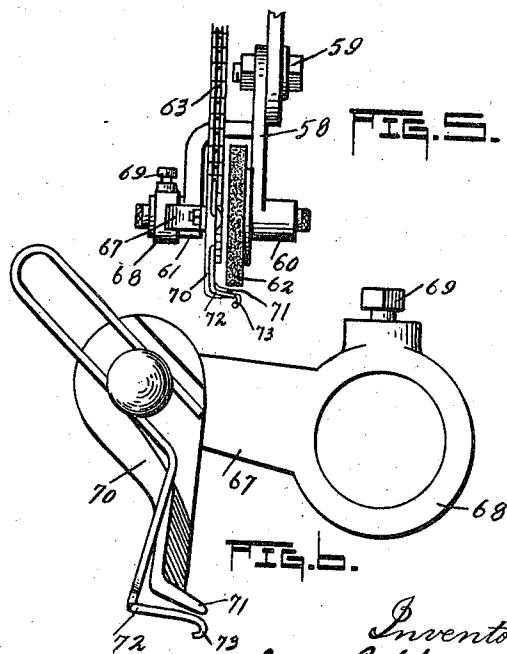
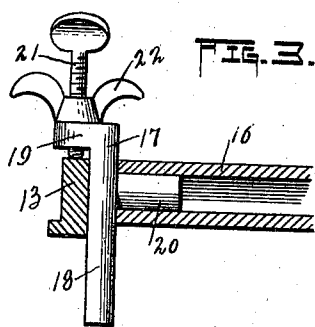
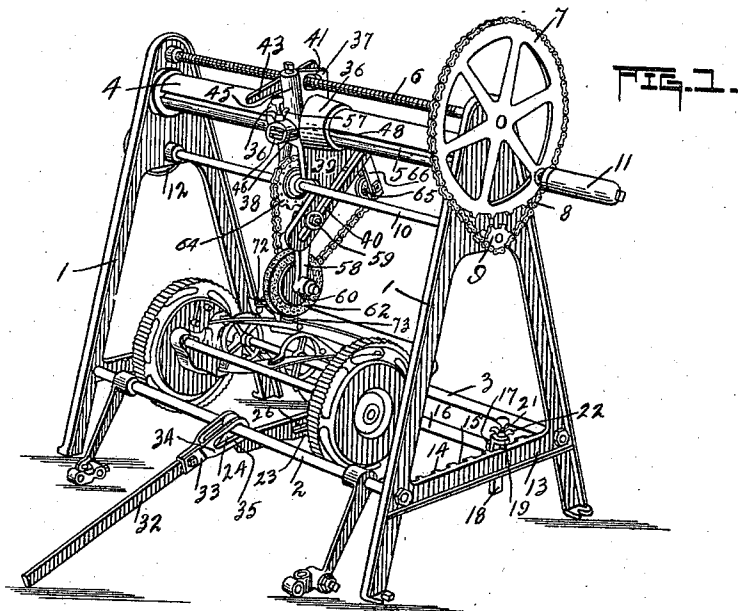


A. C. WARNER.
GRINDING MACHINE.
APPLICATION FILED OCT. 7, 1908.

963,964.

Patented July 12, 1910.

2 SHEETS—SHEET 1.



Witnesses:
H. W. Gibson,
L. E. Claypool.

