(No Model.) 3 Sheets—Sheet 1.

F. D. WINKLEY.

GRINDING APPARATUS.

No. 492,451. Patented Feb. 28, 1893.

Fig. 1.

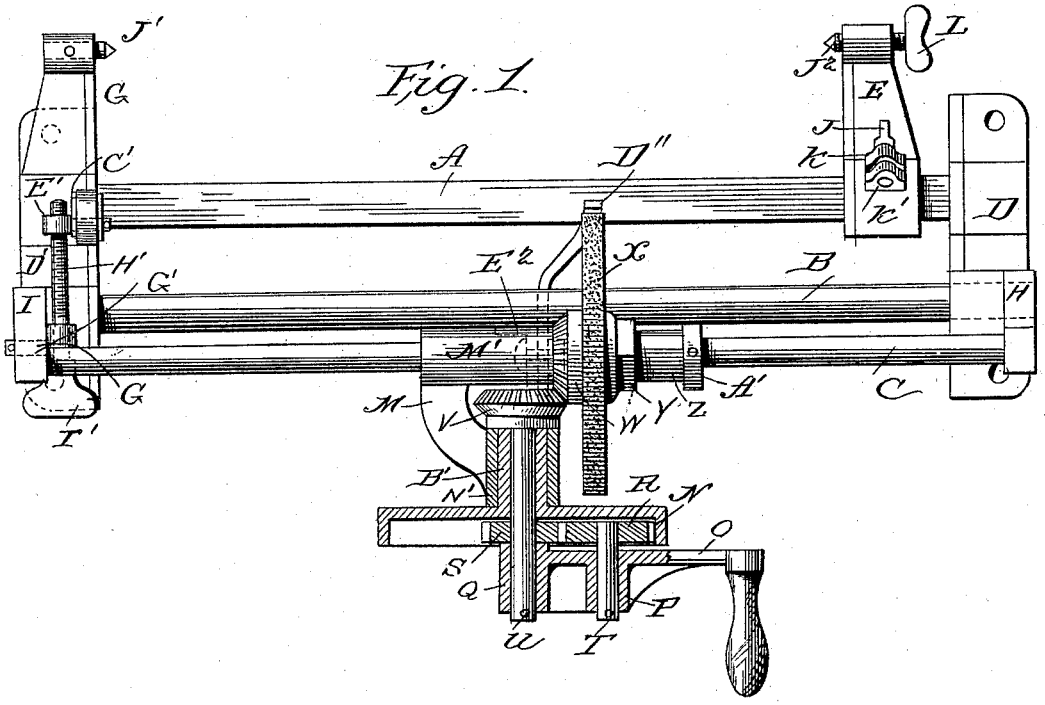


Fig. 5.

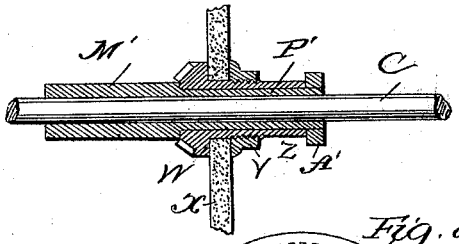
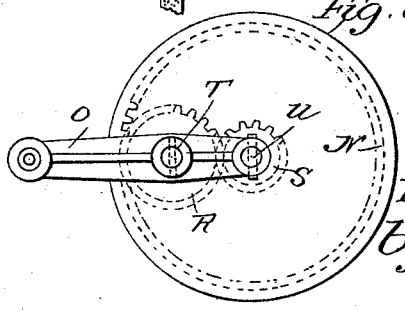


Fig. 2.



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(No Model.) 3 Sheets—Sheet 2.

F. D. WINKLEY.

GRINDING APPARATUS.

