Nov. 12, 1935. F. S. HAAS 2,020,547

GRINDING MACHINE

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Fig. 1

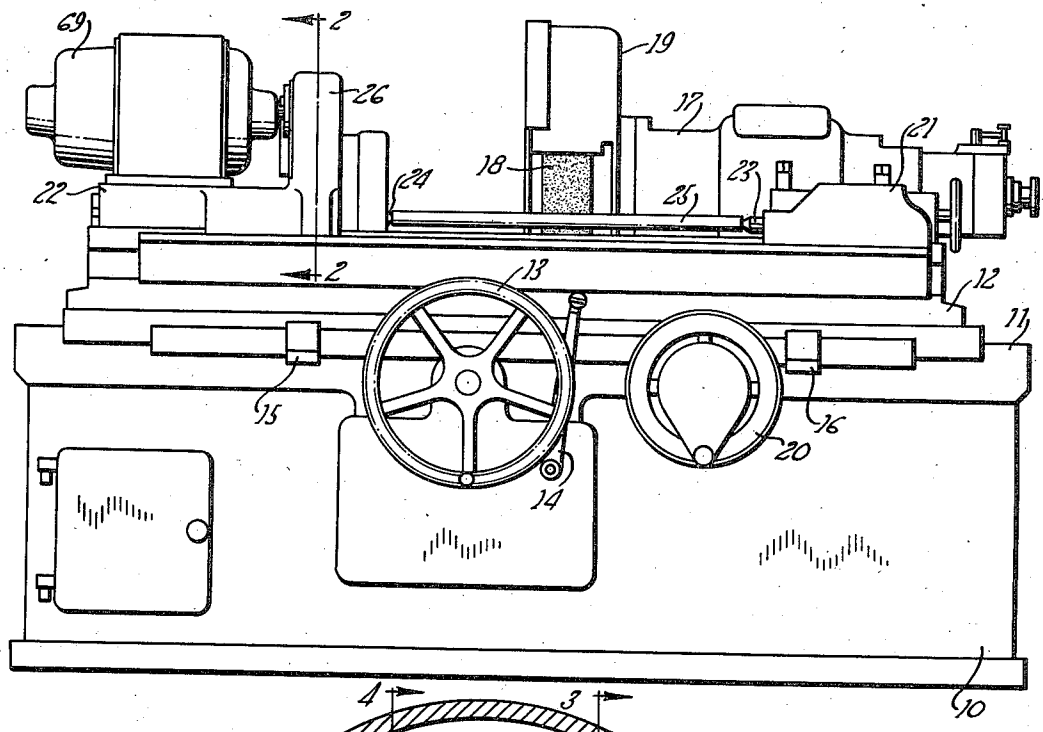
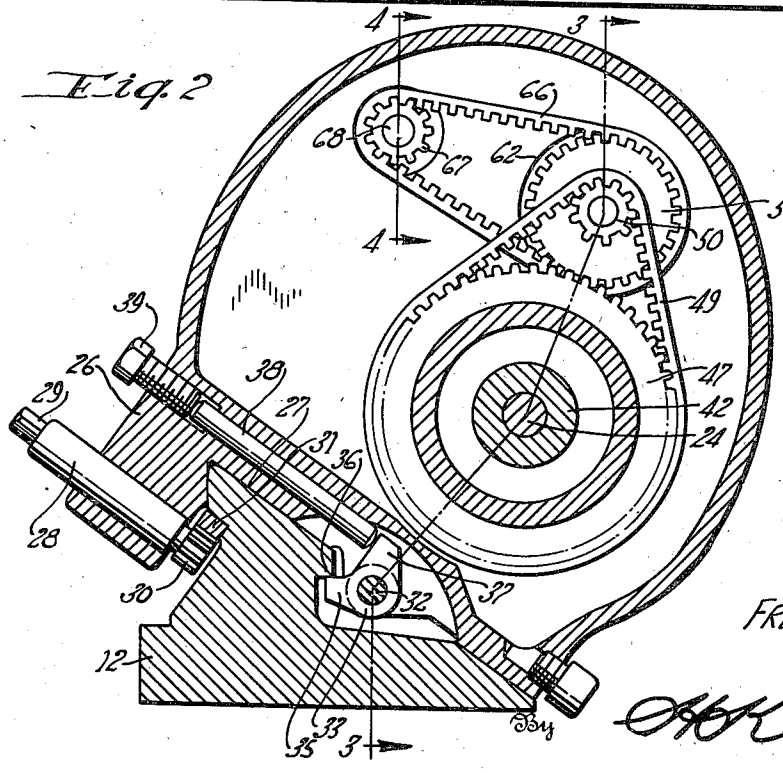