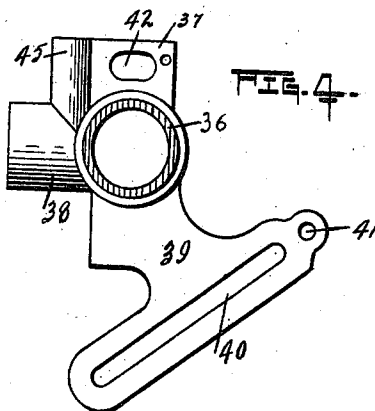
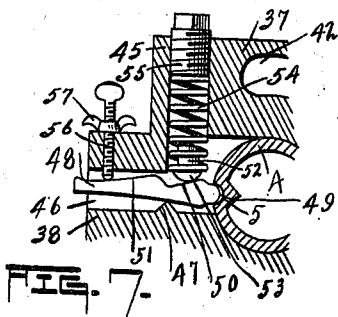
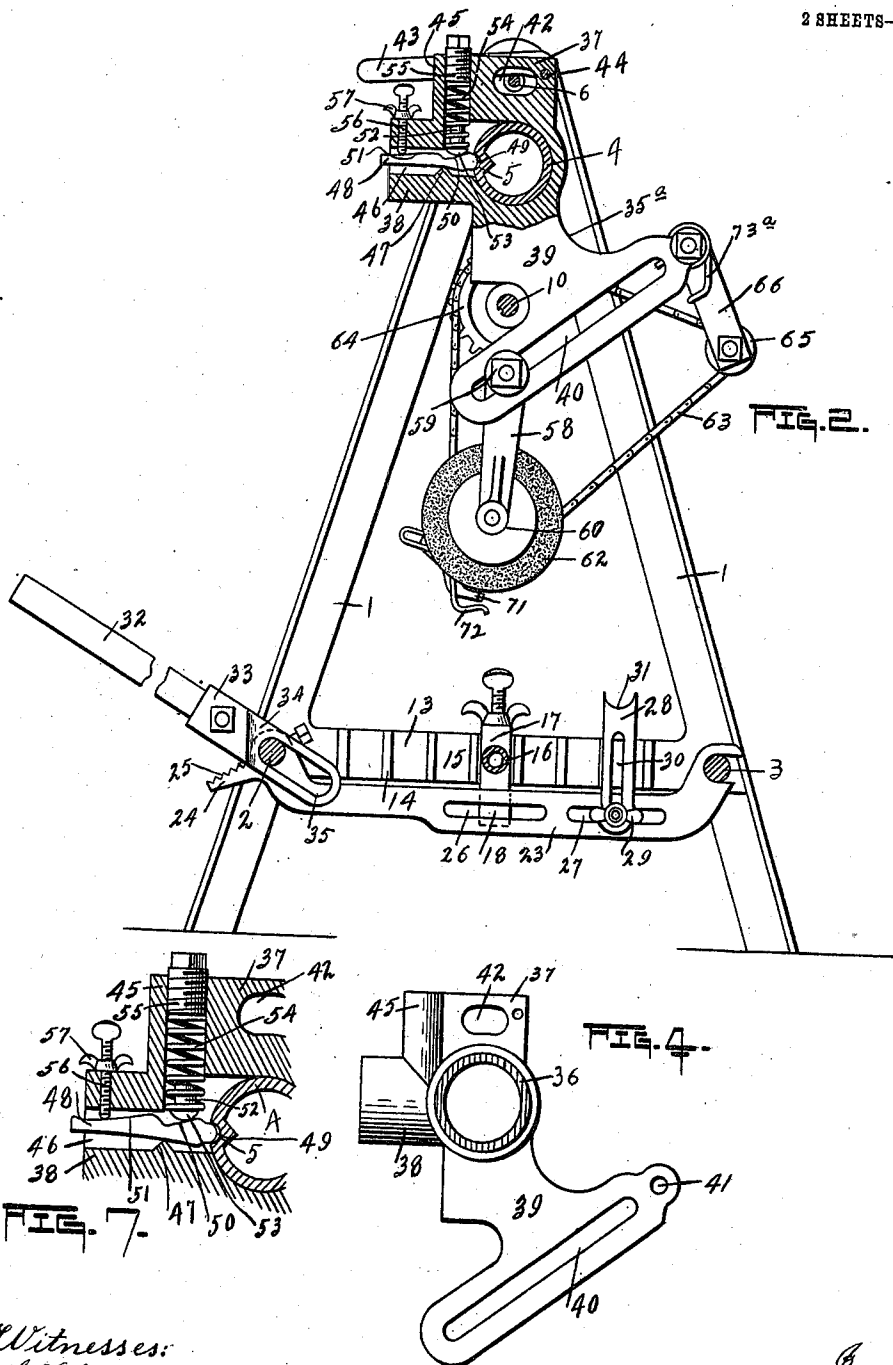
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UNITED STATES PATENT OFFICE.

ALBERT C. WARNER, OF PEORIA, ILLINOIS.

GRINDING-MACHINE.

963,964.

Specification of Letters Patent.

Patented July 12, 1910.

Application filed October 7, 1908. Serial No. 456,544.

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, and particularly to that type intended for grinding and sharpening the blades of a lawn-mower and similar blades.

One of the objects of the present invention is to simplify and produce at first cost a lawn-mower grinder, and wherein is embodied stone supporting mechanism which is capable of being adjusted so as to cause the stone to engage and follow the blade and which may be moved laterally from the blade when it reaches either end thereof so as to disengage the same therefrom.

A further object of the invention is to construct a lawn-mower grinder with means for leveling the blade supporting portion of the mower so as to cause the stone to engage with the blade its full length; which said means may be operated for raising or lowering either end of the blade supporting means of said mower.

One of the further objects of the invention is to construct a lawn-mower grinder, comprising a grooved supporting member, a carriage slidably supported on said member and adapted to support a grinding wheel, a key for locking the carriage to the member and movable lengthwise of the groove in the member when traveling thereon, and means cooperating with the key for oscillating the carriage on the member and thereby move the grinding wheel for adjusting said wheel toward or from the blade of a mower.

