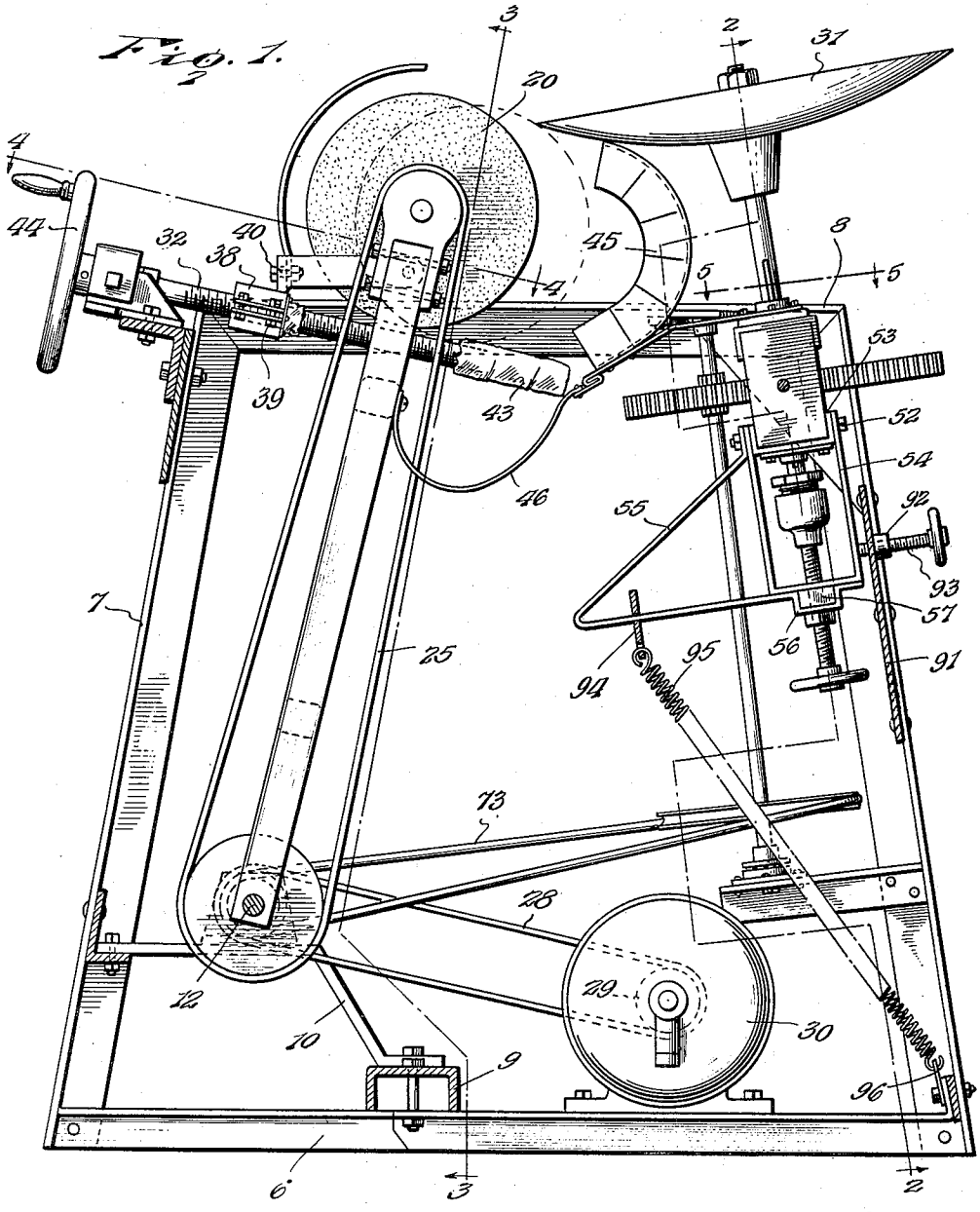
April 23, 1935. G. C. LEACH ET AL 1,998,783

DISK GRINDING MACHINE

Filed Nov. 10, 1933 4 Sheets-Sheet 1

Fig. 1.