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Fig. 4

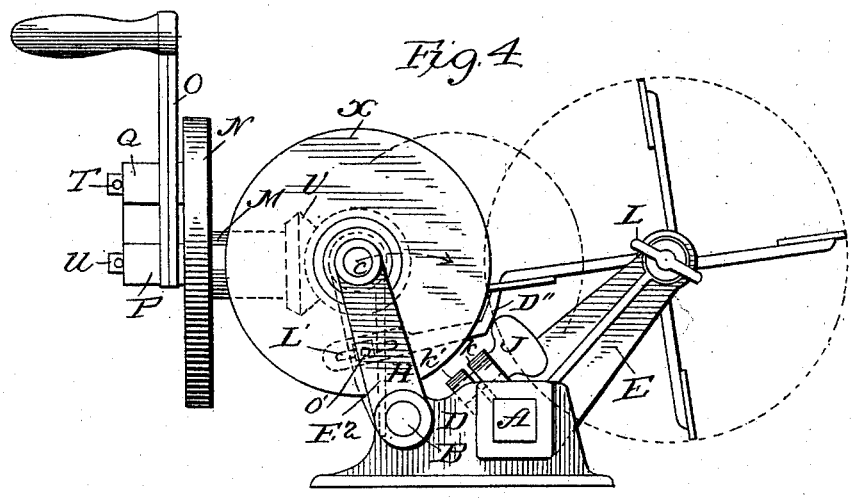

Fig. 3

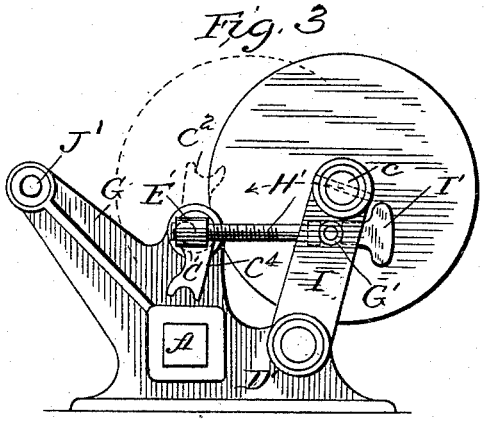

Fig. 6.

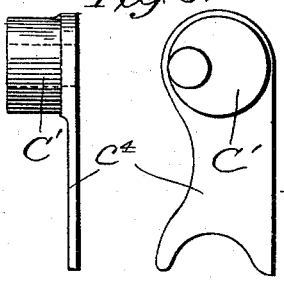

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Fig. 7.

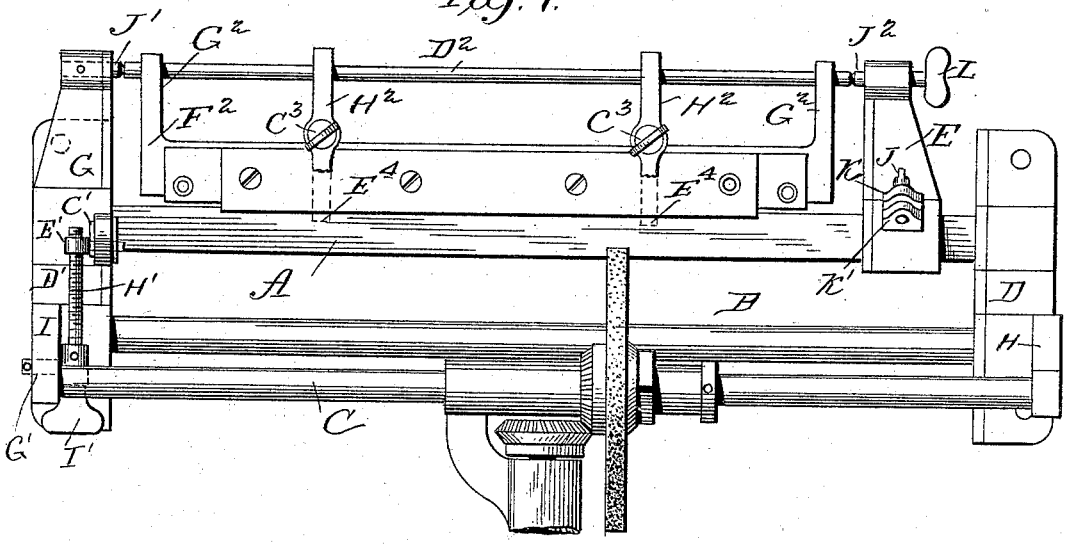
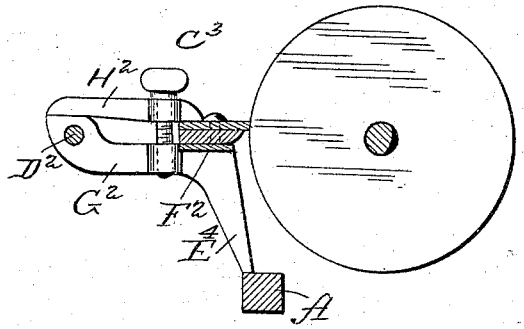


