

No. 625,414.

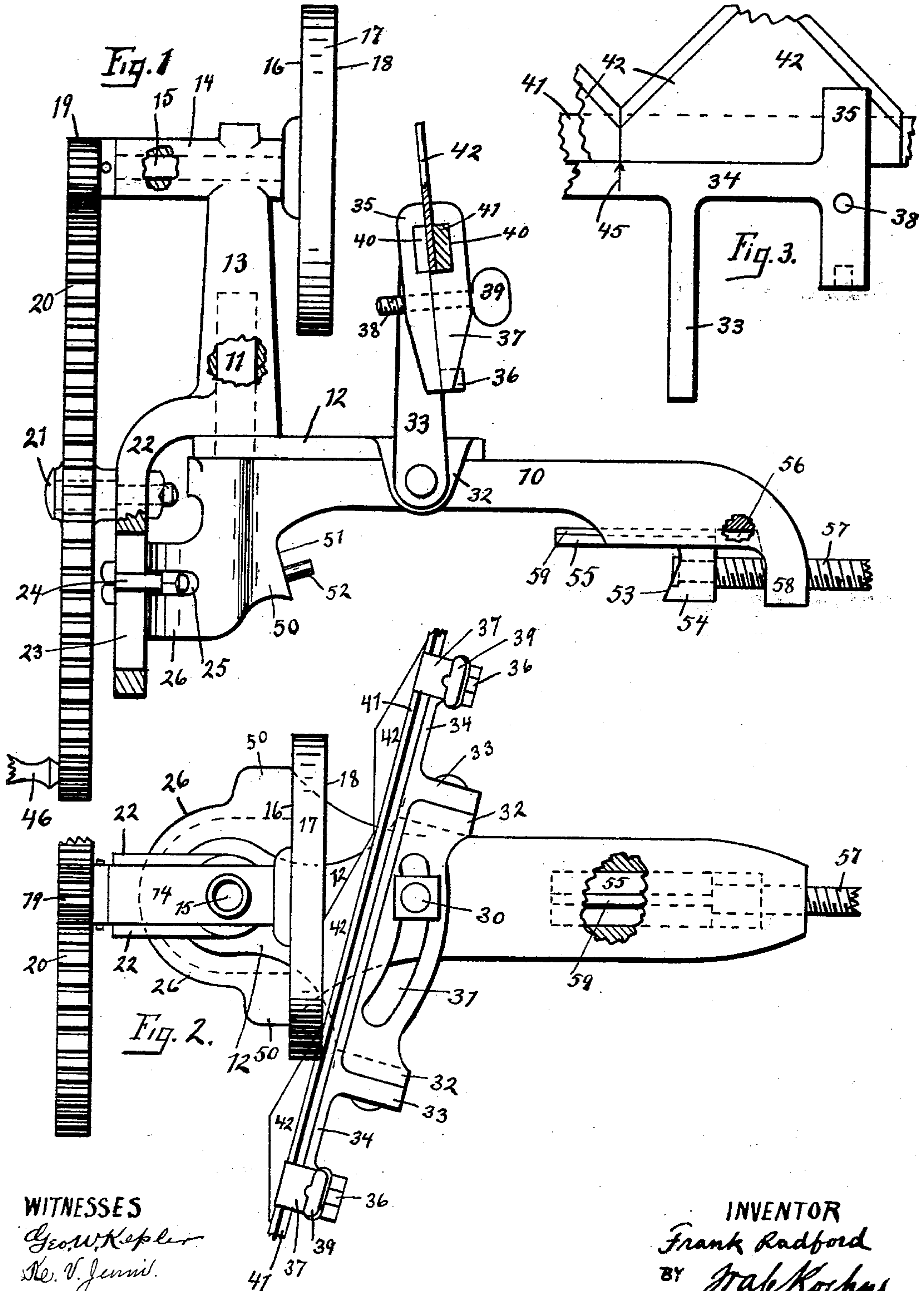
Patented May 23, 1899.