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 perspective view of a lawn-mower grinder embodying my improvements and showing the blades and support therefor of a mower in position on the machine; Fig. 2 is a vertical longitudinal sectional view through the machine and with a portion of the carriage in section to disclose the key and parts cooperating therewith; Fig. 3 is an enlarged sectional detail of a portion of the leveling means; Fig. 4 is a detached view in elevation, showing one side of the carriage; Fig. 5 is a front elevation of that portion of the machine located adjacent to the grinding wheel, showing the blade holding means; Fig. 6 is an enlarged side elevation of the arm which supports the blade holding means, and Fig. 7 is an enlarged side elevation of the key, showing the manner in which it engages the wall of the groove in the member and the means cooperating therewith for causing the carriage in which the key is mounted to oscillate on its support.

Like numerals of reference indicate corresponding parts throughout the figures.

The frame of the machine comprises the two A shaped supports 1 which are connected at or near their lower ends by means of the rods 2 and 3 and their upper ends are connected by means of the member 4. This member is a hollow shaft, of suitable diameter and is so connected to the supports 1 as to be fixed against rotation and is provided with the longitudinally arranged semi-circular groove 5, with which coacts a key, and this key, as will be described, is employed for keying a carriage on the shaft 4 to travel longitudinally thereof, and said key is capable of being so operated as to cause the carriage to be oscillated or swung on the member or shaft.

Mounted above the shaft 4, parallel therewith, and having its opposite ends journaled in the respective supports 1 is a threaded shaft 6, one end of which projecting through one of the supports 1 has attached thereto a sprocket wheel 7 which is operated by a sprocket chain or similar means 8, receiving its power from a pinion 9 carried by a driving shaft 10 which is located below and parallel with the shaft 4 with its opposite ends journaled in the respective supports 1. For operating the threaded shaft 6 and the driving shaft 10, the sprocket wheel 7 is provided with an operator's handle 11, and a pulley 12 is shown in Fig. 1 attached to

the far end of the shaft 10, which may be coupled up in a suitable way with a suitable source of power, so that the machine may be operated by hand or by power.

5 The cross braces 13 of the supports are provided on their inner faces with the spaced vertical lugs 14, forming the grooves 15 therebetween, for a purpose which I will now explain: 16 is a rod, preferably tubular
10 in cross section, and in the opposite ends of the rod are adapted to be detachably connected brackets 17 comprising the elongated vertical stems 18, having the right angular head portions 19 and extending laterally
15 from the body of the brackets, are lugs 20 which have a telescopic connection with the rod 16, substantially as shown in Fig. 3. This rod 16, together with its brackets 17, are adapted to have an adjustable connection
20 with the supports 1 of the machine. That is to say, the rod 16 may be adjusted lengthwise of the cross braces 13 of the supports 1, by placing the said rod between any of the pairs of the vertical lugs 14 which
25 coincide on the respective cross braces of said supports, and when so placed, the vertical stems 18 of the brackets 17 will pass down between the lugs 14 and be disposed in the grooves 15 therebetween, with the
30 head portions 19 of said brackets, extending across and overlying said cross braces 13, in the manner substantially as shown in Fig. 3. Operated through the head portions 19 of the brackets 17, are thumb screws 21
35 which are adapted to engage with the upper faces of the cross braces 13 and 22 are lock nuts for said thumb screws, as will be understood. The office of the rod 16 is to co-operate with either of the rods 2 or 3 for
40 forming a support for the body of the mower and a rest for the wheels thereof, as shown in Fig. 1, for by adjusting the rod 16 in the manner in which I have described, that is, by moving it lengthwise of the cross braces 13, said rod 16 may be
45 placed in a position so that the wheels of the mower will be supported by the rod 2 and the rod 16, substantially as shown in Fig. 1, or by proper adjustment, the rod 16 and the rod 3 may serve as the support for the said mower wheels, as will be understood. It being desired to adjust either end of the body of the mower, for aligning the blade or blades thereof, to come into contact with the grinding wheel, or in other words for the purpose of leveling the mower on the support, either end of the rod 16 may be raised or lowered by operating the thumb screw 21, which bearing against the upper
60 faces of the cross braces 13, will raise or lower the ends of the rod 16, determined, of course, in the direction in which the thumb screws 21 are operated.

I have also provided in connection with
35 the base of the machine, a support for the

wood roller of the mower, and also a support for the handle of the mower, that said mower may be rigidly held in the position in which it is adjusted on the machine, and said supports comprise a bar 23 extending
70 transverse of the machine frame, and supported by the rods 2 and 3, as shown. One end of this bar 23 is provided with the inclined extension 24, having the upper serrated face 25, while the body of the bar is provided with the longitudinal slots 26 and 27,
75 see Fig. 2. 28 is a rest adapted to be detachably and adjustably secured to the bar 23 by means of the fastening device 29, and said fastening device is capable of being inserted through either of the slots 26 or 27
80 of the bar 23, and through a longitudinal slot 30 in the rest 28. Thus it will be seen that upon releasing the fastening device 29, in the position in which the rest is shown
85 in Fig. 2, that the rest may be lowered or moved lengthwise of the bar 23, the length of the slot 27, and if for any reason, if it was necessary to change the position of the rest on account of the slot 27 not being long
90 enough, the rest and its locking device could be removed and said locking device inserted through the slot 26, and the rest be thereby secured in different positions lengthwise of the bar 23. The upper end of the rest 28 is
95 shown provided with a concave seat portion 31, to receive the wood roller of the mower.

