A. C. WARNER.

GRINDING MACHINE.

APPLICATION FILED JUNE 14, 1907.

956,237. **Patented Apr. 26, 1910.**

2 SHEETS—SHEET 1.

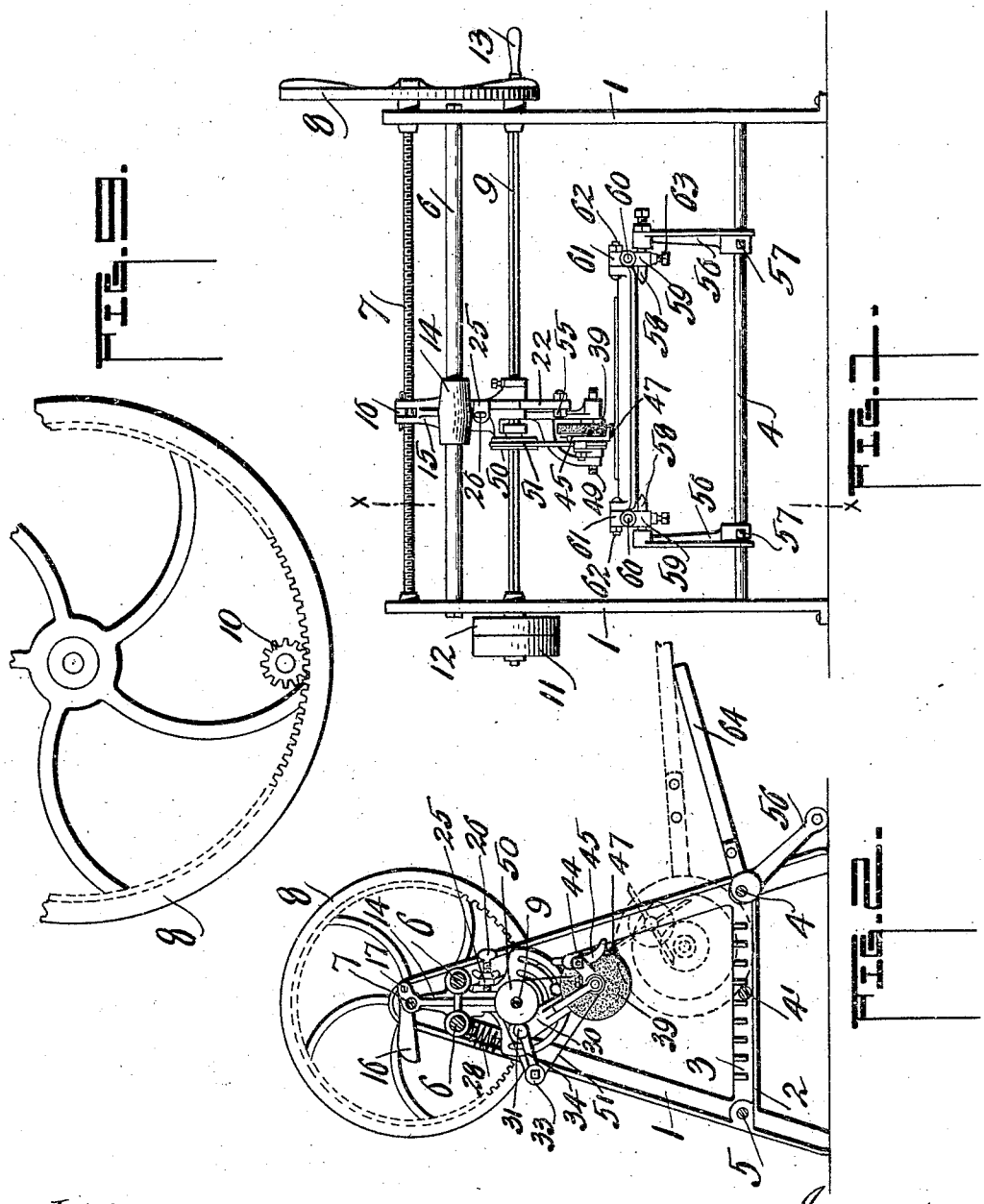

FIG. 3.

FIG. 1.

FIG. 2.

Witnesses:-
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J. C. Bailey

Inventor.
Albert C. Warner,
By Chas. W. LaPorte, Atty.