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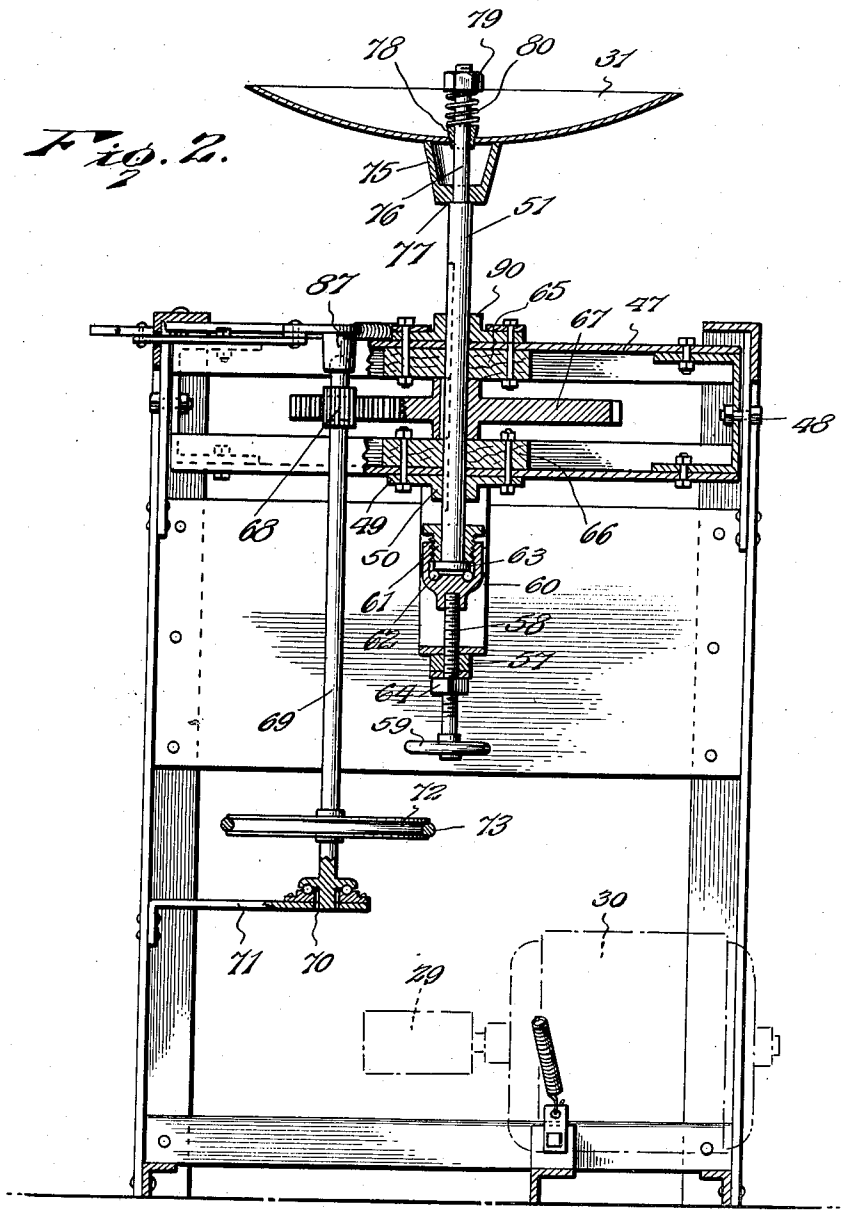
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DISK GRINDING MACHINE

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Fig. 2.



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DISK GRINDING MACHINE

Filed Nov. 10, 1933 4 Sheets-Sheet 3

Fig. 3.