For supporting the handle of the mower, I have provided the bar 32, to which is attached an arm 33 having the bifurcated extensions 34 provided with the longitudinal
100 slots 35 to adapt the same to be carried on the rod 2, with the bifurcated portions of the bracket disposed upon opposite sides of that end of the bar 23 provided with the serrated end or extension 24. In the preferred construction, the bracket 34 is made in two parts and joined to the end of the bar 32 somewhat in the manner seen in Fig. 1, and where the portions of the bracket unite
105 at the end of the bar 32, they are adapted to engage with the serrations 25 of the extension 24 of said bar 23. For the purpose of adjusting the bar 32 on the rod 2, the bar is raised slightly and moved across the axis
115 of the rod 2, the slots 35 in the brackets 33 permitting of such movement, and when proper adjustment has been made, the bar 32 will be held by engagement in the manner just previously described, with the serrations
120 of the extension 24 of the bar 23.

35 denotes a carriage which is mounted on the member or shaft 4 and is not only arranged to be moved from end to end of the shaft 4, but is also capable of being oscillated, for purposes which will be explained. This carriage is provided with the extended hub portions 36, to give suitable bearing for the carriage on the shaft 4, and said carriage is further provided with the upwardly ex-
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tended portion 37, the laterally extended portion 38, and the depending portion 39, in which is provided the elongated slot 40, disposed obliquely or at an incline, as shown in Figs. 1, 2 and 4, and at the upper end of that portion of the depending portion of the carriage 39, which has the slot 40, there is provided a perforation or hold 41, for a purpose which will be explained. The upwardly extended portion 37 of the carriage, is shown provided with an elongated slot 42 extending transversely of the body of the carriage, and when said carriage is placed in position on the member or shaft 4, the threaded shaft 6 extends through said slot 42 and the purpose of making the slot 42 elongated, transversely of the carriage, is for the purpose of allowing movement of the threaded shaft in said slot, when the carriage is oscillated or swung on the member or shaft 4, in a manner which will be explained.

For the purpose of connecting the carriage to the threaded shaft, so that said carriage may be caused to move lengthwise on the member or shaft 4, or axially thereof, a key 43 is provided pivoted at 44 to one side of the extension 37 of the carriage 35 and may be swung into and out of position for engaging the threads on the shaft 6. The forward portion of the extension 37 of the carriage 35, is made tubular as at 45, and the interior of said tubular portion 45 communicates with a transverse opening 46 in the body of the carriage, which said transverse opening 46 is preferably rectangular in shape, as best seen in Fig. 1, and opens out of the laterally extended portion 38, previously referred to, and extending up from the lower wall of said transverse opening 46 and at a suitable point in its length, is a wedge shaped lug or projection 47.

48 denotes a key, which is shown in Figs. 2 and 7, but is best seen in Fig. 7, and this key is carried in the opening 46 of the carriage 35, and normally extends at right angles to the axis of the member or shaft 4. The purpose of this key is to connect the carriage 35 with the member or shaft 4, so that the carriage may be keyed to the member or shaft by engagement of the key with the groove 5 in the shaft, and by such connection, the carriage may be properly aligned with respect to the shaft and for supporting the grinding wheel in position to engage and travel along a blade or blades to be ground or sharpened. The key is preferably of that shape, which is best seen in Fig. 7, having the rounded inner end 49, which is normally held sealed in the groove 5 of the member or shaft 4, with a slight space left between the deepest portion of the wall of the groove and the end of the key to allow for wear. The lower face of the key is beveled upwardly and out-