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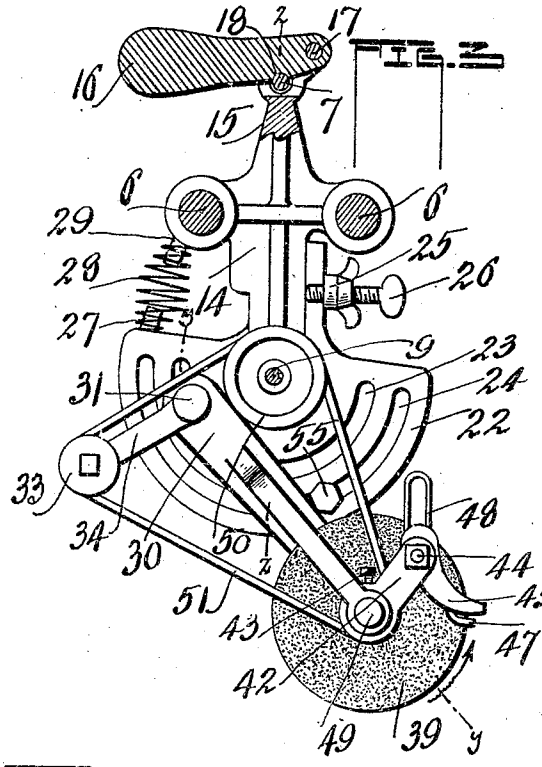


FIG. 2.

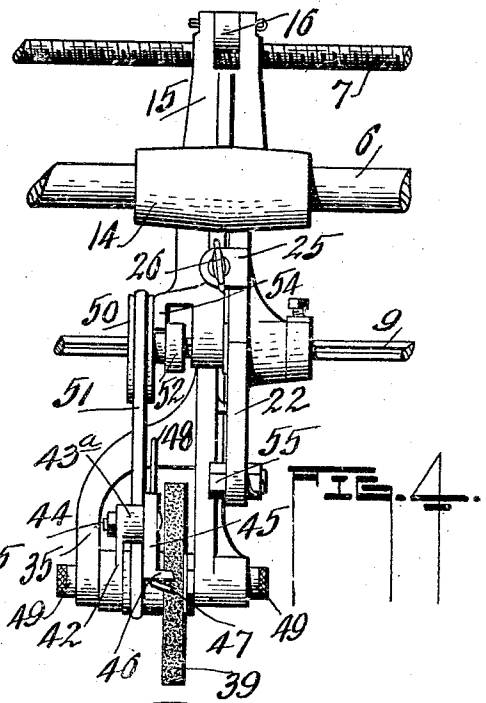


FIG. 4.

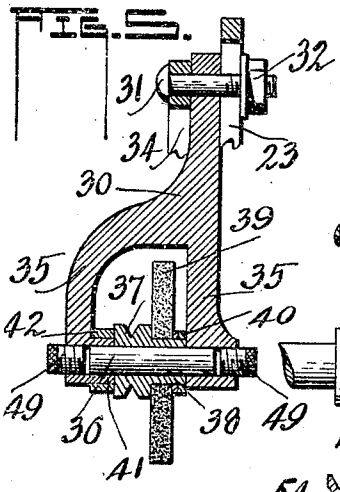


FIG. 5.

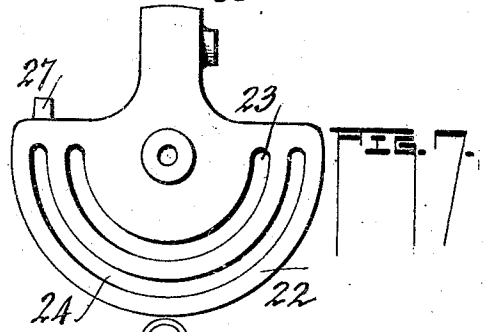
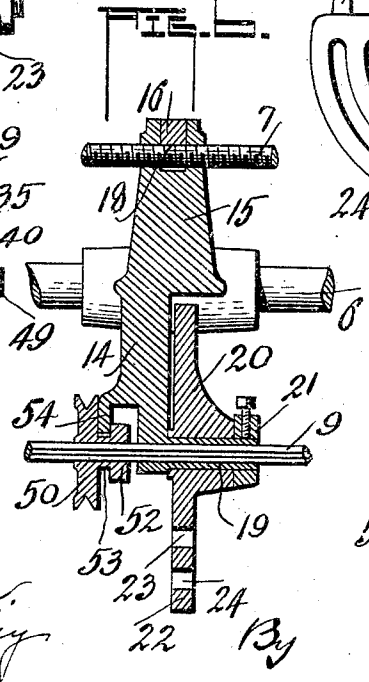


FIG. 7.



