

No. 661,348.

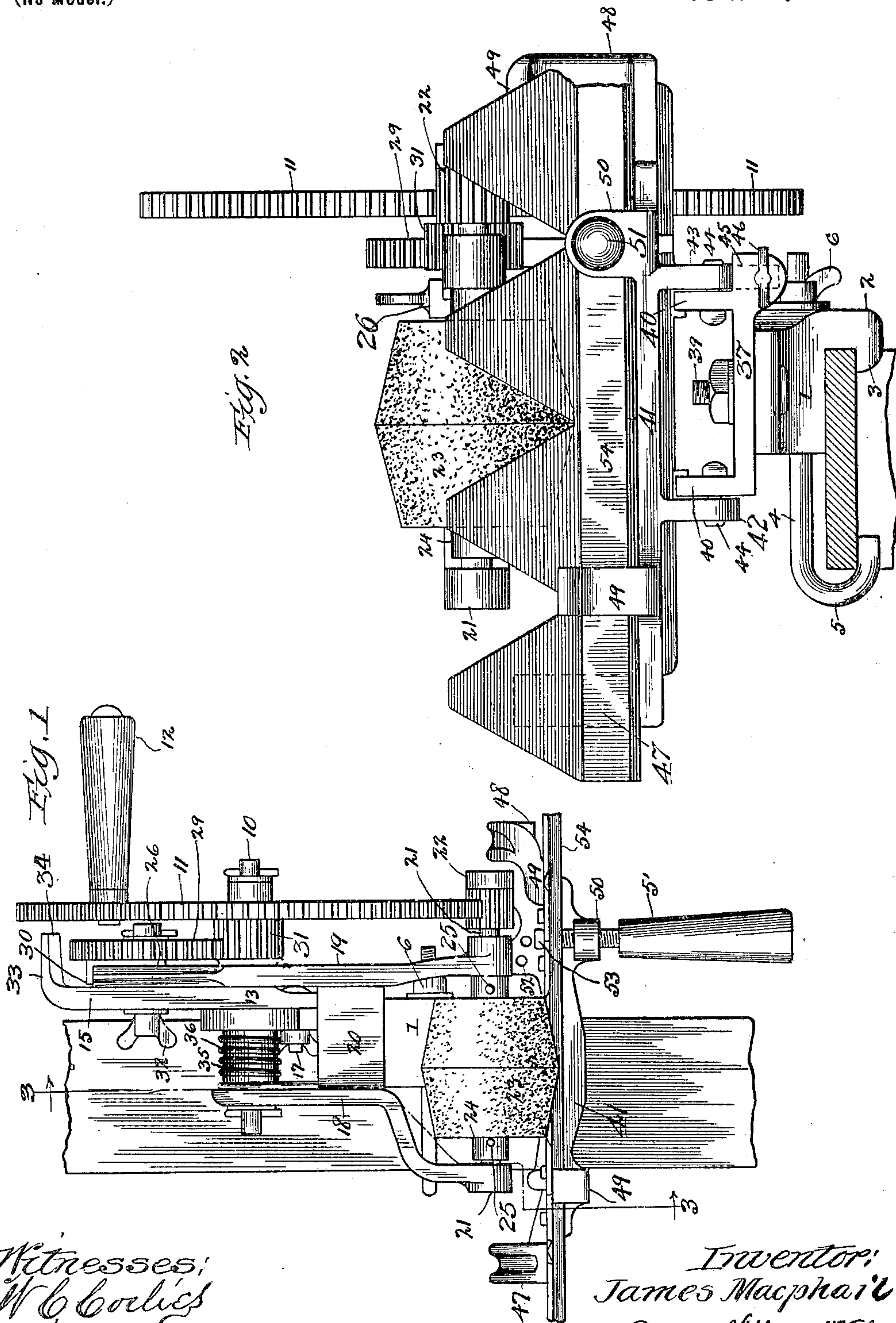
Patented Nov. 6, 1900.