F. RADFORD.  
MOWER KNIFE GRINDING MACHINE.

(Application filed Mar. 4, 1898.)

(No Model.)

2 Sheets—Sheet 1.



WITNESSES

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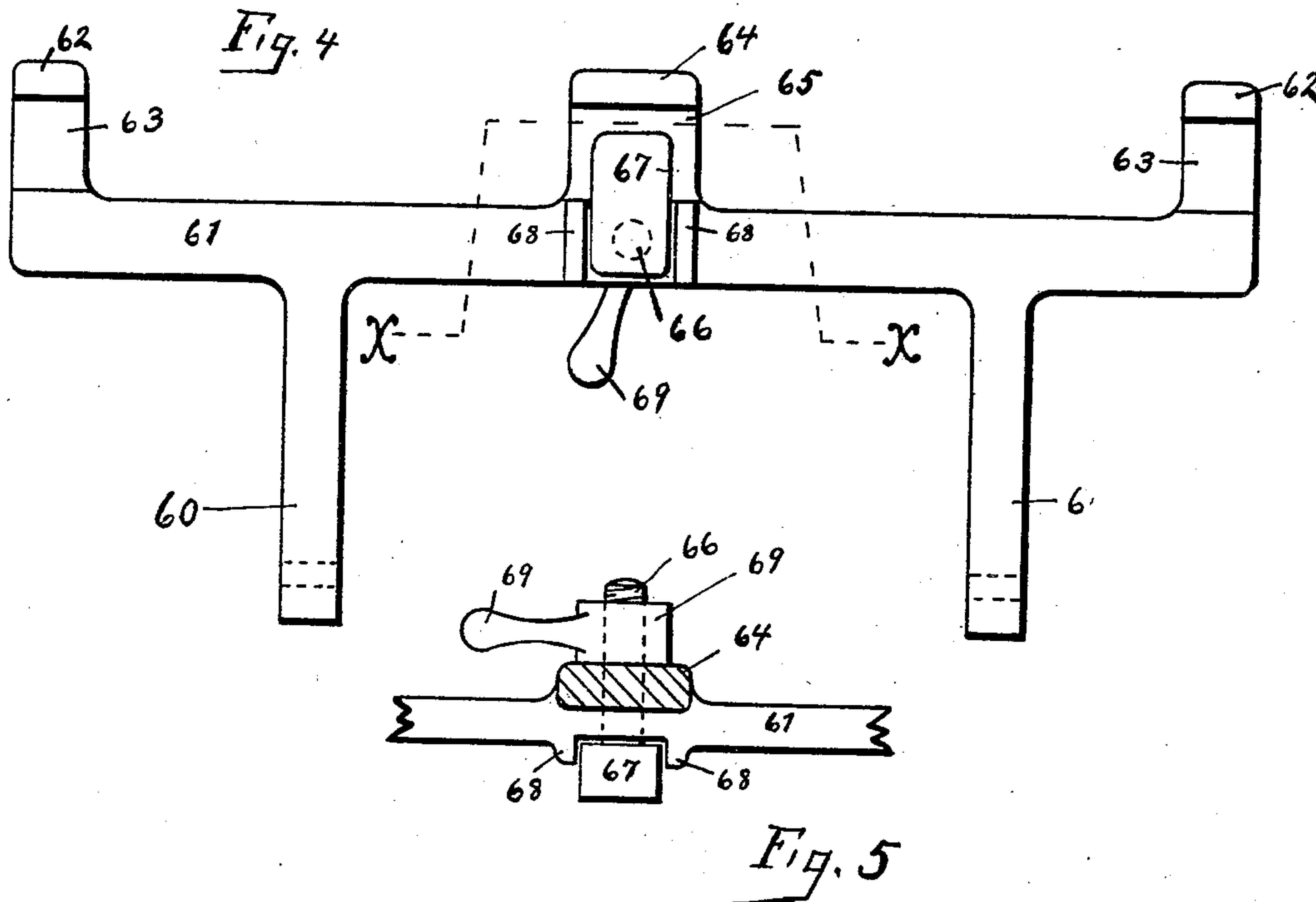
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WITNESSES

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# UNITED STATES PATENT OFFICE.