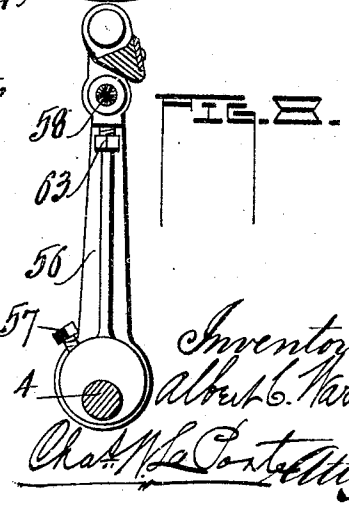


FIG. 8.

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UNITED STATES PATENT OFFICE.

ALBERT C. WARNER, OF PEORIA, ILLINOIS, ASSIGNOR TO PEORIA LAWN MOWER GRINDER CO., OF PEORIA, ILLINOIS, A CORPORATION OF ILLINOIS.

GRINDING-MACHINE.

956,237. Specification of Letters Patent. **Patented Apr. 26, 1910.**

Application filed June 14, 1907. Serial No. 378,904.

To all whom it may concern:

Be it known that I, ALBERT C. WARNER, a citizen of the United States, residing at Peoria, in the county of Peoria and State of Illinois, have invented certain new and useful Improvements in Grinding-Machines; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

This invention has reference to certain new and useful improvements in grinding machines, having special reference to that class of machines for grinding or sharpening lawn-mower blades, although the said machine is adapted to be used for sharpening or grinding skates, shears, planes, chisels and various other tools. A similar machine is shown in an application filed by me on Sept. 13th 1905, bearing Serial No. 278,208.

One of the objects of the present invention is a slidably supported carriage; a grinding wheel support connected to move with said carriage, and means adjustably connected with said support for sustaining a grinding wheel revolubly thereon.

A further object of the invention is a slidably supported carriage; a support adjustably mounted in connection with said carriage; an arm adjustably connected at one end with said support; a grinding wheel revolubly mounted in connection with said arm; guiding fingers adjustably mounted and coöperating with said grinding wheel, and means for operating said grinding wheel.

The invention has for its further object grinding mechanism, adjustably mounted supports, and means coöperating with said supports for supporting the devices to be operated upon by said grinding mechanism.

For a further and full description of the invention herein and the merits thereof, and also to acquire a knowledge of the details of construction, of the means for effecting the result, reference is had to the following description and drawings hereto attached.

While the essential and characteristic features of the invention are susceptible of modification, still the preferred embodiment of the invention is illustrated in the accompanying drawings, in which:—

Figure 1 is a front elevation of a grinding machine embodying my improvements; Fig. 2 is a vertical cross section taken on the line *x*—*x* of Fig. 1, but showing the supports for sustaining the means to be sharpened or ground in a different position, also omitting the parts to be sharpened or ground which are seen in Fig. 1, and further, showing in dotted lines a lawn-mower in position to have its blades sharpened or ground and a support for the handle therefor; Fig. 3 shows an enlarged side elevation of the carriage, grinding wheel support and component parts, also showing in cross section the parts upon which the carriage and supports are mounted; Fig. 4 is an enlarged edge view of what is shown in Fig. 3; Fig. 5 is a cross section taken on the line *y*—*y* of Fig. 3; Fig. 6 is a cross section taken on the line *z*—*z* of Fig. 3, omitting the arm for supporting the grinding wheel; Fig. 7 is an enlarged face view of the support adapted to be connected with the carriage to which the grinding wheel arm is adjustably connected; Fig. 8 is an enlarged side view of one of the supports for sustaining the means to be ground, also showing in connection therewith means to be ground substantially as is shown in Fig. 1, and Fig. 9 is an enlarged detail of the internal gearing for operating the grinding mechanism by hand.

Like numerals of reference indicate corresponding parts throughout the figures.