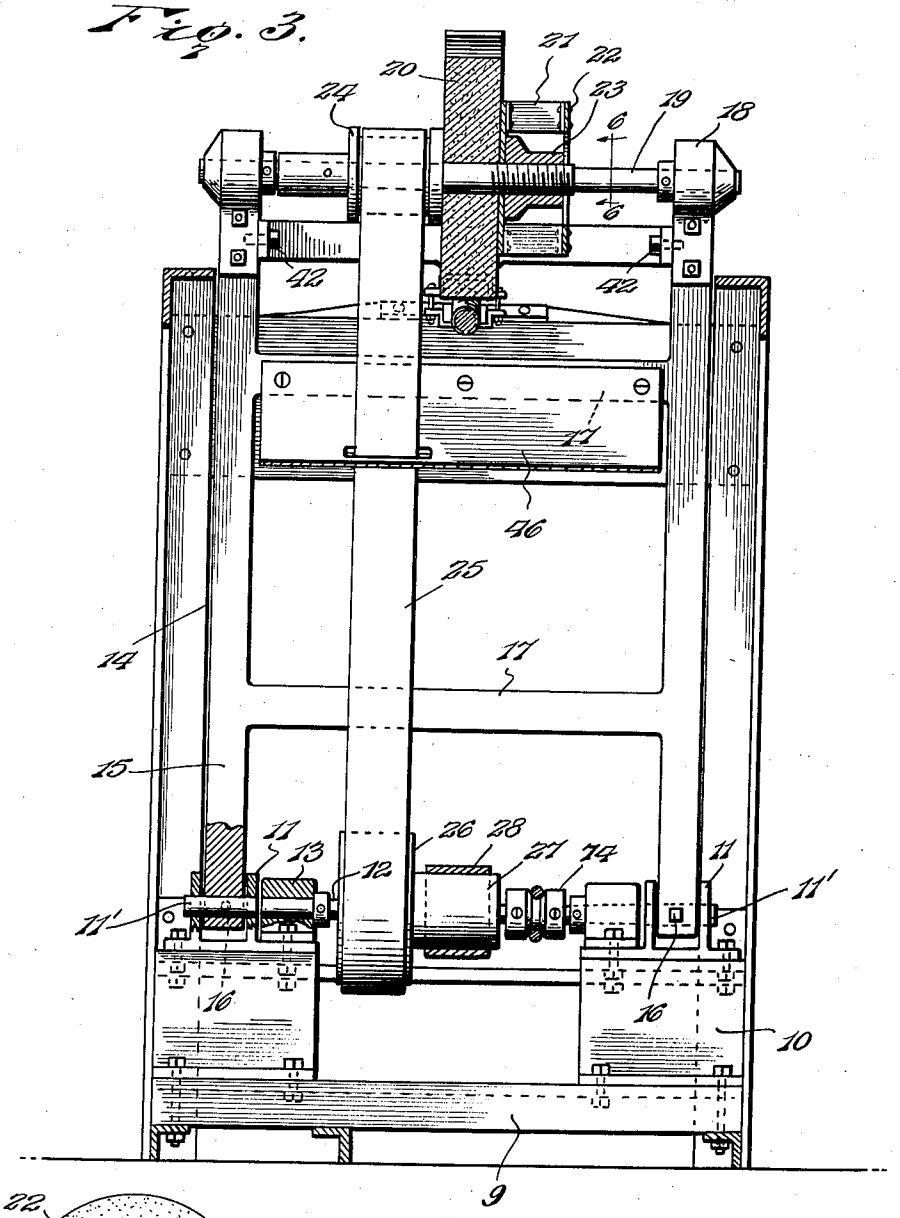
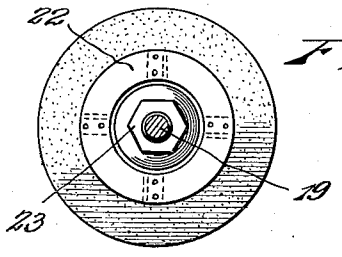


Fig. 6a



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DISK GRINDING MACHINE

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Fig. 4.

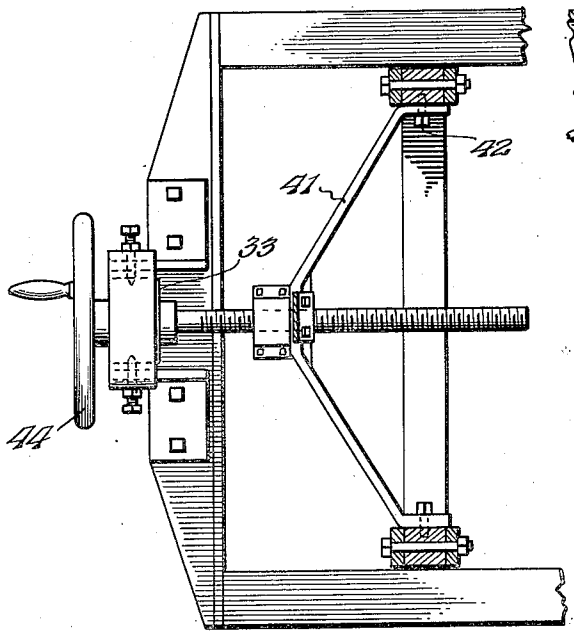


Fig. 5.

