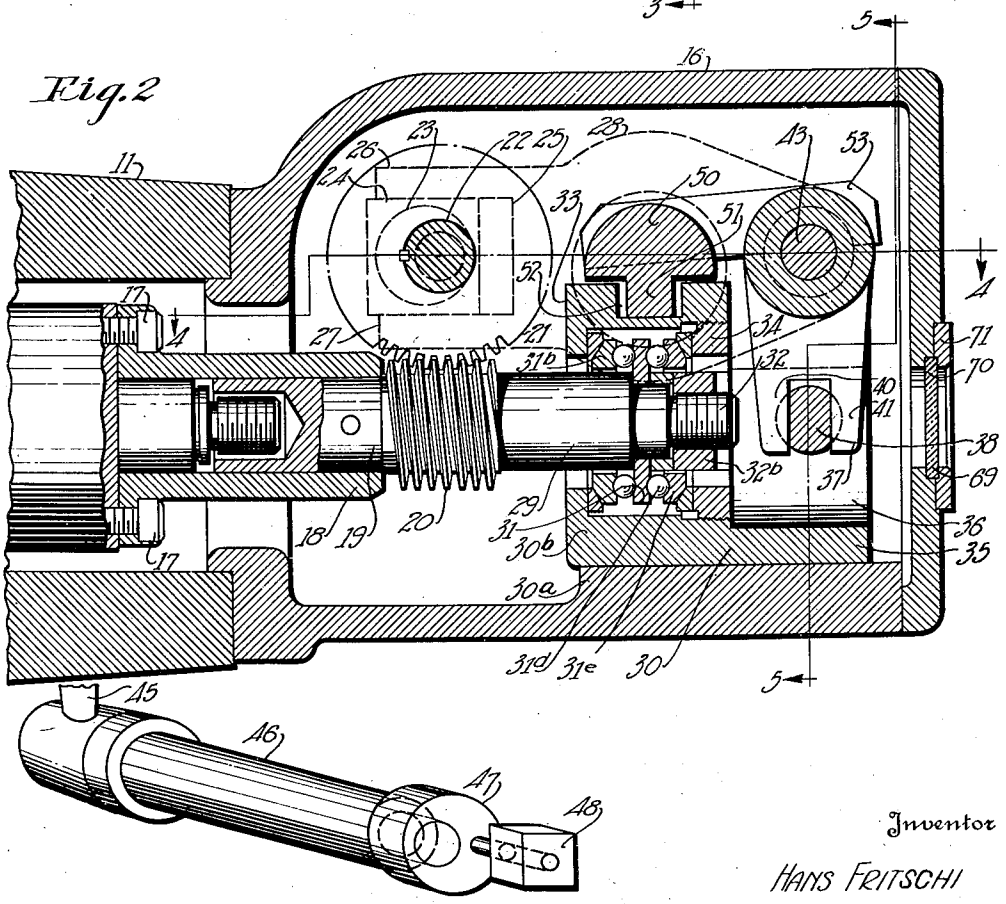

Fig. 6

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Fig. 3

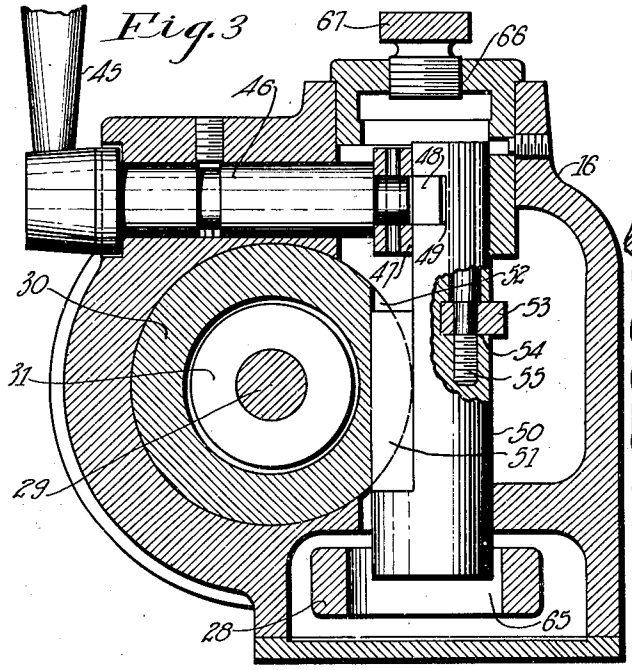


Fig. 5

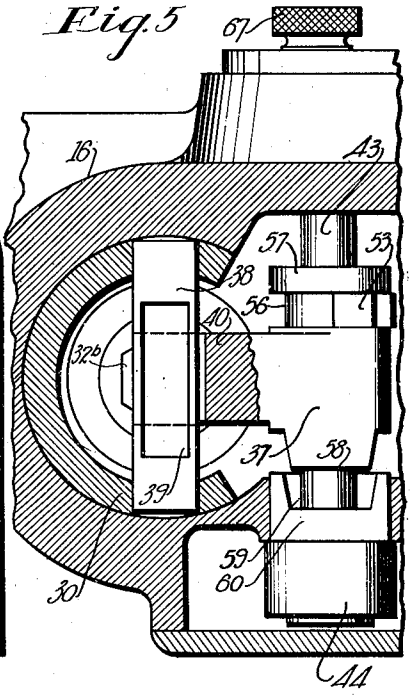
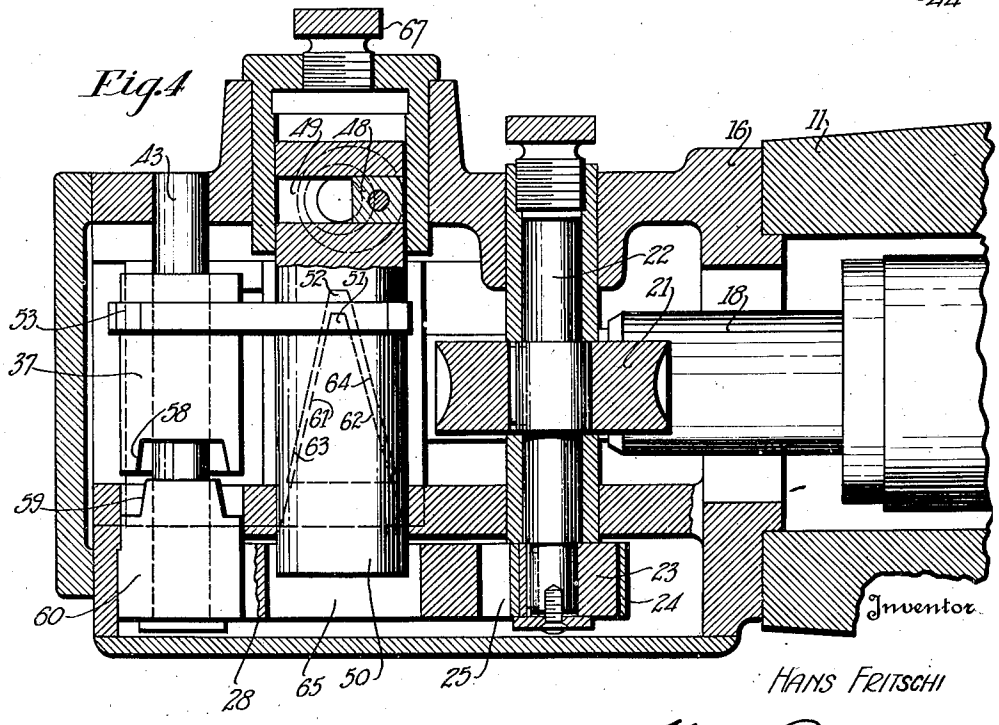


Fig. 4



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Patented June 14, 1932 1,862,850

UNITED STATES PATENT OFFICE

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GRINDING MACHINERY

Application filed February 15, 1930. Serial No. 428,802.

This invention relates to improvements in machine tools and especially to improvements in a grinding machine.

An object of the present invention is to provide in a machine tool having a rotating member such as a grinding wheel spindle, improved means for effecting a slow axial reciprocation thereof.

Another object of the invention is the provision of an improved structure to accomplish the above noted object that is in the nature of an attachment and may be secured to already existing spindles.

Other objects and advantages of the present invention should be readily understood by reference to the following specification considered in conjunction with the accompanying drawings forming a part thereof and it is to be understood that any modifications may be made in the exact structural details without departing from or exceeding the spirit of the invention.

Figure 1 is a fragmentary perspective view of a portion of a grinding machine embodying this invention.

Figure 2 is a sectional view taken on line 2—2 of Figure 1.

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

Figure 4 is a sectional view taken on line 4—4 of Figure 2.