Fig. 8.



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UNITED STATES PATENT OFFICE.

FRANK D. WINKLEY, OF MADISON, WISCONSIN.

GRINDING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 492,451, dated February 28, 1893.

Application filed January 18, 1892. Serial No. 418,412. (No model.)

To all whom it may concern:

Be it known that I, FRANK D. WINKLEY, a citizen of the United States of America, residing at Madison, in the county of Dane and State of Wisconsin, have invented certain new and useful Improvements in Grinding Apparatus, of which the following is a specification.

The object of my invention is to produce a grinding apparatus specially adapted for grinding the cutting knives of lawn mowers without taking the mower apart excepting to a limited extent.

While I show and describe the apparatus as used particularly for grinding mower knives its use is not so limited as it may be adapted by proper adjustment to grind various articles.

The machine includes the construction by which the machine may be used for receiving and grinding either the revolving knives or the straight stationary knife,

The invention further includes devices by which the grinding wheel may be accurately adjusted toward and from the surface to the ground, said devices being capable also of a quick movement to throw the grinding wheel into or out of operative position.

The invention includes further a grinding wheel with mechanism for driving the same, said wheel with its driving mechanism being arranged to have adjustment at right angles to the axis of the wheel in order to suit different sizes of work and also having adjustment parallel with the axis of the wheel to act upon different portions of the work. Various details of construction also form a part of my invention.

In the drawings: Figure 1 is a top view of the machine showing the driving mechanism partly in section. Fig. 2 is a front view of the crank and gearing. Fig. 3 is a view of the left hand side of the frame and the devices for adjusting the proximity of the emery wheel to the object to be ground. Fig. 4 is a view of the other side of the machine showing the position of the rotating knives when being operated upon by the emery wheel and also the device for holding the knife in a fixed position at that point of its length which is being operated upon. Fig. 5 is a sectional view of the emery wheel, its clamping device and the bearing upon which it revolves. Fig. 6 is a detail view of the eccentric. Fig. 7 is a top view of the main frame showing the device for holding the straight knife while being ground. Fig. 8 being an end view partly in section of the same.

The two end frames D and D′ are connected by the square bar A in a perfectly rigid manner. The bar A being carefully finished with parallel sides, throughout its entire length. Upon this bar the bracket E slides and is provided with the split ear K, K′ and set screw J for securely clamping it on said bar. At the outer extremity of the bracket E is a thumb screw L having a conical point, said screw having its axis parallel with the longer axis of the bar A. The frames D and D′ have flanges on their bases by which they can be bolted to a fixed support. The bar A is preferably made square in cross section, although any other shape would answer if provision were made to prevent the bracket E from moving in a direction at right angles to the axis of the bar A as it is essential in the accuracy of the work that the machine does that the two points J′ and J^2 upon which the mower knives are held should always be in a plane parallel with the longer axis of the bar A. The frames D and D′ are provided with the hubs through which the shaft B passes and freely revolves. At each end of the shaft B are rigidly secured the arms H and I. And at the upper extremities of these are hubs through which the shaft C passes and is firmly secured in a position parallel with the shaft B and bar A. Upon the shaft C the carriage which supports the emery wheels slides longitudinally. The rectangular frame formed by the arms H and I and shafts B and C can be oscillated upon B as a center, through the arc indicated by the broken lines in Figs. 3 and 4. By this oscillating movement the proximity of the emery wheel to the knives to be ground is adjusted. In the frame D′ is formed the bracket G having at its extremity the hub into which the conically pointed plug J′ is fitted. The conical points of the plug J′ and screw J^2 fit into the center of the shaft upon which the blades of the mower are mounted and revolved while being ground, and also for holding the frame shown in Figs. 7 and 8 upon which the straight knife of the