J. MACPHAIL.
GRINDER.

(Application filed Mar. 11, 1899.)

(No Model.)

4 Sheets—Sheet 1.



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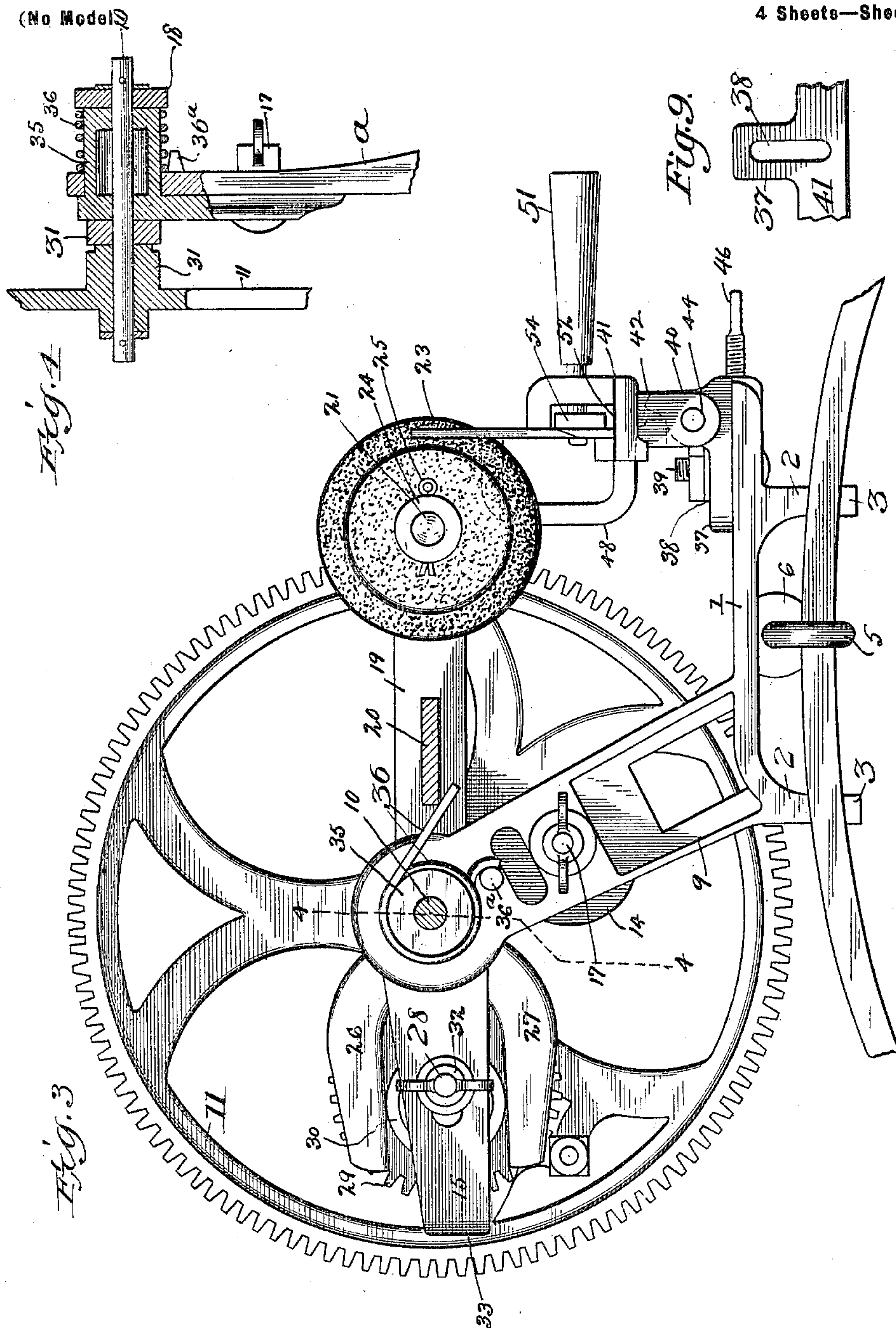
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4 Sheets—Sheet 2.