Figure 5 is a sectional view taken on line 5—5 of Figure 2.

Figure 6 is a perspective view of the clutch actuating shaft forming a detail of the invention.

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

In the drawings the numeral 10 designates the base of a machine such as a grinding machine supporting journals or bearings 11 for the grinding wheel spindle 12 having a grinding wheel 13 mounted on the end thereof to rotate therewith when driven by any suitable source of power through the transmission belts 14 engaging pulleys 15 carried by the spindle intermediate its ends.

In certain classes and types of grinding it is desirable to effect a slight axial reciprocation of the spindle and grinding wheel carried thereby to break up the grinding lines. To this end a housing 16 is secured to the journal 11 containing the reciprocating mechanism. The spindle 12 has secured to it by means of cap screws or the like 17 a sleeve like member 18 extending about and engaging the projection 19 of the standard spindle. Secured interiorly of the sleeve 18 is a worm shaft 19 having formed integral therewith worm 20 meshing with a worm wheel 21 secured to and driving a cam shaft 22. Shaft 22 has formed thereon an eccentric or cam 23 seated in a bore formed in a slide block 24 shiftable through a way 25 formed between arms 26 and 27 carried by one end of a lever 28.

The worm shaft 19 is provided with an extension 29 extending through one end 30*b* of sleeve 30 slidably mounted in a bearing 30*a* formed in the housing 16. An anti-friction thrust bearing 31 is mounted in the sleeve end 30*b* and has its intermediate race secured to the worm shaft 29 by means of a nut 32*b* threadedly secured to the end 32 thereof. The outer races 31*b* and 31*c* and bearings 31*d* of the anti-friction thrust bearing is clamped between a flange 33 formed on the end of sleeve 30*b* and a ring nut 34 threadedly secured therein. The other end 35 of the sleeve 30 is provided with a slot or opening 36 through which a lever 37 oscillates. A pin 38 is secured to the walls of the sleeve 30 and extends laterally of the sleeve and has a flat 39 formed thereon to be straddled by arms 40 and 41 of lever 37. This lever 37 is loosely journaled on a shaft 43 to which the end 44 of arm 28 is secured.

From the foregoing it will be noted that as the spindle 12 is rotated worm shaft 19 and worm 20 rotate therewith for driving worm gear or wheel 21. This effects a rotation of cam shaft 22 and an oscillation of arm 28 about the axis of shaft 43 to which it is secured. The oscillation of shaft 43 is transmitted and changed through the lever or link 37 into axial reciprocation of sliding sleeve 30 and spindle 12 secured thereto. To disconnect the reciprocating mechanism from the spindle 12 the lever 37 is adapted to be

raised to disengage the clutch now to be described.

The lever 45 is secured to a shaft 46 journaled in bearings provided in housing 16 and extending transversely thereof. An eccentric 47 is secured to the end of shaft 46 and pivotally supports eccentrically thereof a slide block 48 received in a guide way 49 formed in shiftable lock plunger 50. The lock plunger 50 has formed on one face thereof a wedge shaped clamp 51 slidable through a similarly shaped groove 52 formed in the face of sleeve 30. A link 53 is fitted in a groove 54 formed in the opposite side of plunger 50 and secured therein by means of a stud 55. The other end of link 53 is received in a circular groove 56 formed in the sleeve 57 of actuating lever 37 above referred to. The other end of the sleeve has clutch face 58 formed thereon cooperating with clutch face 59 formed in a boss or enlargement 60 on one end 44 of arm 48.

From the foregoing it will be noted that as handle 45 is actuated the eccentric slide block 48 thereon will raise or lower the reciprocating plunger 50 thereby actuating the wedge 51 through the groove or way 52 to cause an interlocking engagement between the inclined walls 61 and 62 of the wedge 51 and similarly inclined walls 63 and 64 of the groove or way 52. At the same time the vertical movement of plunger 50 carries with it link 53 thereby raising sleeve 57 together with actuating lever 37 and disconnecting clutch faces 58 and 59 to disconnect the power drive. The relative movement between the pin 38 and the lever 37 is made possible by elongating the flat faces 39 on the pin 38 a sufficient distance to at least equal the movement of the lever. It will also be noted that locking plunger 50 has its path of movement directly above and in line with the arm 28 and to eliminate any interference therebetween the said arm 28 is provided with an enlarged bore 65.