mower is mounted while being ground. Upon the arm I is formed a boss through which the bolt G′ passes parallel with the shaft B. This bolt is held in place by a pin and has its head perforated perpendicular to the longer axis of the bolt. Through this perforation passes the bolt or thumb screw H′ with the large head I′ by which it can be easily turned. This thumb screw passes through the nut E′ which has a round stem passing through the eccentric plate C′ separately shown in several positions in Fig. 6. This eccentric plate is furnished with a lever C^4 by which it can be rotated for a purpose hereinafter explained.

The sleeve M′ is fitted to slide freely upon the shaft C. On its end is formed the bearing P′ for the flanged sleeve Z. This sleeve is designed to rotate freely upon the extension P′ of the sleeve M′ being held in position by the collar A′. The flange W is formed upon the sleeve M′ and has upon its outer face a bevel gear by which power is communicated to it. The combined nut and collar Y is fitted by a screw thread, to the outer surface of the sleeve Z and adapted to hold the emery wheel firmly up against the collar W. The hollow sleeve N′ is connected, by the bracket M to the sleeve M′ the three parts forming one casting. The internal gear wheel N is provided with the hollow hub B′ which enters the sleeve N′ and is held securely from turning. Upon the crank O which rotates freely about the shaft U is formed the hub P in which the shaft T is journaled. The gear R is secured to the shaft T and meshes with the internal gear N and the gear S which is fast to the shaft U. The shaft U has fast to its inner end the bevel gear V which engages with the gear W on the sleeve Z. By turning the crank O a rotary motion at a high rate of speed is communicated to the emery wheel X. On the under side of the sleeve M is formed the bracket E^2 which has a bearing against the shaft B sliding freely thereon, and serving to maintain the gearing mechanism in proper horizontal position in all adjustments of said mechanisms longitudinally of the frame. The guide finger D″ is bolted to the bracket E^2 by bolt *o′* in the slot L′ in a manner to allow of its being adjusted to vary the bevel on the edge of the blade as shown in Fig. 4. The free end of the finger D″ is curved to bring it directly in front of the wheel and being attached to the carriage that supports the emery wheel travels with it from end to end of the shaft C as the wheel passes over the different points of the blade to be ground. This finger is removed when grinding the straight blade as shown in Figs. 7 and 8. Thus it will be seen that the emery wheel with its supporting carriage and driving mechanism are free to travel on the bar or shaft C in a line parallel to a line connecting the two points J′ and J^2 upon which the rotating knives of the lawn mower are supported and slide over the guide fingers D″ in passing over the different points of the spirally curved knives of the mower, the point of the blade being acted upon will be held in a fixed relation to the wheel, the bevel will, therefore, be uniform on the edge of the blade and at all points the same distance from the center about which they revolve. After one blade has been operated upon the next one is to be brought into position and as the radius of the emery wheel and the radius of the circle which the cutting edge of the knife describes are greater than the distance between the center about which they revolve on account of the position in which the blade is placed to produce the proper bevel on it, the wheel must be thrown back to allow its succeeding knife to clear the wheel and supporting finger. This is accomplished by swinging the eccentric C′ through half a circle into the position indicated by the broken lines Fig. 3 C^2. This movement causes the shaft C with its supported parts to recede from the knives sufficiently far to allow the knife to clear the finger D″ and the next one to come to rest upon it, after which the eccentric is restored to its original position, and the emery wheel likewise. The fine adjustment necessary to bring the wheel to its exact position to remove the required amount of material from the blades to produce a good edge, the adjustment necessary to make allowance for wear of the wheel and to adapt the machine to different sizes of mowers is accomplished by means of the screw H′. When the adjustment is once made for one blade it is not disturbed for the others, in the same mower. The eccentric only being operated as above described.