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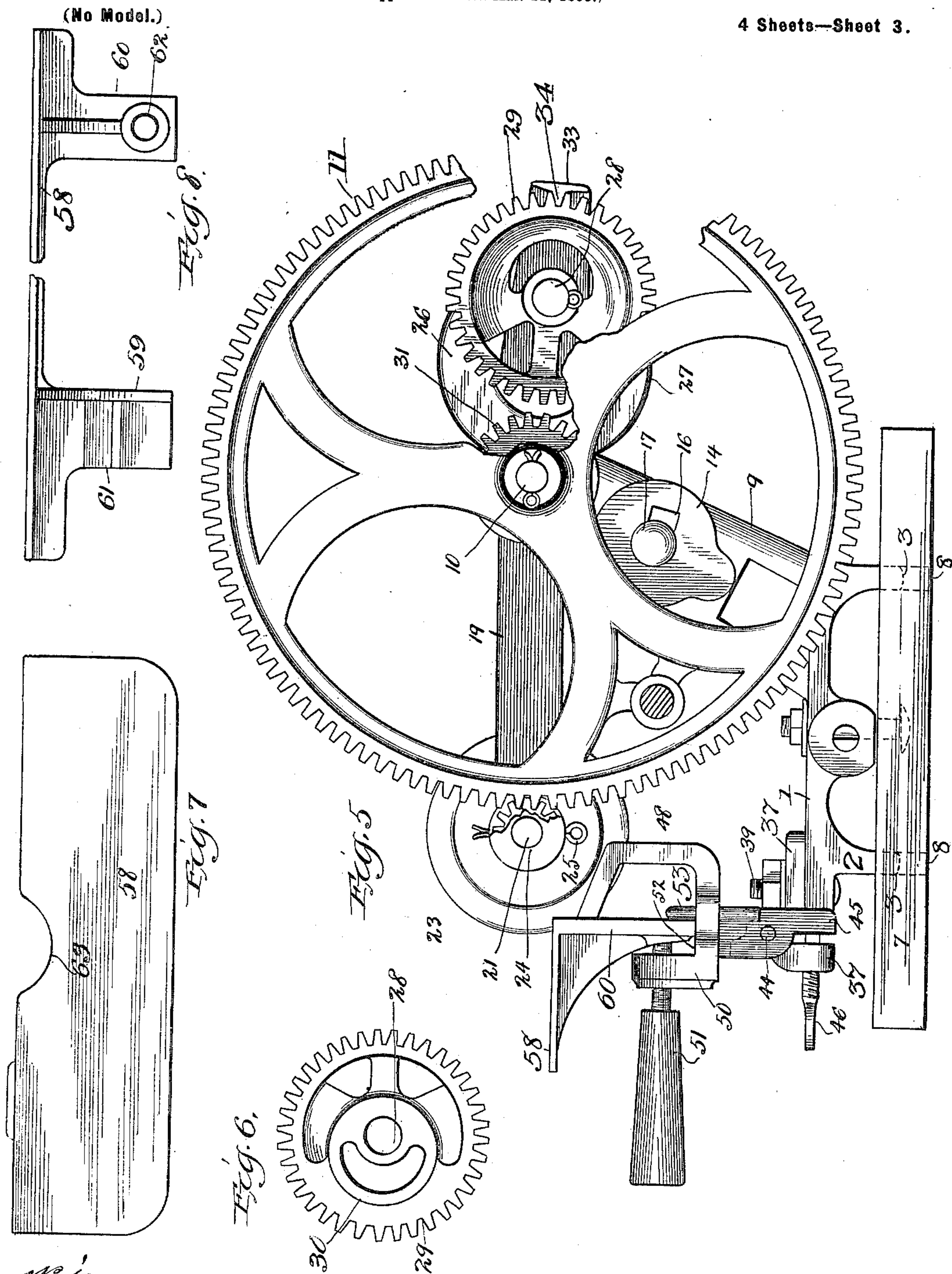
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4 Sheets—Sheet 3.