wardly from the inner rounded end 49, as shown, while the upper face thereof is formed with the irregular or inwardly and outwardly downwardly inclined portions 50 and 51. In operative position, the rounded inner end 49 of this key, as will be understood, has engagement with and travels in the groove 5 of the member or shaft 4, with the lower face of said key at a suitable point intermediate its ends, resting upon and engaging with the apex of the wedge shaped lug or projection 47, previously referred to. There also engages with this key 48, but with the upper face thereof, means, which I will now describe, which cooperate with the key for the purpose of adjusting the position of the carriage on the member or shaft 4, so as to provide for very close adjustment of a grinding wheel supported by the carriage, with respect to the blade or blades upon which the grinding wheel will operate. This means to which I have referred, consists first, of the short stem 52 provided with the rounded head 53 which normally rests upon and bears against the upper face of the key 48, and particularly that portion of the face which I have referred to as being inclined at 50, and at or near the inner end of the key. Coiled about the stem 52, is a spring 54, which is carried in the tubular portion 45 of the extension 37 of the carriage, and the upper end of this coil spring, bears against the lower end of a threaded plug 55 which is screwed into the upper end of said tubular portion 45, as aforesaid. It will be observed that upon screwing the plug 55 into the tubular portion 45, in which the spring 54 is carried, that the spring will be compressed and will cause the stem 52 to bear down on the inner end of the key 48 upon one side of the apex of the wedge shaped lug or extension 47. Coöperating with the outer end of the key 48 and upon the opposite side of the apex of the wedge shaped portion 47, is a thumb screw 56, which has a threaded engagement with the wall of the lateral extension 38 of the carriage, at or near the outer end thereof, and 57 is a lock nut engaging said thumb screw, in the manner shown. The thumb screw, as will be observed, from an examination of Fig. 2, is caused to engage with the face 51 of said key 48, and said key or the outer body portion thereof, is preferably rectangular in shape, so as to have movement up and down in the opening 46 extending through the lateral extension 38 of the carriage 35. Before proceeding with the description of the operation of the parts just described, that is the thumb screw 56 and the spring 54, I will describe how a grinding wheel is supported by the carriage 35 and operated, and also how the blade of a mower is held up against the wheel.

58 is an arm adapted to be supported by and have an adjustable connection with the depending portion 39 of the carriage 35, by means of a suitable securing means indicated as 59, which is carried through the slot 40 of the carriage, and adapted to be fixed at different positions along said slot. In this way, the arm 58 can be moved to different points along the length of the slot 40, and secured in such positions, and said securing means 59 may be released and the arm 58 swung into different positions on a fulcrum formed by such securing means, and adjusted. The lower end of the arm 58 is shown bifurcated and having hub portions 60 and 61 in which is journaled a short spindle, on which is carried a grinding wheel 62, which is located between the bifurcations of the arm 58, as shown, in Fig. 5. Also carried by the spindle supporting the grinding wheel 62, is a sprocket pinion which receives its power from a sprocket chain 63 which is operated by a sprocket wheel 64, carried by the driving shaft 10, and keyed thereto so as to be moved longitudinally thereof, and said sprocket chain 63 is carried around an idler 65 supported by an arm 66, pivotally connected to the upper end of the depending portion 39 of the carriage, by means of a bolt or similar device which is passed through the perforation or hole 41, previously referred to. Neither the spindle supporting the grinding wheel 62 nor the sprocket pinion carried thereby for operating the grinding wheel, are shown, because of being hidden by other elements of the machine, yet it will be understood that such parts are present and necessary in a complete and operative machine, but have not been detailed owing to their being incidental to the complete machine, and do not form a prominent part of the invention, except to provide a means for operating the grinding wheel. On the hub portion 61 of the arm 58, is carried an arm 67 provided with a ring like portion 68 to adapt it to be adjustable on the hub 61 and a set screw 69 is provided for fixing the arm 67 in adjusted positions on the hub 61. Pivotally connected to the outer end of the arm 67 so that it may be adjusted, by being swung into different positions and then fixed, is an arm 70, which said arm has the inwardly projecting finger 71, see Figs. 2, 5 and 6, and said finger is adapted to bear against a blade which is held up to the grinding wheel by means of the spring 72 having the hooked portion 73 to fit over the edge of the blade, and said spring is adjustably connected to the arm 70, in the manner best seen in Fig. 6.

The arm 66 which supports the idler 65, is engaged by a spring 73^a, which has a tendency to lift the end of the arm carrying the idler 65, while the chain 64 connected up in

the manner shown, with a sprocket wheel 64 and the pinion operatively connected with the grinding wheel 62, has a tendency to draw the arm downwardly. The purpose of this is to at all times hold the idler in proper position for keeping the chain taut, when the arm 58 is adjusted back and forth, or swung into different positions on the depending extension 39 of the carriage 35. It will be observed by the means employed for supporting the arm 58 and parts connected therewith, that after a mower has been adjusted on the frame that the grinding wheel may be placed in position for engaging the blade or blades of the mower for sharpening the same. It may be, however, that the adjustment of the grinding wheel in this manner will not be as fine as it is desired, and if moving the grinding wheel to the right looking at Fig. 2, will help matters, the operator will screw down the thumb screw 56 so as to depress the outer end of the key 48, which has a tendency to contract the spring 54 and cause the carriage 35 to be oscillated on the member or shaft 4, moving the grinding wheel in the direction just referred to; but if it is necessary to move the grinding wheel to the left, looking at Fig. 2, for the purpose of making proper contact between the wheel and the blade of the mower, the operator will release the thumb screw 56 or unscrew the same and in so doing, it will have a tendency to allow the spring to expand and bearing against the threaded lug 55 will oscillate the carriage 35 in just a reverse direction and move the grinding wheel to the left.