The machine is provided with a device in the way of an attachment for grinding the lower or straight knife of the mower. This is shown in Figs. 7 and 8. It consists of a frame composed of a flat casting F^2 with the projecting arms G^2 through the extremities of which the rod D^2 passes. This rod has countersunk centers in its ends into which the conical points J′ and J^2 enter to hold it in position. There are also two brackets E^4 extending downward and resting upon the square bar A serving to support the table in position. Upon the table thus formed the knife is supported and held in position by the clamp bars H^2 and screws C^3. The emery wheel is brought to its place against the face of the knife in a manner hereinbefore described.

I claim as my invention—

1. In combination in a grinding apparatus, the supporting frame including a shaft *c*, a grinding wheel supported directly on the said shaft and adjustable along the same at right angles to its plane of rotation and the driving mechanism connected with the grinding wheel, said mechanism also being carried directly by and adjustable on the said shaft, substantially as described.

2. In combination the frame having the

bearings for the work, the shaft forming part of the frame and adjustable toward and from the said bearings, the grinding wheel carried directly by and adjustable longitudinally of the said shaft, and the driving mechanism also carried and adjustable along the grinding wheel shaft, the said wheel and driving mechanism being adjustable with their carrying shaft toward and from the work, substantially as described.

3. In combination the supporting frame comprising a fixed and a swinging portion, the means on the fixed portion for holding the work to be operated on the adjustable connection between the fixed and swinging portions to adjust the wheel accurately in relation to the work, and the additional rapidly operating means for throwing the grinding wheel to and from working position substantially as described.

4. In combination the supporting frame comprising the fixed and swinging portions, the grinding wheel carried by the swinging portion the screw H′ extending between the fixed and swinging portions and the eccentric on one portion of the frame to which the screw is connected and the means for operating said eccentric.

5. In combination the supporting frame, the grinding wheel with operating mechanism adjustable thereon at right angles to its plane of rotation the journal bearings on the frame for receiving and holding the knife reel and a rest D′ for the knife blades adjustable with the grinding wheel and its operating mechanism said rest being supported from the carrying shaft of the grinding wheel and having its end extended across the face of the said wheel, substantially as described.

6. In combination, the frame comprising the cross bar A, the adjustable bracket carried thereby and having a bearing. The grinding wheel, the bearing on the frame, and the clamping means for the work adapted to be held by said bearings and having depending portions, to bear on the bar A, substantially as described.

7. In combination the supporting frame comprising a fixed portion having journal bearings to receive the work, and the swinging portion consisting of the shaft C and the arms H, I on the shaft B the bracket carried by the shaft C the grinding wheel and the gearing carried by and movable with said bracket and the arm E depending from the bracket and bearing upon the shaft B, the said bracket, grinding wheel and gearing being adjustable longitudinally of the swinging frame and the means for adjusting the swinging frame substantially as described.

8. In combination the supporting frame, the grinding wheel and the bracket M adjustable longitudinally of the frame, the internal gear N the shaft U therefor having a pinion V thereon, the pinion W between the same and the grinding wheel, the gear S on the shaft U the crank arm O and the gear R carried thereby and meshing with the internal gear and the gears respectively substantially as described.

9. In combination the fixed portion of the supporting frame having the journal bearings, the swinging portion carrying the grinding wheel, the means for adjusting the swinging frame and the rest D′ adjustable with the grinding wheel and independent thereof substantially as described.

10. In combination the supporting frame comprising the bar A angular in cross section the bracket E adjustable thereon and carrying the bearing J^2 the bearing J′ on the frame, the shaft C and the grinding wheel with its driving mechanism adjustable longitudinally thereon substantially as described.

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

FRANK D. WINKLEY.

Witnesses:
N. S. JOHNSON,
W. J. COFFIN.