In the drawings, the machine is shown consisting of a pair of standards 1 which support the working parts to be described. The standards are substantially A shaped as shown in the drawings, and are provided with the cross braces 2 having the notched or cut out portions 3, as shown in Fig. 2. The legs of the opposite standards are connected at or near their lower ends by means of the stationary rods 4 and 5 and at or near their upper ends, by means of the stationary rods 6. Said last mentioned rods extend parallel and are suitably spaced apart, as shown in Fig. 2.

Journaled in the upper ends of the standards 1, is shown a threaded shaft 7 which

passes out through one of the standards and on the outer end thereof is carried a large internal gear wheel 8. Also suitably journaled in the standards 1 and disposed at a suitable distance beneath and parallel with the threaded shaft 7, is a grooved driving shaft 9, on one end of which is a pinion 10 meshing with the teeth of the wheel 8, and on the opposite end of the said shaft, is seen a pair of pulleys 11 and 12. Although not shown, it is adapted to make both of these pulleys fast with shaft 9, or one loose and the other fast, which will adapt the same being connected with suitable power mechanism for driving said shaft, or in the event that manual power used, the said shaft may be actuated by means of an operator turning the wheel 8, through the handle 13, when the pulleys 11 and 12 would be made fast to the shaft and serve as a fly wheel.

14 denotes a carriage which is slidably supported on the stationary rods 6, as well as being slidably carried on the driving shaft 9, and said carriage has an upper extension 15, the upper end of which partially surrounds the threaded shaft 7. The rods 6 serve to steady the carriage and the parts carried thereby and also serves as a rest for the same. The mode of connecting the carriage 14 with the threaded shaft 7 that the said carriage may be reciprocated from one end of the machine to the other, is through a weighted arm 16 pivotally connected at 17 with the upper extension 15 of said carriage and the said arm has a threaded portion 18 which engages with the threaded shaft 7 when the arm is lowered into the position shown in the figures, such connection, when the threaded shaft is operated causes the carriage to be moved on the rod 6 and the driving shaft 9 and to return the said carriage for any reason, the operator will raise the arm 16, disengaging it from the threaded shaft 7 and sliding the carriage across the frame to any suitable point when he may again lower the arm into the position shown in the drawings and connecting the carriage with the threaded shaft for the purpose of moving the same across the frame.

That portion of the carriage 14 carried on the driving shaft 9 comprises a tubular extension or sleeve 19 on which it is adapted to carry a support 20, locked in position on the said sleeve by means of the collar 21. The main body of said support is substantially semi-circular or flared as at 22, provided with a pair of semi-circular slots 23 and 24, struck on an arc of a circle whose center is the center of the driving shaft 9; and the upper portion of said support 22 is provided with an ear 25 extending laterally from the support 22 with the forward portion of said ear positioned in front of the main body of the carriage 14, substantially as seen in Figs. 1 and 4. Having a threaded engagement with the said ear 25 is a thumb screw 26, the end of which is adapted to bear against the body of the carriage 14, as shown in Figs. 3 and 27 is a winged nut, serving as a lock nut on the said thumb screw. Extending upwardly at a suitable point from the flared portion 22 of the support is a lug 27 about which is coiled one end of a spring 28, and the opposite end of said spring is coiled about a lug 29 depending from one of the bearings of the carriage 14 through which one of the rods 6 extends. The advantages to be derived through the use of the thumb screw 26 and the springs 28 will be hereinafter more fully described, in connection with parts supported by the support 29 and the grinding wheel carried thereby.

30 indicates an arm adapted to have a pivotal as well as an adjustable connection with the flared portion 22 of the support 20, by means of a bolt 31 passing through the upper end of said arm, and through the slot 23 in the said support, a nut 32 being employed for retaining the arm in adjusted positions on the said support. The bolt 31 is also adapted to support an idler in connection with the arm 30 and the support 20, said idler consisting of a sheave wheel 33 carried on the outer end of a supplemental arm 34 connected with the arm 30 and support 20 by the bolt 31 in the manner shown. Through the connections just described it will be seen that the arm 30 is sustained at one end in connection with the support 20, in such a way that the arm may be placed at different positions by the adjustment of the bolt 31 in the slot 23 and that the forward end of the arm 30 may be swung on the bolt 31 which forms a fulcrum therefor, for the purpose of obtaining a large number of positions of the arm 30, to vary the position of the grinding wheel, to be described, carried thereby, to adapt said grinding wheel to different tools to be acted upon; such adjustment is also true of the supplemental arm 34 carrying the idler, which may be swung on the bolt 31 forming a fulcrum for the same, said idler employed in connection with driving means to be described, for imparting power from the shaft 9 to the grinding wheel.