FRANK RADFORD, OF DAYTON, OHIO, ASSIGNOR OF ONE-HALF TO EDWARD  
C. BOYER, OF SAME PLACE.

## MOWER-KNIFE-GRINDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 625,414, dated May 23, 1899.

Application filed March 4, 1898. Serial No. 672,490. (No model.)

*To all whom it may concern:*

Be it known that I, FRANK RADFORD, of Dayton, county of Montgomery, and State of Ohio, have invented a certain new and useful  
5 Improvement in Mower-Knife-Grinding Machines; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, in which like figures refer to  
10 like parts.

My invention relates to improvements in mower-knife-grinding machines, and it particularly relates to improvements upon that  
15 class of such machines as are shown and described in the following Letters Patent of the United States—to wit, No. 74,942, dated February 25, 1868, No. 83,767, dated November 3, 1868, and No. 97,847, dated December 14, 1869.

My invention therefore consists in the  
20 details of construction and arrangement of the parts, as will hereinafter be described, and particularly referred to in the annexed claims.

In the drawings, Figure 1 illustrates in side  
25 elevation a machine embodying my invention, in which illustration the knife-supporting frame is adjusted parallel to the grinding-wheel. Fig. 2 is a plan view thereof, showing the knife-supporting frame adjusted to  
30 grind one edge of one blade of the mower-knife. Fig. 3 illustrates a detail of the mower-knife-clamping frame. Fig. 4 is a rear elevation of the preferred form of clamping-frame, and Fig. 5 is a sectional view on line  
35 *x x* of Fig. 4.

In said drawings, 10 represents the main frame of the machine, from one end of which rises a rigid shaft 11, upon which is loosely mounted a frame 12. Upon the top of frame  
40 12 and loosely pivoted upon said shaft 11 is a standard 13, having upon its top a cross-arm 14, in which shaft 15 is provided with a bearing. Upon the front end of said shaft 15 is rigidly mounted a grinding-wheel 16, of emery or other suitable grinding composition or  
45 stone, provided with a periphery 17 and a side 18. Upon the rear end of said shaft 15 is rigidly mounted a pinion 19, meshing with the teeth of gear 20, provided with a bearing on  
50 bolt 21, rigidly secured in arm 22, rigid with and extending downward from and to the

rear of said standard 13. In the lower end of said arm 22, Fig. 1, is provided a vertical slot 23, through which passes a bolt 24, which bolt also passes through horizontal slot 25 in  
55 the segmental portion 26 of said frame 10, by means of which bolt 24 said arm 22 is clamped against said portion 26 in order to hold the standard 13 in its desired position of adjustment. Said segment 26 is concentric with  
60 said shaft 11. Said arm 22 is clamped to segment 26, as aforesaid, in such position that said standard 13 does not cause friction against the frame 12 when said standard 13 is in the position shown in Fig. 1. The vertical  
65 slot 23 in arm 22 of standard 13 permits said standard 13 to be raised to different heights upon said shaft 11 and clamped in said positions by said bolt 24, and at the same time the horizontal slot 25 in segment 26 permits said  
70 arm 22 and its rigid standard 13, with their attached parts, to be horizontally adjusted within a range of about forty-five degrees and be clamped in any of said positions by bolt  
75 24, passing through said slots 23 and 25.