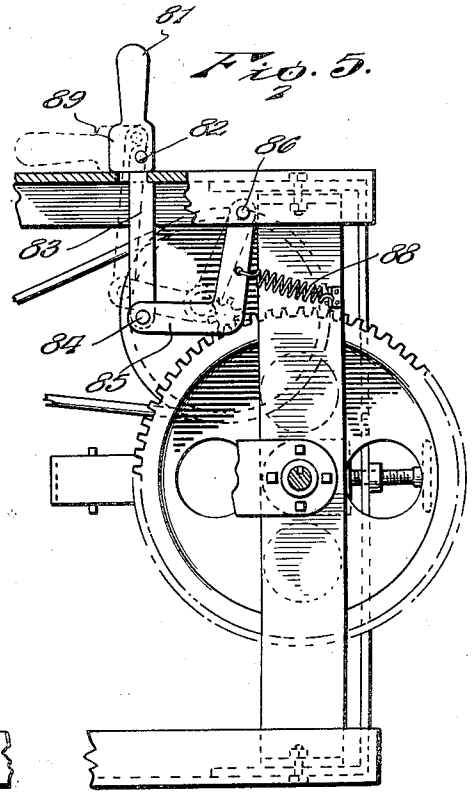


Fig. 6.

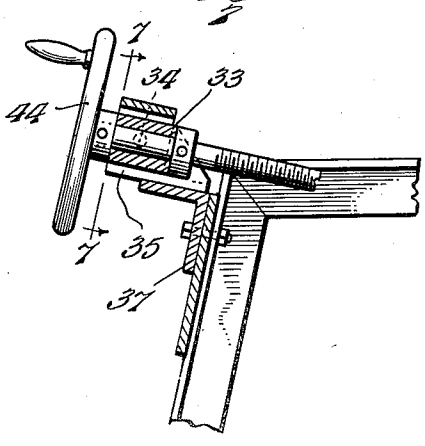
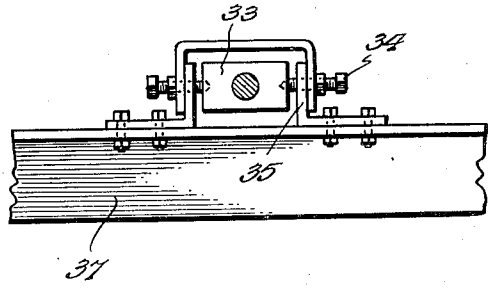


Fig. 7.



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UNITED STATES PATENT OFFICE

1,998,783

DISK GRINDING MACHINE

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Application November 10, 1933, Serial No. 697,522

12 Claims. (Cl. 51—106)

This invention relates to grinding machines and more particularly to a machine especially designed for grinding and sharpening the ground-engaging disks of agricultural machinery.

The object of the invention is to provide a grinding machine of simple, durable and inexpensive construction by means of which plow and harrow disks may be sharpened more expeditiously and economically than heretofore.

A further object of the invention is to provide novel means for adjusting the grinding element with respect to the plow disk and means for cooling said disk during the grinding operation.

A further object is to provide a disk-supporting assembly pivotally mounted for tilting movement on the main supporting frame for yieldably holding the peripheral edge of the plow disk against the grinding element, means being provided for adjusting the disk-supporting assembly with relation to the grinding element whereby to impart the desired bevel or inclination to the cutting edge of the disk.

A further object is to provide novel means for holding the plow disk on the revolving shaft of the pivoted assembly and means for adjusting said shaft vertically of the assembly to permit the sharpening of disks of different sizes and to permit the use of grinding wheels of different sizes.

A further object is to provide means whereby the driving pinion may be conveniently disconnected from the driving gear of the revolving shaft so as to permit removal and replacement of the plow disks without shutting off the motor.

A still further object of the invention is generally to improve this class of machines so as to increase their utility, durability and efficiency.

In the accompanying drawings forming a part of this specification and in which similar numerals of reference indicate corresponding parts in all the views of the drawings,

Figure 1 is a side elevation, partly in section, of a disk grinding machine constructed in accordance with the present invention,

Figure 2 is a vertical sectional view taken on the line 2—2 of Figure 1,

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

Figure 4 is a transverse sectional view taken on the line 4—4 of Figure 1,

Figure 5 is a transverse sectional view taken on the line 5—5 of Figure 1,

Figure 6 is a detail sectional view of the adjusting screw for the grinding element,

Fig. 6a is a sectional view on the line 6—6 of Fig. 3.

Figure 7 is a transverse sectional view taken on the line 7—7 of Figure 6.