It will be observed that the key 48 will have a bearing against the apex of the wedge shaped lug or projection 47, so long as the spring 54 is held in position and is exerting pressure against the same, and that if the thumb screw 56 is operated so as to depress the outer end of the key, the pressure so exerted by the thumb screw on the key will be applied directly through the key to the carriage 35, through such engagement of the key, and wedge shaped projection 47. As the key is depressed, movement will also be imparted to the carriage to rock the carriage on the member or shaft 4, the point of fulcrum for the key being the point of engagement of the key with the shaft 4, and as you depress the key, the shaft not being able to move, or the key independent of the carriage by reason of the engagement of the key with the wedge shaped projection 47, the carriage must move with the key and be oscillated on the shaft 4; in other words, immediately upon applying pressure to the key 46 for depressing the same, you cause the carriage to be oscillated simultaneously in the same general direction as you move the key, and thereby move the lower end of said carriage with the grinding wheel to the

right, looking at Fig. 2. The contrary of this is also true, if you loosen the thumb screw 56 for the purpose of allowing the outer end of the key to be raised; the operation is then as follows: It will be observed that the spring 54 is bearing downwardly on the inner end of the key on one side of the apex of the wedge shaped projection 47, whereas the thumb screw has engagement with the outer end of the key, and upon the opposite side of said apex. As you unloosen the thumb screw 56, the spring bearing on the inner end of the key will cause the outer end of the key to follow the thumb screw, and because the inner end of the key is fixed and cannot be moved in the direction of the pressure exerted by the spring against the same during the raising of the outer end of the key, this pressure will be exerted upon the threaded lug 55, and will cause the carriage to be oscillated on the member or shaft 4 and the lower end thereof to move in the same general direction and in unison with the oscillation of the key.

A further advantage of a carriage such as I have shown and described, embodying the means thereon for allowing the grinding wheel to be adjusted toward and from a blade or blades of a mower, is that in this class of machines when the grinding wheel has traveled the length of a blade, the space between the end of the blade and the mower wheel is not sufficient to permit the grinding wheel to be moved beyond the blade so as to be disengaged therefrom, but with a structure such as I show, it is immaterial whether there is sufficient space between the end of the blade and the mower wheel, to allow the grinding wheel to travel to a point beyond the mower blade, for an operator may, when the grinding wheel is at or near the end of the blade, or at any point between the ends of the blade for that matter, push against the depending portion 39 of the carriage and oscillate said carriage on the member or shaft 4, which movement, will detach the blade from the hook 73 of the spring 72, and as soon as the operator releases his pressure from the carriage, the spring 54 will operate to return the carriage to its adjusted position.

I have described the sprocket wheel 64 as keyed to move on the shaft 10, and said sprocket wheel is moved with the carriage by engagement of the depending portion 39 of the carriage with said sprocket wheel on one side and by engagement of a depending portion 74 of the carriage with the opposite side of said sprocket wheel.

It will be observed from an examination of the drawings, that neither the threaded shaft 6 nor the driving shaft 10 form a support for the carriage 35, but that the carriage is wholly supported by the member or shaft 4, and that it is immaterial, so long

as the threaded and driving shafts are provided, whether they are true or not, for they will not interfere with the movement of the carriage from one side to the other of the machine. This has been a great disadvantage in machines of this type where the carriage was supported either by the threaded shaft or the driving shaft, or both and would materially interfere with the travel of the carriage and the operation of sharpening or grinding, particularly if both shafts were not true, and absolutely parallel one with the other.

There is the further advantage derived by the use of mechanism in a grinding machine, such as I show, and that is that after the mower has been leveled and properly adjusted on the machine, the operator may by regulating the thumb screw 56, in the manner previously described by me, position the grinding wheel so as to engage with the blade or blades of the mower and such engagement will continue through the length of said blade. I am aware that it is not new to provide a means for adjusting the mower or the blades thereof with respect to the grinding wheel or the grinding wheel to the mower or blades thereof, but I am not aware that such adjustment has been made in as convenient and simple a manner as I show, so that by the operation of one thumb screw, the grinding wheel may be brought into contact with the blade, and such contact maintained from end to end of the blade.

The shaft 4 should be true, being the support on which the carriage is to travel, but it is not absolutely necessary that a snug fit be made between the carriage and said shaft, for the key will prevent any wobbling and take up any looseness, particularly after the threaded plug has been screwed into place and applies pressure through the coil spring 54 to said key.

The lower portion of the carriage extends across the axis of the driving shaft 10, see Fig. 2, so that the grinding wheel support may be carried well forward, but the contour of this portion of the carriage is such that the carriage may be swung forward a sufficient distance without coming into contact with the said shaft 10.