Rising from the frame 10 and at a distance in front of the side 18 of the wheel 16 is a bolt  
80 30, Fig. 2, passing through a slot 31 in frame 12, which slot 31 is the arc of a circle concentric with said shaft 11. At opposite ends of  
85 said slot 31 are lugs 32, which project below the top surface of frame 10 and are adapted to contact with said frame 10 to limit the lateral swinging movement of said frame 12 about  
90 shaft 11 as a center. To said lugs 32 are pivoted arms 33, Figs. 1, 2, and 3, which are united at their upper ends by a rigid bar 34, Figs. 2 and 3, which bar 34 projects on opposite sides of and beyond said arms 33, and  
95 at each of the opposite ends of said bar 34 is formed a rigid clamp-jaw 35, Figs. 1 and 3, having formed upon its lower end a rigid projection 36, engaging in a slot formed in the lower end of a mating jaw 37, through which  
100 jaw 37 loosely passes a screw 38, engaging with threads in said jaw 35, and said screw 38 being provided with head 39 for operating said screw. The adjacent faces of said jaws 35 and 37 are provided near their upper ends with recesses 40, adapted to accommodate the  
rib 41 of the mower knife-blades 42.

The mower-knife is adjusted laterally in



the clamp-jaws until the seam between two of its knife-blades 42 registers with an index 45 on bar 34, when the screws 38 are tightened and jaws 35 and 37 clamped firmly upon the mower-knife. The frame 12 is moved laterally in the arc of a circle and the clamp-frame (composed of arms 33, connected by rod 34, having clamps 35 and 37) inclined forward on its pivots toward the side 18 of the grinding-wheel, as shown in Fig. 2, when by turning gear 20 by its handle 46 the wheel 16 is revolved at a high rate of speed by reason of its connected gear 19 and shaft 15, and one tapering edge of a V-shaped blade 42 of the mower-knife is ground to a true edge without a reciprocating contact with the grinding-wheel, as the angle lateral inclination of the frame 12 adjusts the edge of said blade to a parallel with the side 18 of the wheel, while the forward inclination of said clamp-frame adjusts the blade 42 to the proper angle for a ground cutting edge for said blade. When one edge of said knife-blade 42 is sufficiently ground, shift frame 12 to the opposite side and the remaining edge of said V-shaped knife-blade 42 will be ground, when the clamp-frame is forwardly inclined.

When one knife-blade is ground on both sides, unloosen clamps 35 and 37 and laterally adjust the mower-knife therein until the next seam between its knives 42 registers with said index 45, when reclamp and grind, as before. These operations aforesaid will be continued until all the knife-blades 42 are ground on both edges, there being one clamping for each of said blades 42.

When the driving end of the mower-knife is reached in the operation of grinding, some makes of mower-knives have a large rib on the edge of the knife toward the grinding-wheel and at the end where the driving connection is attached. To grind these blades at said end, the bolt 24 is loosened and standard 13 raised a sufficient distance to clear said rib, when said bolt is tightened and the grinding of the edges of the blades 42 is proceeded with as before, except that the grinding-wheel does not reach down into the crotch between those blades 42, but more than three-fourths of the length of the edges of said blades is perfectly ground, which answers all requirements for those blades at said end. Upon the sides of said frame 10 and projecting from the opposite ends of its segment 26 are projections 50, Figs. 1 and 2, having inclined front faces 51, each provided with an upwardly-inclined and forwardly-projecting pin 52, said faces 51 being adapted to engage the rim of the mowing-machine wheel, while said pins 52 are adapted to extend under said wheel-rim when said wheel-rim is clamped by the inclined face 53 of the downward projection 54 of slide 55, mounted in slot or recess 56, formed in the under side of the front end of said frame 10. Said slide 55 is operated by screw 57, threaded in downward projection 58 of frame 10, and said screw is revolu-

bly but non-longitudinally movable in said projection 54 of slide 55. The operation of said screw 57 causes the rim of the mower-machine to be clamped between said faces 51 and 53 or to release therefrom. Said slide 55 is provided on its top with a central longitudinal rib 59, adapted to engage the upper wall of recess or slot 56 in order to reduce friction.

It will be seen that in the construction of the clamp as above described the projections 50 and their clamping-faces 51 are on opposite sides at one end of frame 10, while the clamping-face 53 of projection 54 of slide 55 occupies an intermediate or central position at the opposite end of said frame 10, thus making three clamping-faces occupying the three points of a triangle and forming a very simple, cheap, and serviceable clamp.