The outer end of the arm 30 is provided with bifurcated extensions 35 which are spaced at suitable distances apart, their lower ends forming a bearing for the opposite ends of a shaft or spindle 36 on which is carried a sheave wheel 37 having a hub extension 38 on which is carried a grinding wheel 39; said grinding wheel being retained on the hub extension of the sheave wheel by means of a nut 40. The lower end of one of the bifurcated extensions 35 of the arm 30 has a hub extension 41 in connection

with the bearing thereof and on this hub extension is adapted to be adjustably carried an arm 42 secured in adjusted positions by means of the bolt 43. This arm 42, as will be seen in Fig. 5, is disposed between the body of the bifurcated extension 35 and sheave wheel 37 and the upper end of the arm 42 is provided with a boss 43ª for the purpose of securing thereto by means of a bolt 44 a guiding finger 45, which may be of suitable shape and preferably provided with a right angle extension 46 at its outer free end which extends over and partially across the peripheral face of the grinding wheel 39. In connection with this guiding finger is carried a spring finger 47 which also extends partially across the peripheral face of the grinding wheel 39 and has the upper extension 48 which is secured in connection with the guiding finger 45 by means of the bolt 44 for securing the guiding finger 45 to the boss of the arm 42, as shown in the figures. The spindle 36 above referred to on which the sheave wheel 7 and grinding wheel 39 are carried is somewhat shorter at its opposite ends than the full width of the bearings in the bifurcated extensions 35 of the arm 30 to adapt the connecting with the bearings in the bifurcated extensions of the arm of a pair of threaded plugs 49 having a threaded engagement with the bearings arm. After the short shaft 36 with the sheave wheel 37 and grinding wheel 39 have been assembled in the manner shown in Fig. 5, a suitable lubricant is inserted into the ends of the bearings so that when the plugs are screwed therein, they will force the lubricant up and around the ends of the short shaft 36, which lubricates the said shaft and insures easy running of the same in its bearings. For driving the grinding wheel 39 through the medium of the sheave wheel 37, I provide a driving sheave wheel 50 which is feathered on the driving shaft 9 and passing around said driving sheave wheel 50, the sheave wheel 37 and the idler 33 is a belt or equivalent driving member 51, which transmits motion from the driving shaft to the grinding wheel 39, when power has been connected with said driving shaft. The use of an internal gear on the threaded shaft 7 obviates the twisting of the belt 51 which would be the case if ordinary spur gearing was used for transmitting motion to the driving shaft and from the driving shaft to the grinding wheel; although it is not intended in the use of the internal gear to limit myself to the use of a straight belt, although the straight belt is preferable, and in using a straight belt for the purpose of driving the grinding wheel in the drive shown by the arrow in Fig. 3, it is necessary to use an internal gear, substantially as described.

The manner of carrying the driving sheave wheel 50 on the driving shaft 9 in connection with the carriage 14 is best seen in Fig. 6, wherein is shown an extended hub 52 from the body of the wheel provided with an annular groove 53 in which is adapted to be seated, when the parts are assembled, a yoke 54 forming a part of the carriage 14.

Adjustably carried in the semi-circular slot 24 of the flared portion 22 of the support 20 is a bolt 55, which is adjusted when the arm 30 is adjusted so as to engage the upper edge of the same, substantially as shown in Fig. 3. The object of the bolt 55 is to sustain the outer portion of the arm 30 in its adjusted position during the operation of the grinding wheel on a tool. The tendency of the grinding wheel as well as its supporting arm would be to ride up on to the article being ground and to prevent this and hold the same in true working position, the bolt 53 has been provided.