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 with the frame, of a stationary shaft provided with a longitudinal groove, a carriage supported by said shaft to move longitudinally thereof, means for operating the carriage, a member mounted in the carriage and operating in the groove of the shaft for alining the carriage on the shaft, and means for operating the member and simultaneously therewith oscillate the carriage on the shaft.

2. In a grinding machine, the combination with the frame, of a stationary shaft provided with a longitudinal groove, a carriage supported by said shaft to move longitudinally thereof, a grinding wheel support adjustably connected with said carriage, means for operating the carriage, a member mounted in the carriage and operating in the groove of the shaft for alining the carriage on the shaft, and means for operating the member and simultaneously therewith oscillate the carriage on the shaft.

3. In a grinding machine, the combination with the frame, of a stationary shaft provided with a longitudinal groove, a carriage supported by said shaft to move longitudinally thereof, said carriage provided with a depending portion provided with an obliquely disposed slot, a grinding wheel support having a detachable connection with said carriage and adjustable longitudinally of the slot thereof, means for operating the carriage, a member mounted in the carriage and operating in the groove of the shaft for alining the carriage on the shaft, and means for operating the member and simultaneously therewith oscillate the carriage on the shaft.

4. In a grinding machine, the combination with the frame, of a stationary shaft provided with a longitudinal groove, a carriage supported by said shaft to move longitudinally thereof, a grinding wheel support adjustably connected with said carriage, a grinding wheel mounted on said support, means for operating the carriage, means for operating the grinding wheel, a member mounted in the carriage and operating in the groove of the shaft for alining the carriage on the shaft, and means for operating the member and simultaneously therewith oscillate the carriage on the shaft.

5. In a grinding machine, the combination with the frame, of a stationary shaft provided with a longitudinal groove, a carriage supported by said shaft to move longitudinally thereof, a grinding wheel support pivotally connected with the carriage, means for adjusting the support on said carriage, a grinding wheel carried by said support, means for operating the carriage, means for operating the grinding wheel, a member mounted in the carriage and operating in the groove thereof and adapted to be swung from the point of engagement of the member with the groove, and means for oscillating the member and simultaneously therewith oscillate the carriage on the shaft.

6. In a grinding machine, the combination with the frame, of a stationary shaft provided with a longitudinal groove, a carriage supported by said shaft to move longitudinally thereof, a threaded shaft, means for connecting the carriage to the threaded

shaft, a driving shaft, connections between the driving and the threaded shafts, a member mounted in the carriage for operating in the groove thereof and adapted to be swung from the point of engagement of the member with the groove, and means for oscillating the member and simultaneously therewith oscillate the carriage on the shaft.

7. In a grinding machine, the combination with the frame, of means for adjustably supporting a member in the base of said frame, a shaft provided with a longitudinal groove fixedly mounted in the upper portion of said frame, a carriage supported by said shaft to move longitudinally thereof, means for operating the carriage, a member mounted in the carriage for operating in the groove thereof and adapted to be swung from the point of engagement of the member with the groove, and means for oscillating the member and simultaneously therewith oscillate the carriage on the shaft.

8. In a grinding machine, the combination with the frame, of means for adjustably supporting a member in the base of said frame, a shaft provided with a longitudinal groove fixedly mounted in the upper portion of said frame, a carriage supported by said shaft to move longitudinally thereof, a threaded shaft, means for operatively connecting the carriage to the threaded shaft, a driving shaft, connections between the driving and threaded shafts, a driving wheel adjustably supported in connection with said carriage, means for operating the grinding wheel from the driving shaft, a member mounted in the carriage for operating in the groove thereof and adapted to be swung from the point of engagement of the member with the groove, and means for oscillating the member and simultaneously therewith oscillate the carriage on the shaft.

9. In a machine of the class described, the combination of a stationary supporting member, a grinding wheel support hung on said member and capable of being moved from end to end thereof, a key mounted in said support, one end having engagement with the supporting member and movable longitudinally thereof, a spring in said support, one end bearing against the key, its opposite end bearing against a wall of the support, and means in operative engagement with the outer end of said key for depressing the key, the operation of depressing the key imparting movement to the carriage and causing it to be oscillated on said supporting member.

10. In a machine of the class described, the combination of a stationary supporting member, a grinding wheel support hung on said member and capable of being reciprocated thereon, a grinding wheel revolvably connected with said last mentioned support,

means for operating the grinding wheel, means for reciprocating the grinding wheel support on its supporting member, a key mounted in said support, one end having engagement with the supporting member and movable longitudinally thereof, a spring in said support, one end bearing against the key, its opposite end bearing against a wall of the support, and means in operative engagement with the outer end of said key for depressing the key, the operation of depressing the key imparting movement to the carriage and causing it to be oscillated on said supporting member.