In Figs. 4 and 5 the preferred form of mower-knife-clamping frame and clamp is shown, in which arms 60 are substituted for the aforesaid arms 33 and cross-bar 61 is substituted for the aforesaid cross-bar 34, both of which arms and bar are substantially the same in construction, except as hereinafter stated. At the opposite ends of said cross-bar 61 rise vertical jaws 62, having in their rear faces a recess 63 to receive the rib upon the mower-knife. At about the center of the length of said bar 61 rises a jaw 64, Figs. 4 and 5, provided in its rear face with a recess 65, corresponding with the aforesaid recess 63 in jaw 62 and for the same purpose. Passing loosely through a hole in cross-bar 61 is a bolt 66, having enlarged head 67 loosely resting between vertical ribs 68 upon the rear side of cross-bar 61. Upon the forwardly-projecting end of bolt 66 is threaded a handle 69 for the purpose of drawing bolt-head 67 against the mower-knife bar and locking it against the jaws 62 and 64 and the rib of the mower-knife bar in recesses 63 and 65 of said jaws, while the ribs 68 prevent said bolt from turning in such position that it will not clamp the knife-bar.

It will thus be seen that a very effective, simple, and durable clamp is formed which will securely clamp the knife-bar with but one operation, which result saves considerable time and labor in the grinding of each mower-knife bar, as said knife-bar must be shifted in said clamping-frame and reclamped as many times for each different knife-bar as there are teeth in the knife-bar to be ground.

I claim—

1. In a mower-knife-grinding machine, a grinding-wheel, a standard supporting a grinding-wheel and located at a point to the rear of the grinding-face of said wheel, a laterally-movable frame pivoted concentric with said standard and extending in front of the grinding-face of said wheel, a mower-knife clamp pivotally mounted upon said frame, said frame being adapted to be moved equal distances upon opposite sides of the axis of the grinding-wheel for grinding the opposite edges of the same knife-blade, the pivot-point



of said frame being to the rear of the grinding-face of said grinding-wheel and vertically below the axis of said grinding-wheel, whereby said clamp may be moved with said frame  
 5 equal distances on opposite sides of the axis of said grinding-wheel and in the arc of a circle to grind the oppositely-tapered edges of the same tooth of the mower-knife, substantially as specified.

10 2. In a mower-knife-grinding machine, the combination of a main frame upon which are pivotally mounted at the same point a standard and a swinging frame, a cross-arm on the top of said standard in which revolubly bears  
 15 a shaft having a grinding-wheel and a gear-wheel rigidly secured upon its opposite ends, a downward projection rigid with said standard and revolubly carrying a driving-gear meshing with said first-named gear, means for  
 20 securing said standard to said main frame, a mower-knife-clamping frame pivotally connected to said swinging frame at a point in front of the forward side of the grinding-wheel, the axis of said swinging frame being  
 25 below and at right angles to the axis of the grinding-shaft and to the rear of said grinding-wheel, and projections on opposite sides of said swinging frame and adapted to contact with the sides of the main frame for limiting the swinging movement of said frame  
 30 to an equal distance upon opposite sides of the axis of the grinding-wheel shaft, substantially as specified.

3. In a mower-knife-grinding machine, the  
 35 combination of a relatively stationary grinding-wheel support, a grinding-wheel mounted in said support with its side toward the front, a laterally-movable frame independent of said support and pivoted to the rear of said grinding-wheel and vertically below its axis, a  
 40 mower-knife-clamp frame pivotally mounted upon said frame at a point in front of the grinding-face of said grinding-wheel and adapted to incline toward the front side of  
 45 said wheel and be moved a distance upon opposite sides of the axis of said wheel, and an index on said clamp-frame adapted to register with the seam between two of the knife-sections for grinding the two opposite edges  
 50 of the knife-blade nearest the axis of said wheel, at one clamping of the mower-knife section, substantially as specified.