The improved grinding machine, forming the subject-matter of the present invention, comprises a main supporting frame 5 preferably formed of angle iron and comprising bottom sills 6 having converging uprights 7 secured thereto and connected by top rails or sills 8. The bottom sills 6 are connected by a transverse brace 9 and secured to said brace and the adjacent uprights 7 are plates 10 to which are secured brackets 11 having stub shafts 11' journaled therein. Arranged adjacent the brackets 11 and secured thereto and to the plates 10 are suitable bearings 13 in which is journaled a transverse shaft 12, as shown. Pivotally mounted for oscillating movement on the main supporting frame is an auxiliary frame 14 comprising spaced side bars 15, the lower ends of which are secured by set screws 16 to the stub shafts 11' so as to turn therewith and thus permit free pivotal movement of said auxiliary frame. The side bars 15 of the auxiliary frame are connected by transverse braces 17, and journaled in suitable bearings 18 on the upper ends of the side bars 15 of the auxiliary frame is a shaft 19 carrying a grinding wheel 20 formed of any suitable abrasive material, as shown. Disposed on one side of the grinding wheel 20 is a fan 21 having radiating blades 22 and provided on one side with an opening to permit the passage of a clamping nut 23 threaded on the shaft 19 and which bears against the inner wall of the fan casing and serves to hold said fan casing rigidly against the grinding wheel. The fan 21, therefore, revolves with the shaft 19 and grinding element or wheel 20 and serves to keep the plow disk or other implement being sharpened cool during the grinding operation. Disposed on the shaft 19 opposite the fan 21 is a pulley 24 over which extends a belt 25 which also extends over a relatively large pulley 26 mounted on the shaft 12. The pulley 26 is keyed to the shaft 12 and is provided with an integral hub 27 over which extends a driving belt 28 leading to a pulley 29 of a motor 30 of any suitable construction so that motion will be transmitted from the motor 30 through the medium of the belts 28 and 25 to the shaft 19 and thus rotate the grinding element.

As a means for adjusting the grinding element towards or away from the plow disk 31, there is provided a threaded rod 32, the outer end of which is smooth and extends through a tilting

bearing block 33 pivotally mounted by means of pointed screws 34 extending through spaced brackets 35 secured to a transverse angle bar 37 connecting the uprights 7 at one side of the machine, as best shown in Figures 1 and 7 of the drawings. The adjusting screw 34 is thus free to tilt in a vertical plane to accommodate the movement of the auxiliary frame 14. Mounted on the intermediate portion of the threaded adjusting rod 32 is a split nut 38 preferably formed in two sections connected by clamping bolts 39 and extending upwardly from the upper section of the split nut is a post 40 having diverging arms 41 integral therewith with their outer ends bolted at 42 to the side members 15 of the pivoted auxiliary frame. The threaded portion of the adjusting screw 34 is preferably housed in a suitable casing or jacket 43 to protect the threads from the abrading material during the grinding operation, and secured to the outer end of said screw is a handwheel 44 by means of which the screw may be rotated to move the auxiliary frame towards or away from the disk to be sharpened. A guard 45 is also preferably mounted in advance of the grinding wheel 20 and secured to the lower end of said guard is an apron 46 which extends beneath the grinding wheel 20 and is fastened to the upper transverse brace 17 of the auxiliary frame 14 and movable therewith.

Mounted on the main supporting frame in front of the auxiliary frame is a disk-supporting assembly comprising a hollow elongated frame 47 having its opposite ends pivotally mounted at 48 between the side members of the main supporting frame, at the upper end thereof. Secured to the bottom of the hollow frame 47, at the center thereof, is a plate 49 having a central bearing 50 in which is journaled a vertically adjustable disk-supporting shaft 51. Bolted at 52 to suitable ears 53 formed on the plate 47 is a depending substantially U-shaped frame 54 and secured to said frame is a V-shaped extension 55, the lower portion of which is offset to form a socket 56 in which is seated a nut 57. Extending through the socket 56 and nut 57 is an adjusting screw 58, the lower end of which is provided with a handwheel 59, while the upper end of the screw engages a cup-shaped bearing member 60. The cup-shaped bearing member 60 is internally threaded for engagement with the correspondingly threaded portion of a bushing 61, there being a series of anti-friction balls 62 seated in the member 60 and normally bearing against a disk-like head 63 carried by the lower end of the shaft 51. It will thus be seen that by rotating the handwheel 59 the shaft 51 may be adjusted vertically to accommodate the particular style or type of disk being sharpened and to permit the use of different size grinding wheels. A lock nut 64 is threaded on the screw 58 beneath the socket 57 and bears thereagainst for holding the shaft 51 in adjusted position. Secured to the upper and lower walls of the elongated frame 47 are bearing blocks 65 and 66 and interposed between said bearing blocks and slidably keyed to the shaft 51 is a gear wheel 67 which normally meshes with a pinion 68 carried by the upper end of a stub shaft 69, the lower end of the shaft 69 being journaled in suitable bearings 70 carried by a bracket 71 projecting inwardly from the main frame, as best shown in Figure 2 of the drawings. A pulley 72 is secured to the lower end of the stub shaft 69 over which extends a belt 73 trained around a pulley 74 secured to the transverse shaft 12 so that, when the motor is in operation, motion will be transmitted from said motor through the medium of the shaft 12, belt 73 and stub shaft 69 to the intermeshing gears for rotating the disk-carrying shaft 51.