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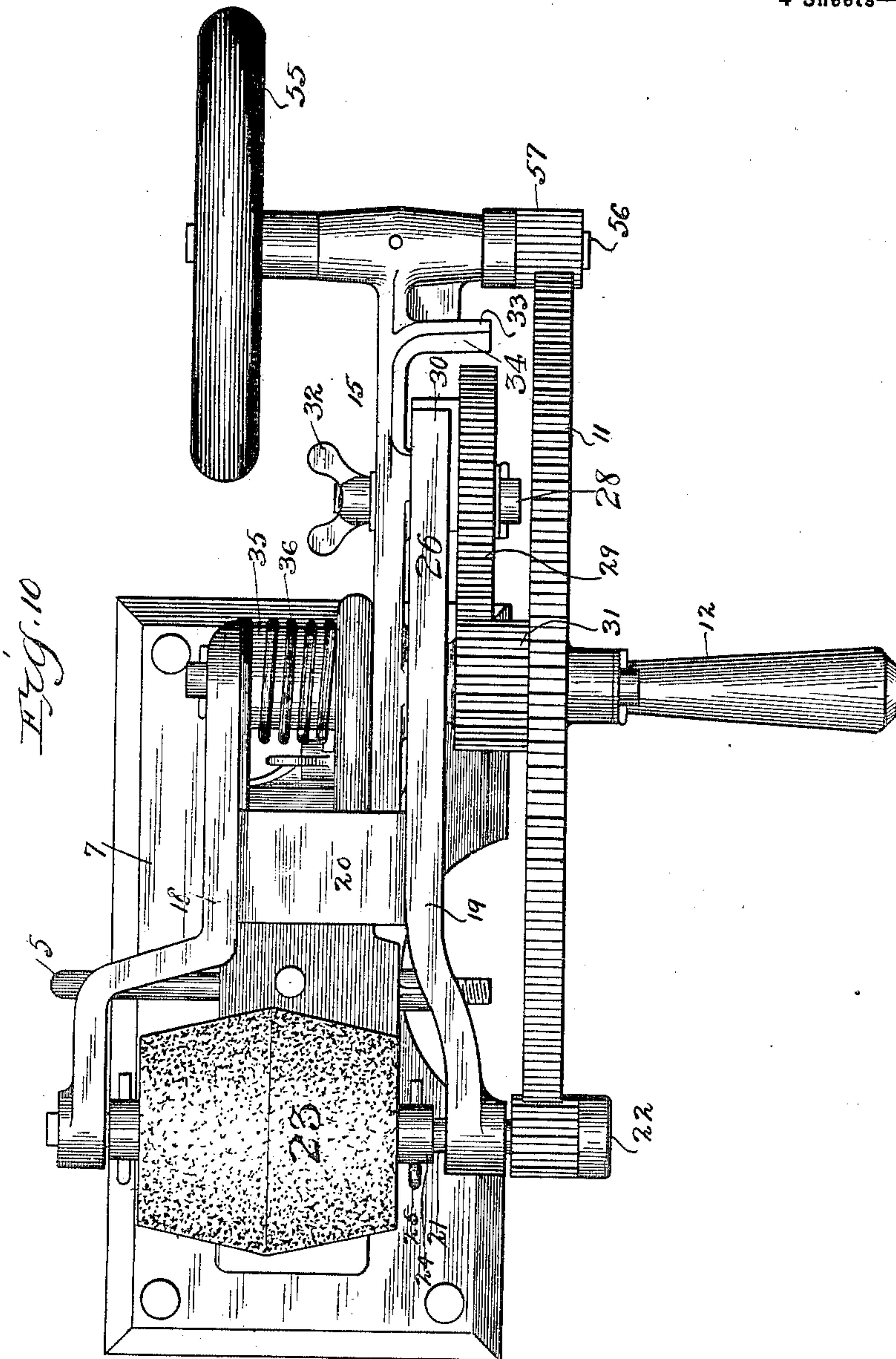
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4 Sheets—Sheet 4.