Fig. 2



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Fig. 5

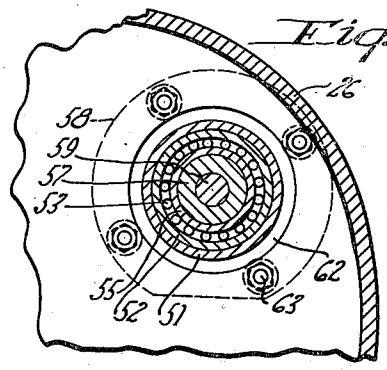
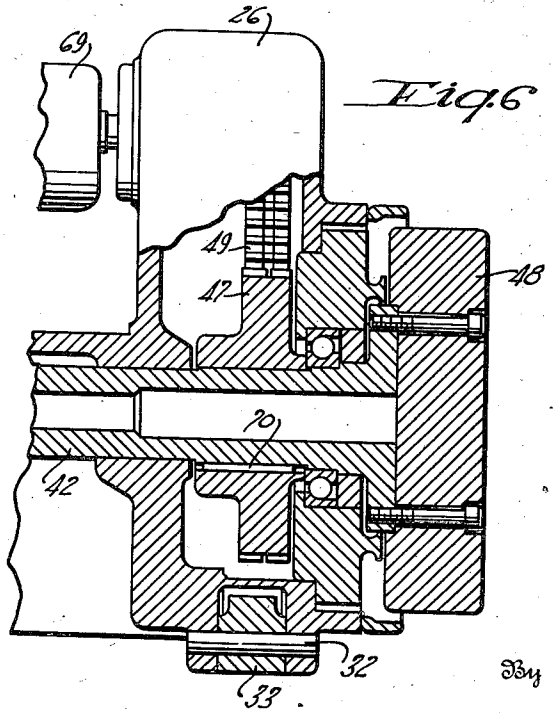


Fig. 3

Fig. 6



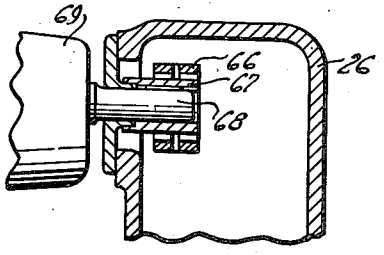


Fig. 4

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UNITED STATES PATENT OFFICE

2,020,547

GRINDING MACHINE

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Application November 4, 1933, Serial No. 696,709

3 Claims. (Cl. 51—237)

This invention relates to improvements in grinding machines and particularly to improvements in work driving means, such as the headstock of a center type grinder.

An object of the invention is therefore the provision of an improved head stock mechanism for use with center type grinders and like machine tools.

Another object of the invention is the provision of an improved drive for headstocks and the like to effect the rotation of work driving spindles.

A further object of the invention is the provision of an improved work rotating mechanism wherein flexible transmission members are employed and wherein friction and the like is held to an absolute minimum, resulting in a very smooth drive.

A still further and specific object of the invention is the provision of a drive for headstocks and the like utilizing a plurality of flexible transmission members and in which the tension in said members may be readily established and any slack therein simultaneously taken up.

Other objects and advantages of the present invention should be readily apparent by reference to the following specification, considered in conjunction with the accompanling drawings forming a part thereof and it is to be understood that any modifications 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 a front elevation of a grinding machine embodying the improvements of 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 2.

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

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

Figure 6 is a view, partly in section and partly in elevation, showing the invention as applied to a live or rotating spindle structure.

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

As was noted above, this invention pertains primarily to work driving or rotating means which is generally termed a headstock when applied to grinding machines, lathes and like machine tools. The invention is shown in the drawings as being applied to a grinding machine, but it is to be understood that the invention is not necessarily restricted to this type of machine.