11. In a machine of the class described, the combination of a stationary supporting member, a grinding wheel support hung on said member and capable of being reciprocated thereon, a grinding wheel adjustably connected with said last mentioned support, means for holding a blade to be ground or sharpened up against the grinding wheel, a grinding wheel revolvably connected with said last mentioned support for operating the grinding wheel, means for reciprocating the grinding wheel support on its supporting member, a key mounted in said support, one end having engagement with the supporting member and movable longitudinally thereof, a spring in said support, one end bearing against the key, its opposite end bearing against a wall of the support, and means in operative engagement with the outer end of said key for depressing the key, the operation of depressing the key imparting movement to the carriage and causing it to be oscillated on said supporting member.

12. In a machine of the class described, the combination of a stationary supporting member, a grinding wheel support hung on said member and capable of being reciprocated thereon, a key mounted in said support and having a bearing intermediate its ends on a projection of said support, one end of the key having engagement with the supporting member and movable longitudinally thereof, a spring in said support, one end bearing against the key, its opposite end bearing against a wall of the support, and a thumb screw operatively connected with the support and adapted to engage also with one end of said key; the operation of the thumb screw in one direction depressing the key and through the bearing of the key against the projection of the support, causing said support to be oscillated in one direction on the supporting member, the operation of the thumb screw for releasing the key, allowing the spring to operate to cause the support to be oscillated in an opposite direction.

13. In a grinding machine, the combination with the frame, of a stationary supporting member, a carriage reciprocally mounted

on said member and having a depending portion provided with an obliquely disposed slot, a grinding wheel supporting arm, means for pivotally and adjustably connecting the arm in the slot of said carriage, a grinding wheel journaled in the lower end of said arm, means for reciprocating the carriage and means for operating the grinding wheel.

14. In a grinding machine, the combination with the frame, of a stationary supporting member, a carriage reciprocally mounted on said member and having a depending portion provided with an obliquely disposed slot, a grinding wheel supporting arm, means for pivotally and adjustably connecting the arm in the slot of said carriage, a grinding wheel journaled in the lower end of said arm, a guide arm adjustably connected with said grinding wheel supporting arm, a spring finger adjustably connected with said guide arm, means for reciprocating the carriage and means for operating the grinding wheel.

15. In a grinding machine, the combination with the frame, of a stationary supporting member, a carriage reciprocally mounted on said member and having a depending portion provided with an obliquely disposed slot, a grinding wheel supporting arm, means for pivotally and adjustably connecting the arm in the slot of said carriage, a driving shaft, a threaded shaft operatively connected with the driving shaft, means for connecting the carriage with the threaded shaft, an endless belting operatively connected with the driving shaft and with the grinding wheel, an idler for taking up the slack in said endless belting, and an arm supporting said idler, said arm adjustably connected with said carriage.

16. In a grinding machine, the combination with the end supports having cross braces, of a rod adapted to extend between the cross braces of said supports and adjustable lengthwise of said braces, brackets connected with the opposite ends of said rods, and means connected with said brackets and in operative engagement with the cross braces of said supports for adjusting the opposite ends of said rod in a vertical plane.

17. In a grinding machine, the combination with the end supports having cross braces, of a rod adapted to extend between the cross braces of said supports and adjustable lengthwise of said braces, members connected with the opposite ends of said rod and having portions overlying said cross braces, and adjusting screws operatively carried through the overlying portions of the brackets and in engagement with the upper faces of said cross braces.

18. In a grinding machine, the support for the handle of a mower, comprising a bar

supported on the frame of the machine and provided with an extension having a serrated face, and a bar adjustably connected with the frame of the machine and adapted
5 to have engagement with the serrations of said first mentioned bar.

19. In a grinding machine, the combination with the end supports of the frame and the brace rods therefor, of a bar supported
10 by said brace rods and having an extension provided with a serrated face, and a second bar having an adjustable connection with one of said brace rods and adapted to be
held at different inclines by adjustment with
15 the serrated face of said first mentioned bar.

20. In a grinding machine, the combination with the end supports thereof, and cross braces connecting said supports, of a bar mounted on said cross braces, one end of
20 said bar having a serrated face, a second bar provided with a bifurcated end, the bifurcations of which are adjustably connected with one of said cross braces upon opposite sides of said first mentioned bar, and means

on said second bar adapted to have engage- 25
ment with the serrated face of said first mentioned bar.

21. In a grinding machine, the support for the wood roller of the mower, comprising a bar supported on the frame of the ma- 30
chine, a rest connected with said bar and means for adjusting said rest vertically and longitudinally of said bar.

22. In a grinding machine, a grinding wheel support, comprising a member hav- 35
ing extended hub portions, an upwardly carried extension from the body of the member provided with a transverse slot, and a depending portion from the body of the member provided with an elongated obliquely 40
disposed slot, all arranged substantially as and for the purposes set forth.

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

ALBERT C. WARNER.

Witnesses:

CHAS. W. LA PORTE,
LAURA E. CLAYPOOL.