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UNITED STATES PATENT OFFICE.

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GRINDER.

SPECIFICATION forming part of Letters Patent No. 661,348, dated November 6, 1900.

Application filed March 11, 1899. Serial No. 708,742. (No model.)

To all whom it may concern:

Be it known that I, JAMES MACPHAIL, a resident of Blue Island, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Grinders, of which the following is a specification.

My invention relates to grinders; and its object is to provide a grinder both for harvester-knives and the like and for general purposes.

My grinder embodies a novel construction and operation as well as novel adjustments of parts.

In the drawings, Figure 1 is a plan view of my grinder or machine; Fig. 2, a front elevation thereof; Fig. 3, a sectional elevation on line 3 of Fig. 1; Fig. 4, a section on line 4 of Fig. 3; Fig. 5, a side elevation of the machine; Fig. 6, a detail view of the cam-gear; Figs. 7 and 8, detail views of the work-support used for general grinding purposes; Fig. 9, a detail view of a portion of the base-plate of the holder-frame, and Fig. 10 a plan view of a grinder with a fly-wheel coöperating therewith and attached thereto.

The grinder has a base portion 1, provided with means of attachment to a bull-wheel or other stationary base, which means comprise, preferably, a pair of depending arms 2, having lugs 3. A rod or bar 4, screw-threaded at one end and having a hook 5 at the other end, passes through the base 1. The hook is adapted to engage under the rim of a bull-wheel or the edge of any other stationary base, while the lugs 2 engage on the other side of the rim. To clamp the parts together, a thumb-screw 6 on rod 4 is employed. Figs. 2 and 3 particularly show the attachment of the grinder on the bull-wheel of a harvester, while Fig. 5 shows the grinder attached to a stationary board or other base 7, having holes 8 to receive the lugs 2, which set into the holes, while the hook 5 is adapted to engage over the edge of such board.

From the base rises a standard 9, which provides a bearing for a transverse stud or pintle 10, carrying a gear-wheel 11, operated by a handle 12. On this stud is pivotally mounted an adjustable bell-crank-shaped frame or bracket 13, having substantially right-angled arms 14 and 15, the arm 14 being

extended downwardly and the arm 15 rearwardly. The arm 14 has a slot 16 to receive the screw-bolt 17, passing through the standard or support 9. The grinding-wheel frame comprises two arms or standards 18 and 19, preferably having a connecting-piece 20 and pivoted at their rear ends upon the stud 10. The forward ends of these arms have journals, in which is mounted a shaft 21, carrying at its end adjacent to the gear-wheel 11 a small pinion 22, meshing with such gear-wheel, whereby the shaft 21 is rotated by the gear-wheel 11. The grinding-wheel 23 is adapted to grind two adjacent cutting edges of a harvester-knife, and, as shown, it is for this purpose beveled from the center outwardly. This wheel is securely fastened to a sleeve 24, which is removably secured to the rotating shaft 21 by one or more cotters or pins 25 or the like passing through registering holes in the sleeve and shaft, respectively. This construction provides a simple and ready means of attachment and permits of the removal of one wheel and the insertion of another by simply removing the cotters and drawing the shaft out toward the right, Fig. 1. The arm 19 is extended rearwardly beyond its bearing on the stud 10 and is bifurcated to form arms 26 and 27.