It is understood that when the arm 30 has been properly adjusted for causing the grinding wheel carried thereby to operate upon a tool, the guiding fingers 45 and 47 are so positioned as to engage the upper and lower edges of the tool, if the same is a cutting blade, that has an irregular shape, for the purpose of guiding such blade and holding it in working position for the operation of the grinding wheel thereon during the movement of the carriage from one end of the machine to the other. Such adjustment of the guiding fingers may be obtained in two ways; either by loosening the bolt 43 and oscillating the arm 42 into a suitable position, or by loosening the bolt 44 and oscillating the guiding fingers into a suitable position or both of said bolts may be loosened for adjusting not only the arm 42 but the guiding fingers as well. For instance, in Fig. 2 a straight blade is shown being operated upon by the grinding wheel and in this case the guiding fingers are not used in connection with the grinding wheel; but in Fig. 1 where a lawn mower is shown in dotted lines and one of the blades is being acted upon by the grinding wheel, the guiding fingers have been adjusted to engage the opposite edges of the blade for holding it in position against the grinding wheel. As is understood, the blades of mowers are usually of irregular shape and as the carriage is moved across the machine, the fingers operate to oscillate the blade supporting means and retain the blade against the grinding wheel. After the carriage is moved across the frame to a point where the grinding wheel has reached the end of the blade or other suitable tool being ground, the operator may push against the forward portion of the support 20 and oscillate the same on the sleeve of the carriage 14 for the purpose of releasing the blade from the guiding means and grinding mechanism;

such movement of the support 20 is against the tension of the spring 28, which, when the support is released will return the same to its adjusted position. The operator may by screwing up the thumb screw 26 partially revolve the support 20 on its axis for the purpose of obtaining minute adjustments of the grinding mechanism after the adjustment has been made of the arm 30, the arm 42 and guiding fingers. In fact, with the regulating means in connection with the grinding means support, the machine may be adjustable to sharpen or grind most any suitable tool and for the purpose of causing the grinding wheel to act more or less on such tools.

In Fig. 1 a straight blade is shown supported to be acted upon by the grinding wheel, and in this connection I have provided a suitable means for supporting a straight blade of the type shown in the drawing or other forms of blades and similar devices, which said supporting means may be also employed, and is, for adjusting the position of a lawn mower sustained by the main frame and the parts thereof, so that as the carriage moves from one side of the machine to the other, the edge of the blade from one end or the other may be adjusted with respect to the grinding wheel acting upon the same. These devices comprise the crank arms 56, preferably supported eccentrically of the rod 4 and adapted to be adjusted thereon by means of the thumb-screws 57. Projecting inwardly from the outer ends of said crank arms are pins 58 having center points, as shown, for the purpose of supporting any devices having centers which it is desired to operate upon by the grinding wheel; and the said pins 58 are also adapted to support the blocks 59 having transverse bearings 60 and 61 through which it is adapted to carry bolts 62 for securing to said blocks any suitable devices upon which are adapted to be ground or sharpened by the grinding wheel. These blocks may be properly adjusted on the pins 58 by means of the bolts or thumb-screws 63. It will thus be seen that the crank arms may be suitably adjusted on the rod 4, and that the blocks may be suitably adjusted on the pins 58, so that almost any desired adjustment may be attained for the purpose of properly positioning the tools to be acted upon by the grinding wheel, which are sustained in connection with the blocks 59.

When the machine is being employed for the purpose of sharpening or grinding the blades of lawn mowers where it is not necessary to use the crank arms in the manner in which they are used as shown in Fig. 1, for it is intended to support the body of the mower in the frame by resting the wheels thereof on the rod 4 as well as on the rod 4′ adapted to have adjustable connection with the standards 1 by seating the opposite ends thereof in the notched or cut out portions 3 in the braces 2. By separating the rods 4′ and 4 or placing them nearer together will raise or lower the body of the mower in the frame, the handle portion thereof adapted to be supported by an arm or rest 64 carried by the rod 4, best seen in Fig. 2. However, when the mower is placed in the frame if it is found that one end of the blade is lower or higher than the other, so that after the stone has been adjusted in connection with one end of said blade, it will not engage with the entire blade as the carriage is moved from one end of the machine to the other, the crank arms 56 which are eccentrically disposed on the rod 4 may be so placed that the wheels of the mower may rest thereon and said arms adjusted for the purpose of properly alining the mower blades with respect to the said grinding wheel.

In the application to which reference has been made, a collar was eccentrically carried on a rod similar to the rod 4 and was employed only for raising one of the wheels of the mower to properly adjust the mower blades to make them uniform throughout with respect to the grinding wheel; while in the present machine, as has been explained, the eccentrically carried crank arms which serve the same purpose as the collar in my previous application, are also adapted to serve as a support for devices other than lawn mowers which it is desired to grind or sharpen.