In operation the casing 16 is partly filled with a suitable lubricating oil or the like adapted to be introduced through port 66 normally closed by plug 67 and to keep the operator advised of the amount of lubricant within the casing 16, the rear cover 68 thereof is provided with a sight gauge 69 of the usual construction comprising a glass plate 70 held in place by cover 71.

From the foregoing it will be noted that a reciprocating attachment for use with grinding wheel spindles or other revolving members of a machine tool organization which it is desired to effect a slow axial movement has been provided which may be attached to the standard commercial spindle now on the market by simple easily obtainable parts. It will also be noted that the structure described is of a compact nature and may be readily operatively connected or disconnected with the spindle depending upon the wishes or desires of the operator and the class or type of work being done. The spindle is rigidly locked in position when the reciprocating mechanism is disconnected therefrom and the spindle is at all times returned to and locked in the same position relative to the work whether or not the reciprocating attachment was disconnected at either end of the reciprocating stroke or in the middle thereof by means of the wedge shaped lock.

What is claimed is:

1. In a device of the class described the combination of a support, bearings carried thereby, a spindle rotatable in and axially shiftable through the bearings, disconnectable means for axially shifting the spindle, and means thereof for simultaneously disconnecting the axially shiftable means from the spindle and for locking same against axial displacement.

2. In a device of the class described the combination of a support, bearings carried thereby, a spindle rotatable in and axially shiftable through the bearings, said spindle having a normal definite position of rotation relative to the bearings means for axially shifting the spindle from its normal position including a cam, means connecting the cam with the spindle for rotation thereby, an assembly oscillatable by the cam, means for connecting and disconnecting the assembly and the spindle and additional means operable simultaneously with the disconnecting means for locking the spindle against axial displacement in its normal rotating position.

3. In a device of the class described, the combination of a support, bearings carried thereby, a spindle rotatable in and axially shiftable through the bearings, means for axially shifting the spindle driven by the spindle and including an oscillatable arm, a sliding sleeve, a pin and slot connection between the arm and sleeve to convert the oscillating motion of the arm into reciprocating motion of the sleeve and an anti-friction connection between the spindle and sleeve whereby the spindle is reciprocated with the sleeve without retarding the rotation of the spindle during said reciprocation.

4. In a device of the class described the combination of a rotatable spindle, bearings therefor, means for reciprocating the spindle axially of the bearings including a rotating cam, an oscillatable arm operated by the cam, an actuating lever operatively connecting the arm and spindle to change the oscillating motion of the arm into reciprocating motion of the spindle, a separable clutch between the oscillatable arm and actuating lever, and means for shifting the clutch to disconnect the reciprocating means from the spindle.

5. In a device of the class described, the combination of a rotatable spindle, bearings

for the spindle, said spindle having a definite normal rotating position relative to the bearings, means for axially reciprocating the spindle relative to its bearings including an oscillating arm, means for connecting and disconnecting the arm with the spindle to reciprocate same thereby including a separable clutch, and means for returning the spindle to and locking same in its normal, rotating position simultaneously with the disconnection of the reciprocating means.

6. In a device of the class described, the combination of a spindle, bearings for the spindle, means to rotate a spindle in the bearings, the spindle having a definite normal position relative to the bearings when not reciprocating, interruptable means for axially reciprocating the spindle relative to its bearings including an oscillating arm, means connecting the arm with the spindle to reciprocate same thereby including a separable clutch, means locking the spindle in its normal rotating position when the reciprocating means is disconnected, and a common actuating member for the separable clutch and locking means.

7. A reciprocating attachment for rotating spindles and the like comprising a driving shaft connected to the spindle, a driven cam shaft operatively connected with the driving shaft, an oscillatable arm actuated by the cam shaft, a sliding sleeve operatively connected with the oscillatable arm and adapted to be slidably reciprocated thereby, and anti-friction means connecting the sleeve and driving shaft to reciprocate the shaft with the sleeve without retarding the rotation of the shaft during said reciprocation.

8. A reciprocating attachment for rotating spindles and the like comprising a driving shaft connected to the spindle, a driven cam shaft operatively connected with the driving shaft, an oscillatable arm actuated by the cam shaft, a sliding sleeve operatively connected with the oscillatable arm and adapted to be slidably reciprocated thereby, anti-friction means connecting the sleeve and driving shaft to reciprocate the shaft with the sleeve, and means to break the connection between the oscillatable arm and sleeve to interrupt the reciprocation of the driving shaft without interfering with its rotation.