The arm 15 is provided with a slot to receive the short stud 28, on which a gear-wheel 29 rotates. This gear-wheel has an eccentric or cam 30, contacting the arms 26 and 27 and causing such arms, and consequently the grinding-wheel, to rock up and down as it is rotated. This gear-wheel 29 meshes within a pinion 31, affixed to or made a part of the gear-wheel 11 or arranged in any other suitable way, so as to be rotated by such gear-wheel 11. A thumb-nut 32 clamps the gear-wheel shaft 28 in the in-mesh position or in the out-of-mesh position of its gear-wheel. The extreme end of the arm 15 is bent laterally to form an arm 33, whose inner face has a rib or locating-tooth 34, similar to a gear-tooth, and adapted to receive and lock the gear-wheel 29 and prevent its rotation when out of mesh. Around the stud 10, between the standards 9 and the arm 18, is arranged a sleeve 35, (see Fig. 4,) around which is a coiled spring 36, abutting at one end

against a lug 36^a on the standard and at the other end beneath the cross-piece 20 of the grinding-wheel frame. The object of this spring is to carry the weight of this frame and relieve the cam therefrom.

The holder for clamping the work and presenting it to the grinding-wheel comprises a base-plate 37, having a slot 38 to receive a screw-bolt 39, passing through the base 1, whereby the plate 37 may be adjusted forwardly and backwardly. This base-plate has upwardly-extending lugs or arms 40, on which is pivotally mounted the holder-frame 41 through means of the depending arms 42 and 43 and the bearing-pins 44. The arm 43 is carried below its pivotal point to form an extended end 45, against which bears an adjusting-screw 46, whereby the pivotal movement of the frame 41 on the plate 37 may be limited.

The holder-frame has a pair of rearwardly-turned fingers 47 and 48 and one or more oppositely-turned fingers or rests 49. The frame 41 has an arm or lug 50, having a screw-threaded hole to receive the screw-threaded end of a clamp 51, which is, in fact, a combined clamp and a handle, inasmuch as it is grasped by the hand, and after clamping the knife-bar is used to direct and hold the knife-sections against the grinding-wheel. The frame 41 has a substantially horizontal flat portion 52, provided with any desired number of holes located in different positions and adapted to receive a pin 53, such as an ordinary cotter-pin, against which the knife-bar 54 (a portion of which is shown) is caused to bear when the clamp 51 is screwed inwardly. This knife-bar fits between the fingers 47 and 48 on the one side and the finger 49 and clamp 51 on the other side.

In Fig. 10 is shown a machine with a cooperating fly-wheel 55, having a shaft 56 journaled in an extension of the arm 15 and carrying a small pinion 57, meshing with the gear-wheel 11. While this fly-wheel may be dispensed with its use assures a smoothness and uniformity of movement, and, furthermore, the peculiar arrangement of such wheel away from the drive-gear allows of a high speed to be imparted to such wheel, which assists the operator and facilitates the grinding, besides rendering the motion continuous.

In Figs. 7 and 8 is shown a work-support, preferably of metal, and comprising a flat portion 58, having depending arms 59 and 60. This support is adapted to be securely clamped in the same place as the knife-bar, and to this end the arm 59 has a horizontal slot 61, which is received by the finger 49, while the arm 60 has a screw-threaded hole 62, received by the clamp. The flat portion 58 is preferably hollowed out at 63 to accommodate a different size of grinding-wheel used for general grinding.

My machine, being constructed as hereinbefore set forth, operates as follows: The adjustable gear-wheel 29 being in mesh and the gear-wheel 11 being turned, the pinion 22 is

rotated and the grinding-wheel 23 is also rotated. Simultaneously the gear 29 is rotated, and by reason of the eccentric contacting the bifurcated end of the grinding-wheel frame such frame is caused to vibrate or rock up and down, so that the grinding-wheel as it rotates has a rocking or vibrating movement in an arc of a circle whose center is the stud 10.