4. In a mower-knife-grinding machine, the  
 55 combination of a main frame having secured thereto a vertical shaft at one end, a frame loosely pivoted on said shaft adjacent said main frame, a standard slidably mounted upon the top of said shaft, a vertical arm rigid with said standard, a vertical slot in said  
 60 arm, a segmental portion of said main frame contacting with said vertical arm, said segment being concentric with said rigid shaft, a horizontal slot in said segmental portion, a bolt passing through said vertical and horizontal  
 65 slots, a cross-arm upon the top of said standard, a revoluble shaft bearing therein at right angles to and vertically above the axis

of said stationary shaft, a grinding-wheel rigid upon the front end of said revoluble shaft and a gear-wheel rigid upon its rear  
 70 end, a driving-gear revolubly mounted upon said arm of said standard, a handle for operating said driving-gear, and a pivoted knife-clamping frame attached to said pivoted frame at a point in front of said grinding-  
 75 wheel, substantially as specified.

5. In a mower-knife-grinding machine, the combination of a main frame having secured thereto a vertical shaft at one end, a standard  
 80 slidably mounted upon the top of said shaft, a vertical arm rigid with said standard provided with a vertical slot, a segmental portion of said main frame contacting with said vertical arm, said segment being concentric with said rigid shaft, and provided with a  
 85 horizontal slot in said segmental portion, a bolt passing through said vertical and horizontal slots, a cross-arm upon the top of said standard, a revoluble shaft bearing therein at right angles to and vertically above the axis  
 90 of said stationary shaft, a grinding-wheel rigid upon the front end of said revoluble shaft and a gear-wheel rigid upon its rear end, a driving-gear revolubly mounted upon said arm of said standard, and a pivoted knife-  
 95 clamping frame mounted in front of and adapted to be inclined toward said grinding-wheel, substantially as specified.

6. In a mower-knife-grinding machine, the combination of a base adapted to be clamped  
 100 to a part of the mower, a knife-grinding wheel mounted upon a standard and adapted to have the knife ground upon one of its sides, a mower-knife clamp mounted in front of said grinding side of said wheel and independent  
 105 of said standard, a vertically-sliding connection between said standard and base, and a projection of said standard separate from said sliding connection and adapted to be clamped  
 110 to said base at different elevations for vertically adjusting said grinding-wheel on its sliding connection and with reference to said base for grinding only certain teeth or blades of the mower-knife, substantially as specified.

7. In a mower-knife-grinding machine, the  
 115 combination of a main frame, a grinding-wheel mounted upon and vertically adjustable with reference to said main frame, a laterally-movable frame pivoted upon said main frame, a clamp-frame pivoted upon said lat-  
 120 erally-movable frame, of downward projections 50 on opposite sides of one end of said main frame, inclined faces 51 on said projections, a pin 52 projecting from each of said faces 51, a slot or recess located at the center  
 125 of said frame and its front end, a slide mounted in said slot or recess, inclined face 53 carried by said slide, a screw threaded into a projection of said main frame and revolubly but non-longitudinally engaging said slide,  
 130 substantially as and for the purpose specified.

8. In a mower-knife-grinding machine, the combination of a knife-clamp formed of arms



pivoted at one end and secured to a cross-bar  
at their other end, a vertical jaw on each end  
of said cross-bar, a vertical jaw at substan-  
tially the center of said cross-bar, recesses in  
5 the rear face of said jaws, a bolt passing  
loosely through said cross-bar and having an  
enlarged head adapted to clamp the mower  
knife-bar against said jaws, a lug or rib pro-  
jecting from said cross-bar on opposite sides

of said enlarged bolt-head, and a nut or han- 10  
dle for operating said bolt, substantially as  
specified.

In witness whereof I have hereunto set my  
hand this 1st day of March, 1898.

FRANK RADFORD.

Witnesses:

ISAAC G. KENNEDY,  
IRA C. KOEHNE.