A grinding machine in general comprises a base or bed 10 having formed on its upper surface ways 11 for guiding a work supporting table 12 during its movement relative thereto. Suitable mechanism is enclosed within the bed and under the control of the hand wheel 13 and a reversing lever 14 for controlling said reciprocating movements of the table 12. The reversing lever 14 operates a power reversing mechanism, as is well known, and this lever is in turn engaged by dogs 15 and 16 adjustably mounted on the forward face of the table 12 at each end of the stroke of the table.

Behind the work supporting table 12 the bed 10 supports a grinding wheel carriage 17 for movement relative thereto and at right angles to the direction of movement of the table 12. The carriage 17 has journaled therein a spindle to which is secured the grinding wheel 18. Also carried by the carriage 17 is a wheel guard 19 which substantially encloses the grinding wheel and confines the coolant and the like usually employed with grinding machines. Suitable mechanism is supported by the bed and under the control of the hand wheel 20 for effecting the said movement of the carriage 17 toward and from the work supporting table 12.

Mounted on the table 12 at opposite ends thereof is a tailstock 21 and a headstock 22 respectively supporting and having projecting therefrom centers 23 and 24 which terminally engage the work, such as 25 for rotation and operation thereon by the grinding wheel. The tailstock 21 is of the usual construction, while the headstock as shown in the drawings is of a new and novel type.

The headstock 22 comprises a housing 26 having formed on its lower surface a way 27 engaging a correspondingly formed supporting surface on the table 12. Along the forward side, the housing 26 has journaled therein one or more shafts 28, each carrying at its upper end a wrench boss 29 and at its inner end a pinion 30. The pinion 30 is adapted to mesh with the teeth of a rack 31 secured to the table 12. Rotation of the shaft 28 therefore causes, through the pinion 30 and rack 31, the adjustment of the headstock relative to the table 12 toward and from the tailstock 21. In order to secure the headstock in different positions of adjustment the said headstock carries a shaft 32 on which is loosely

mounted one or more clamping dogs 33, each of which is in the form of a bell crank having one arm 35 thereof adapted to engage with a lug 36 projecting inwardly of the table. The other arm 37 of the dogs 33 engages with the inner end of an axially shiftable rod 38 disposed in a suitable bore formed through the housing 26. The outer end of the rod 38 contacts with a clamping screw 39 threaded into the housing 26 at the end of the clamping rod bore. From this it will be seen that actuation of the rod 38 downwardly toward the right, as seen in Figure 2, will rotate the clamping dog 33 in a clockwise direction and securely clamp the headstock to the table, while reverse actuation of these parts will effect the loosening thereof.

The housing 26 is provided interiorly thereof with bearings 40 and 41 for a spindle 42. The spindle 42 carries at its inner end the center 24 and immediately behind the center, the inner race members 43 and 44 of anti-friction bearings 45 are journalled. The outer races of these bearings are carried by a driven member 47, such as a pulley or chain sprocket, the latter being shown in the drawings. The sprocket 47 is keyed or otherwise secured, as by screws or bolts 47*a*, to a face plate or the like 48 which provides the connection to the work so that as it is rotated the work is driven. Extending about the sprocket 47 is a chain 49 in turn trained about a pinion 50 integral with or secured to a second pinion or gear 51.

As shown in the drawings, the pinion 51 is cup-shaped and has pressed or clamped into it the other races 52 of anti-friction bearings 53 and 54. The inner races 55 and 56 of these bearings are secured to a hollow stub shaft or boss 57 projecting from plate member 58. The compound pinion gear 50—51 is therefore carried by the plate 58 and the integral stub shaft or boss 57. Extending through the bore in said stub shaft or boss is a stud 59 having a head on one end thereof whereby the inner races 55 and 56 of the bearings 53 and 54 are actuated toward one another and clamped between said head 60 and a shoulder 61 formed at the base of the stub shaft 57. These parts are entered through an enlarged bore 62 formed in one wall of the housing 26. The parts are secured in position by a plurality of cap screws 63 which pass through enlarged bores 64 in the plates 58 and are threaded at 65 into the wall of the housing 26.

Trained about the large pinion or gear 51 is a flexible member or chain 66, in turn passing around a pinion 67 secured to the shaft 68 of a motor or prime mover 69 mounted on the housing 22. From the foregoing it will be noted that the drive is from the motor 69 through the chain 66 to the compound gear 51—50, then through the chain 49 to the main gear 47. It will further be noted that the compound gear 51—50 is mounted on anti-friction bearings, as is the gear 47, thereby holding the friction in these parts to an absolute minimum and providing a drive that is really smooth. It should also be noted at this time that the assembly carried by the plate 58 and including bearings 52 and 53, gear 51 and pinion 50 may be termed a jack shaft between the initial source of power or the motor pinion 67 and the final driven member or sprocket 47.