The plow or harrow disk 31 is detachably mounted on the upper end of the shaft 51 and normally rests on a substantially conical hollow holder 75 fitted to the reduced end 76 of the shaft and engaging a shoulder 77 formed by said reduced portion. The plow disk is retained in position on the holder 75 by means of a conical plug 78 which fits in the central opening of the plow disk and interposed between said plug and a nut 79 on the reduced end of the vertical shaft is a coil spring 80 which serves to yieldably support the plug within the opening in the plow disk. It will thus be seen that by loosening the nut 79 the spring and plug 78 may be readily detached and the plow disk 31 removed from the shaft 51 after the grinding operation and a new disk placed in position for sharpening. The spring 80 not only serves to retain the plow disk on the holder 75 but also serves to permit the plow disk to yield slightly to accommodate any inequalities in the surface of the grinding wheel or irregular shape of disks.

In order to permit changing of the plow disks without the necessity of stopping the motor, there is provided a gear shifting device comprising a lever 81 to which is pivotally connected at 82 one end of a link 83, the other end of which is pivotally connected at 84 to a bell crank lever 85, one arm of which is pivotally mounted at 86 on the main supporting frame, as best shown in Figure 5 of the drawings. The angle of the bell crank lever 85 is provided with a depending socket 87 which receives the upper end of the stub shaft 69, there being a coil spring 88, one end of which is secured to the bell crank lever 85 and the other end thereof to the main supporting frame for the purpose of normally and yieldably holding the pinion 68 in mesh with the gear 67. The handle 81 is provided with a cam face 89 so that when the handle 81 is moved inwardly to the dotted line position shown in Figure 5 of the drawings, the bell crank lever 85 will swing laterally on its pivot 86 and thus move the pinion 68 out of mesh with the gear 67 and prevent rotation of the vertical shaft 51 when removing or replacing the plow disk to be sharpened. A bearing plate 90 is preferably arranged opposite the upper block 45 to assist in centering the shaft 51 on the pivoted assembly.

Disposed at one side of the machine is a transverse plate 91 having an internally threaded boss 92 projecting laterally therefrom and in which is threaded an adjusting screw 93, the inner end of which constitutes a stop for limiting the pivotal movement of the disk-supporting assembly Mounted on the lower leg of the V-shaped frame 55 is an anchoring plate 94 to which is secured one end of a coil spring 95, the opposite end of which is secured at 96 to the main supporting frame immediately below said assembly. The spring 95 serves to normally and yieldably hold the disk-supporting assembly against the inner end of the adjusting screw 93 and by rotating the screw 93 the plow disk 31 may be moved toward or away from the grinding wheel 20. Only a slight pivotal movement of the frame 47 is necessary to adjust the disk 31 relative to the grinding wheel 20, and when said frame is tilted, the difference in the angle or inclination of the teeth on the gear wheel 67 with respect to the teeth on

the pinion 68 is compensated for by allowing sufficient play between the teeth, said gear and pinion being normally and yieldably held in engagement with each other by the coil spring 88, as previously stated. The disk-supporting assembly is thus pivotally and yieldably mounted on the main supporting frame and any excessive pressure exerted by the grinding wheel on the disk will be compensated for by the spring 95 so as to permit the disk to give or yield to accommodate any irregularities on the peripheral edge thereof. It will be apparent that by rotating the handwheel 59 the shaft 51 may be adjusted vertically and that by manipulating the handwheels of the screws 32 and 93, the auxiliary frame and disk-supporting assembly may be adjusted towards or away from each other to accommodate the particular size or style disk being sharpened.

It will, of course, be understood that the main supporting frame will be encased in a suitable housing so as to protect the operating mechanism and to give the machine a neat appearance. While the machine is particularly adapted for grinding plow or harrow disks, it will be understood that the machine may be used for other purposes such as grinding different kinds of edged tools and in which event the tools to be sharpened will be supported on the plow disk 31 or on a flat disk in lieu of the concavo-convex disk. From the foregoing description it is thought that the construction and operation of the machine will be readily understood by those skilled in the art and further description thereof is deemed unnecessary.