Having thus fully described my invention, what I claim and desire to secure by Letters Patent of the United States, is:—

1. In a grinding machine, the combination of a carriage, a support mounted on said carriage, adjusting means for oscillating said support on the carriage, yielding means between said support and carriage, and a grinding wheel mounted on said support.

2. In a grinding machine, the combination of a carriage, a support mounted on said carriage, adjusting means for oscillating said support on the carriage, yielding means between said support and carriage, an arm depending from said support, and a grinding wheel revolubly connected with said arm.

3. In a grinding machine, the combination of a carriage, a support mounted on said carriage, adjusting means for oscillating said support on the carriage, yielding means between said support and carriage, an arm pivotally and adjustably connected with said support, and a grinding wheel revolubly connected with said arm.

4. In a grinding machine, the combination of a driving shaft, a carriage slidably

supported on said shaft, a support mounted on said carriage, adjusting means for oscillating said support on the carriage, yielding means between said support and carriage, an arm depending from said support, a grinding wheel revolubly connected with said arm, and connections between said shaft and grinding wheel.

5. In a grinding machine, the combination of a driving shaft, a carriage slidably supported on said shaft, an arm adjustably connected with said support, a grinding wheel revolubly connected with said arm, a belt connecting said grinding wheel with said driving shaft, and a guide for said belt adjustably connected with said arm.

6. In a grinding machine, the combination of a driving shaft, a carriage slidably supported on said shaft, a support having a flared extension mounted on said carriage, an arm having an adjustable connection with the flared portion of said support, a grinding wheel revolubly connected with said arm, a belt connecting said grinding wheel with said driving shaft, and a guide for said belt connected and adjustable with said arm.

7. In a grinding machine, the combination of a carriage, a support mounted on said carriage, having a flared portion provided with a pair of semi-circular slots, means for adjusting said support, an arm having a pivotal and an adjustable connection with one of said slots, governing means for said arm adjustably connected with the other slot, and a grinding wheel revolubly connected with said arm.

8. In a grinding machine, the combination of a driving shaft, a carriage slidably supported on said shaft, a support mounted on said carriage having a flared portion provided with a pair of semi-circular slots, an arm pivotally and adjustably connected with one of said slots, governing means for said arm adjustable in the other slot, a grinding wheel revolubly connected with said arm, a belt connecting said grinding wheel with said driving shaft, and a guide for said belt supported by said arm.

9. In a grinding machine, the combination of a driving shaft, a carriage slidably supported on said shaft, a support mounted on said carriage, an arm adjustably connected with said support, a shaft journaled in said arm, a grinding wheel revolubly mounted on said shaft, driving connections between the driving shaft and grinding wheel, a short arm adjustably connected with said first mentioned arm and guiding fingers connected with said last mentioned arm.

10. In a grinding machine, the combination with a frame, of arms eccentrically supported in said frame, means for adjusting said arms, and blocks adjustably connected with the extremities of said arms, said blocks provided with openings extending at right angles to each other.

11. In a grinding machine, the combination with a frame, of a pair of arms, eccentrically supported on said frame, means for adjusting said arms independent of each other, pins connected with the extremities of said arms and having center points, means for adjusting one of said pins and blocks adjustably connected with said pins, said blocks provided with openings disposed at right angles to each other.

12. In a grinding machine, the combination of a frame, a threaded shaft journaled in the upper end of said frame, a pair of parallel spaced supporting rods located below said threaded shaft, a carriage having portions slidably connected with said rods and extending above and below the same, means for connecting the carriage with the threaded shaft so as to cause it to travel on said rods, a driving shaft journaled in said frame below said rods and in the same vertical plane with said threaded shaft, a support slidably mounted on said power shaft, and operatively connected with said carriage, an arm adjustably and detachably connected with said support, a grinding wheel suitably carried by said arm, means for operating the threaded shaft from the power shaft, and means for operating said grinding wheels from said power shaft.

In testimony whereof I affix my signature, in presence of two witnesses.

ALBERT C. WARNER.

Witnesses:

CHAS. W. LA PORTE,

ROBERT N. MCCORMICK.