By reference to Figures 3 and 5 it will be noted that considerable clearance is provided by the bore 62 through which the jack shaft assembly enters the housing 26. It will also be noted from these figures that considerable clearance is provided around the cap screws 63 which secure this assembly in position. From this it will follow that the jack shaft assembly has universal adjustment relative to the housing and parts carried thereby and may be readily secured in position in any desired relationship to these parts. Therefore, the slack or a suitable driving tension may be eliminated or placed simultaneously on the chains 66 and 49 or their flexible transmission members by a single adjustment of the jack shaft assembly. Also, either chain may be readily tensioned or the slack therein eliminated by an adjustment in a universal direction with respect to the remaining member, which, it is presumed at this time, is under the proper tension. It is, therefore, believed that the present invention provides a simple mechanism whereby the proper adjustment of the driving members of the headstock may be effected and resulting in a more accurate drive to the work.

The structure shown in Figure 6 is similar in connection with the drive to that described above. Instead, however, of having the final driven member 47 secured to the face plate 48 it is secured by the key 70 directly to the spindle when it is desired to provide a live spindle construction.

I claim:

1. A drive mechanism for a grinding wheel spindle or the like including a driving member and a final member adapted to be driven thereby, a casing inclosing said members, and an adjustable jack shaft device carried by and projecting within the casing including a drum having a sprocket formed exteriorly thereon for operative connection with one of the two first named members, and having a reduced projecting sprocket portion for power transmitting connection with the other of said members, said drum being interiorly provided with an anti-friction bearing race, a stub axle projecting within the drum, anti-friction bearing members carried thereby for cooperation with the race of the drum, and means for adjustably securing the stub axle in position on the casing whereby proper positioning of the pair of drum sprockets may be effected with respect to the members coupled thereto.

2. A headstock spindle structure for a grinding machine or the like including a casing, a spindle projecting within the casing providing a bearing, a driven pinion rotatable on the bearing, drive connections extending from the pinion to the interior of the casing, a pinion engaging said drive connections, a pinion drum integral with the pinion having a second pinion portion exteriorly formed thereon, a prime mover having a drive member disposed within the casing, driving connections between said casing contained portion thereof and the exterior sprocket on the drum whereby motion may be transmitted from the prime mover to the spindle pinion, and means rotatably supporting the drum pinion within the casing for adjustment relative to both the prime mover and the spindle pinion, the casing having an aperture to receive said means and said means including a plate portion over-lying the aperture and providing a closure therefor, said plate having enlarged fastening receiving apertures formed therein, fastening devices of less size than the apertures extending therethrough for clamping the plate to the casing, whereby the plate is capable of limited adjustment with respect to the casing, and a stud projecting inwardly from the

plate into the casing providing a supporting bearing for the sprocket drum.

3. A headstock spindle structure for a grinding machine or the like including a casing, a spindle projecting within the casing providing a bearing, a driven pinion rotatable on the bearing, drive connections extending from the pinion to the interior of the casing, a pinion engaging said drive connections, a pinion drum integral with the pinion having a second pinion portion exteriorly formed thereon, a prime mover having a drive member disposed within the casing, driving connections between said casing contained portion thereof and the exterior sprocket on the drum whereby motion may be transmitted from the prime mover to the spindle pinion, means rotatably supporting the drum pinion within the casing for adjustment relative both the prime mover and the spindle pinion, the casing having an aperture to receive said means, and said means including a plate portion over-lying the aperture and providing a closure therefor, said plate having enlarged fastening receiving apertures formed therein, fastening devices of less size than the apertures extending therethrough for clamping the plate to the casing, whereby the plate is capable of limited adjustment with respect to the casing, a stud projecting inwardly from the plate into the casing providing a supporting bearing for the sprocket drum, anti-friction bearings interposed between the sprocket drum and the stud to facilitate free rotative movement of the former, and a securing member inter-engaged with said bearings and projecting outwardly through the stud for locking the parts against axial displacement.

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