Having thus described the invention, we claim:

1. A disk grinding machine including a main frame, a disk-supporting assembly pivotally and yieldably mounted on the frame for tilting movement relative to a vertical plane and including a vertically adjustable disk-carrying shaft, an auxiliary frame pivotally mounted on the main frame, a grinding wheel carried by the auxiliary frame, a bearing pivotally mounted on the main frame, a split nut operatively connected with the auxiliary frame, an adjusting rod having a smooth portion extending through the pivoted bearing and a threaded portion extending through the nut for adjusting the auxiliary frame towards and away from the disk-supporting assembly, a motor, and means for transmitting motion from the motor to the grinding wheel and disks supported by said assembly.

2. A disk grinding machine including a main frame, a disk-supporting assembly pivotally mounted on said frame for tilting movement relative to a vertical plane and including a vertically adjustable disk-carrying shaft, an auxiliary frame pivotally mounted on the main frame, brackets on said main frame, a bearing pivotally mounted between the brackets, a nut including upper and lower sections, one of which is provided with diverging arms connected with the auxiliary frame, a grinding wheel carried by the auxiliary frame, an adjusting rod having a smooth portion extending through the pivoted bearing and a threaded portion engaging the nut for adjusting the grinding wheel with respect to the disk-supporting assembly, a motor, and means for transmitting motion from the motor to the grinding wheel.

3. A disk grinding machine including a main frame, a disk-supporting assembly mounted on the main frame, an auxiliary frame pivotally mounted on the main frame, a shaft carried by the free end of the auxiliary frame, a grinding wheel mounted on the shaft, a fan arranged on one side of the grinding wheel, a clamping member mounted on the shaft and engaging the fan for holding the fan in contact with the grinding wheel, a split nut having diverging arms connected with the upper end of the auxiliary frame on opposite sides of the grinding wheel, an adjusting rod threaded in the nut for moving the auxiliary frame towards or away from the disk-supporting assembly, and a bearing for one end of said adjusting rod.

4. A disk grinding machine including a main frame, a disk-supporting assembly mounted on said frame, an auxiliary frame, spaced plates secured to the main frame, brackets mounted on the plates, bearings secured to the brackets, a shaft journaled in the bearings, stub shafts extending through the brackets and auxiliary frame and forming a pivot for said auxiliary frame, a grinding wheel carried by the upper end of the auxiliary frame, a bearing pivoted on the main frame at the rear of the grinding wheel, a threaded nut having arms connected with the upper end of the auxiliary frame, an adjusting rod having a smooth portion extending through the pivoted bearing and a threaded portion engaging the threads of the nut for adjusting the grinding wheel towards or away from the disk-supporting assembly, a motor, and means for transmitting motion from the motor to the grinding wheel.

5. A disk grinding machine including a main frame, a horizontal shaft on said frame, stub shafts in alinement with the horizontal shaft, an auxiliary frame pivotally mounted on stub shafts, a grinding wheel carried by the upper end of the auxiliary frame, a vertically adjustable shaft, means on the upper end of the vertical shaft for supporting a plow disk, a gear wheel slidably keyed on the vertical shaft, a stub shaft, a pinion carried by said stub shaft and movable into and out of engagement with the gear wheel, a motor, means for transmitting motion from the motor to the horizontal shaft, means for transmitting motion from the horizontal shaft to the grinding wheel, and means for transmitting motion from said horizontal shaft to the stub shaft.

6. A disk grinding machine including a main frame, an auxiliary frame pivotally mounted for tilting movement on the main frame, a grinding wheel carried by the auxiliary frame, a hollow frame pivotally mounted on the main frame, a vertically adjustable shaft journaled in said hollow frame, means at the upper end of the vertical shaft for supporting a plow disk, a gear wheel slidably keyed to the vertical shaft, a stub shaft, a pinion carried by the stub shaft and normally meshing with the gear wheel, means for moving the pinion into and out of mesh with said gear wheel, a motor, and means for transmitting motion from the motor to the grinding wheel and stub shaft respectively.