9. A reciprocating attachment for rotating spindles and the like comprising a driving shaft connected to the spindle, a driven cam shaft operatively connected with the driving shaft, an oscillatable arm actuated by the cam shaft, a sliding sleeve operatively connected with the oscillatable arm and adapted to be slidably reciprocated thereby, anti-friction means connecting the sleeve and driving shaft to reciprocate the shaft with the sleeve, means to break the connection between the oscillatable arm and sleeve to interrupt the reciprocation of the driving shaft without interfering with its rotation, said means comprising a separable clutch, a manually oscillatable shaft, an eccentric carried by the shaft and a shiftable sleeve connected with one member of the clutch receiving the eccentric to be shifted thereby.

10. A reciprocating attachment for a rotating member comprising means for supporting the member during rotation, the member and supporting means having a normal position relative to one another when the member is rotating but not reciprocating, oscillatable driving means operated by the rotating member, and means for returning the member to its normal position when the reciprocating means is disconnected therefrom and for locking the member in said normal position.

11. In a reciprocating attachment for a rotating member the combination of a support for said member, means operable by said member for effecting reciprocation of the member including a sliding sleeve having a connection with the member, the rotating member having a normal position relative to its support when not reciprocating, means connecting and disconnecting the reciprocating means with the member, and means for returning the member to its normal position when the reciprocating means is disconnected therefrom and for holding the member against axial displacement in its normal position.

12. In a reciprocating attachment for a rotating member the combination of a support for said member, means operable by said member for effecting reciprocation of the member including a sliding sleeve having a connection with the member, the rotating member having a normal position relative to its support when not reciprocating, means connecting and disconnecting the reciprocating means with the member, and means for returning the member to its normal position when the reciprocating means is disconnected from the member and for holding the member against axial displacement when in its normal position, said means comprising a vertically shiftable wedge having its walls at an angle to one another cooperating with a similarly formed way in the side of the sleeve having side walls at an angle to one another and adapted to be engaged by the side walls of the wedge.

13. In a reciprocating attachment for a rotating member the combination of a support for said member, means operable by said member for effecting reciprocation of the member including a sliding sleeve having a connection with the member, the rotating member having a normal position relative to its support when not reciprocating, means connecting and disconnecting the reciprocating means with the member, and means for returning the member to its normal position

when the reciprocating means is disconnected therefrom and for locking the member against axial displacement when in its normal position, and said means comprising a vertically shiftable wedge having its side walls at an angle to one another cooperating with a similarly formed way in the side of the sleeve having side walls at an angle to one another and adapted to be engaged by the side walls of the wedge, and the sleeve enclosing an anti-friction terminal bearing for the rotating member whereby the thrust between the sleeve and the member during reciprocation is reduced to a minimum and the friction between the member and sleeve is reduced to a minimum when the member is in its normal rotating position.

14. In a grinding machine the combination of a grinding wheel, a spindle for the wheel, means supporting the spindle, a power operated eccentric for effecting a reciprocation of the spindle relative to its bearings, and a manually operated eccentric for disconnecting the power eccentric from the spindle and for manually shifting the spindle relative to its bearings.

15. In a reciprocating attachment for use with grinding machines the combination with a grinding wheel, a spindle therefor, bearings for the spindle, a housing secured to the spindle bearings, an eccentric journaled in the housing, means connecting the eccentric with the spindle for rotation thereby, means connecting the eccentric with the spindle for effecting its reciprocation, a manually operated eccentric journaled in the housing, and means operable by the manually actuable eccentric for disconnecting the power operated eccentric from the spindle, stopping the reciprocation of the spindle and manually shifting the spindle relative to its bearings.

16. In a reciprocating attachment for use with grinding machines the combination with a grinding wheel, a spindle therefor, bearings for the spindle, a housing secured to the spindle bearings, an eccentric journaled in the housing, means connecting the eccentric with the spindle for rotation thereby, means connecting the eccentric with the spindle for effecting its reciprocation, a manually operated eccentric journaled in the housing, means operable by the manually actuable eccentric for disconnecting the power operated eccentric from the spindle stopping the reciprocation of the spindle and manually shifting the spindle relative to its bearings, and an anti-friction thrust bearing in the spindle connection with the power operated eccentric whereby the said spindle is reciprocated without retarding its rotation.

In testimony whereof I affix my signature.

HANS FRITSCHI.