7. A disk grinding machine including a main frame, an auxiliary frame pivotally mounted on the main frame, a grinding wheel mounted on the auxiliary frame, a hollow frame pivotally mounted on the main frame in advance of the grinding wheel, a vertically adjusting shaft journaled in the hollow frame and having its lower end provided with a disk-like head, a sectional bearing receiving the disk-like head of the shaft, an adjusting screw operatively connected with the sectional bearing for adjusting the shaft vertically, a gear wheel disposed within the hollow frame and slidably keyed to the vertical shaft, a stub shaft, a pinion carried by the stub shaft

and normally meshing with the gear wheel, a shift lever operatively connected with the upper end of the stub shaft for moving the pinion in and out of mesh with the gear wheel, means carried by the upper end of the shaft for supporting a plow disk, means for adjusting the auxiliary frame towards or away from the plow disk, a motor, and means for transmitting motion from the motor to the grinding wheel and stub shaft respectively.

8. A disk grinding machine including a main frame, an auxiliary frame pivotally mounted on the main frame, a grinding wheel carried by the auxiliary frame, a hollow frame pivotally mounted on the main frame, a U-shaped frame depending from the hollow frame, a V-shaped frame secured to the U-shaped frame, a gear wheel mounted in the hollow frame, a vertically adjustable shaft extending through the hollow frame and said gear wheel, means depending from the V-shaped frame and operatively connected with the vertical shaft for adjusting said shaft, means carried by the upper end of the vertical shaft for supporting a plow disk, a stop carried by the main frame, a spring forming a yieldable connection between the V-shaped frame and the main frame for yieldably supporting the U-shaped frame in engagement with the stop, a stub shaft, a pinion carried by the stub shaft and meshing with the gear wheel, a motor, and means for transmitting motion from the motor to the grinding wheel and stub shaft respectively.

9. In a disk grinding machine, a main frame, a hollow horizontally disposed frame pivotally mounted on the main frame, a bearing plate secured to the bottom of the hollow frame, a U-shaped frame secured to said plate and provided with a V-shaped extension, a vertically adjustable shaft journaled in said bearing plate, means carried by the upper end of the shaft for supporting a plow disk, a bearing receiving the lower end of the shaft, an adjusting screw engaging the bearing, a gear wheel carried by the hollow frame and slidably keyed to the vertical shaft, a stub shaft, a pinion carried by the stub shaft and engaging the gear wheel, a rod threaded in the main frame and constituting a stop, a spring forming a yieldable connection between the V-shaped extension and main frame for normally and yieldably holding the U-frame in engagement with the stop, a motor, and means for transmitting motion from the motor to the stub shaft.

10. In a disk grinding machine, a main frame, a hollow horizontally disposed frame pivotally mounted on the main frame, a shaft carried by and adjustable vertically of the hollow frame and having its upper end reduced to form a shoulder, a holder bearing against said shoulder and adapted to receive and support a plow disk, a conical plug engaging the plow disc, a nut carried by the upper end of the shaft, a spring interposed between the nut and conical plug, gearing operatively connected with the vertical shaft, and means for rotating the gearing.

11. In a disk grinding machine, a main frame, a horizontally disposed hollow frame pivotally mounted on the main frame, spaced bearing blocks secured to the hollow frame, a vertical shaft journaled in said blocks, a gear wheel interposed between said blocks and slidably keyed to the vertical shaft, means on the upper end of the shaft for supporting a plow disk, means at the lower end of the shaft for adjusting said shaft vertically of the hollow frame, a stub shaft, a pinion carried by the upper end of the stub shaft, a bell crank lever pivotally mounted on the main frame and provided with a socket receiving the upper end of the stub shaft, a lever operatively connected with the bell crank lever for shifting the stub shaft to move the pinion into and out of mesh with the gear wheel, a spring operatively connected with the bell crank lever for normally holding the pinion and gear in mesh, a motor, and means for transmitting power from the motor to the stub shaft.

12. In a disk grinding machine, a main frame, a horizontally disposed hollow frame pivotally mounted on the main frame, an auxiliary frame depending from the horizontal frame and provided with a socket, bearing members carried by the horizontal frame, a vertically adjustable shaft journaled in said bearings, a gear wheel carried by the horizontal frame and slidably keyed to the vertical shaft, a stub shaft, a pinion carried by the stub shaft and meshing with the gear wheel, a bearing for the lower end of the shaft, a threaded adjusting screw extending through the auxiliary frame and engaging the bearing at the lower end of the vertical shaft, a nut seated in said socket and engaging the adjusting screw, a lock nut on the adjusting screw and bearing against the socket, an adjustable stop carried by the main frame for engagement with the auxiliary frame, a spring forming a connection between the auxiliary frame and main frame for normally and yieldably holding the auxiliary frame in engagement with the stop, and means carried by the upper end of the shaft for supporting a plow disk.

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