When it is desired to use the machine for ordinary grinding-work or when for any reason it is desired that the grinding-wheel frame shall be stationary, the thumb-nut 32 is loosened and the gear-wheel 29 moved backward, the teeth engaging the locating-tooth 34 on the arm 33, after which the nut 32 is tightened, thereby also locking such frame in any adjusted position. The position of the grinding-wheel frame with respect to the standard 9 is adjustable by virtue of the slotted arm 14, whose adjustable movements are communicated to the other arm 15, and thereby to the gear-wheel 29 and its cam, whereby the axis of such gear-wheel is raised or lowered. The arc described by the grinding-wheel frame may thus be adjusted higher or lower to suit requirements. As this frame descends the coiled spring is somewhat compressed, and on further movement of the parts the spring tends to raise this frame and relieve the machine and its operator of a continual lift. The knife-bar is inserted in the holder-frame, so that the angle or point between the two adjacent knife-sections is in the same vertical plane as the central or highest point of the grinding-wheel, as seen in Fig. 2. The clamp 51 is then screwed inward and bears against the knife-bar. To accommodate a thick or thin bar or any size of head on a knife-bar the pin 53 may be placed in the proper hole in the plate 52. The base-plate 37 is adjustable to proper position to or from the wheel, according as the knife-sections are either long or short, and is then clamped. The arm 14 is adjustable, so that the grinding-wheel in its vibration will grind the entire cutting edge of the sections, and the set-screw 46 is also adjusted to regulate and limit the forward tipping of the holder-frame to prevent dubbing or rounding off of the sickle-sections. After being thus properly adjusted perfect work is always assured, however inexperienced the operator may be.

When the machine is used for general grinding purposes, the grinding-wheel frame is arranged not to vibrate by taking the gear 29 out of mesh, and such frame can be adjusted to the desired height or altitude by adjusting the arm 14 on the stationary standard 9, or such gear-wheel after being taken out of mesh may be turned and then locked on the locating-tooth. The grinding-wheel may thus be readily adjusted to grind low or high or at any intermediate point. If the gear-wheel is taken out of mesh when the eccentric is at a position to vibrate the frame to its highest altitude, the frame will be held high and held

low if such gear-wheel is adjusted when the frame is at its lowest position. The grinding-wheel shown may be readily removed in the manner before stated and the grinding-wheel of the desired shape or style substituted.

Although I have described more or less precise forms and details of construction, I do not intend to be understood as limiting myself thereto, as I contemplate changes in form, the proportion of parts, and the substitution of equivalents, as circumstances may suggest or render expedient and without departing from the spirit of my invention.

I claim—

1. A grinding-machine comprising a pivoted frame, a grinding-wheel therein, an eccentric for vibrating such frame, an adjustable frame in which the eccentric is mounted and means for operating the grinding-wheel and the eccentric.

2. A grinding-machine comprising a support, a frame pivoted therein, a grinding-wheel in such frame, an eccentric for vibrating such frame, a second frame adjustable on such support, said eccentric being adjustably mounted in said adjustable frame and means for operating the grinding-wheel and the eccentric.

3. A grinding-machine comprising a standard or support, a stud mounted therein, a grinding-wheel frame pivotally mounted on said stud, a grinding-wheel journaled in such frame, a bracket or frame also mounted for rotary adjustment upon said stud, an eccentric carried by said bracket and arranged to engage said grinding-wheel frame for rocking the same about said stud, and a drive-gear mounted on said stud and adapted to actuate said grinding-wheel and eccentric.

4. A grinding-machine comprising a standard, a stud mounted therein, a grinding-wheel frame pivotally mounted on the stud, a grinding-wheel journaled in such frame, a bracket also mounted on said stud and provided with a lug, means connected to said frame arranged to engage said lug for locking said frame against movement and a main drive-gear for actuating said grinding-wheel.

5. A grinding-machine comprising a main stud, a frame pivotally mounted thereon and carrying a grinder, a slotted bracket also mounted on said stud, a short stud adjustably mounted in the slot of said bracket and carrying an eccentric, said eccentric arranged to engage said frame, and a drive-gear mounted on said main stud and arranged to actuate said grinder and eccentric.

6. A grinding-machine comprising a vibrating grinding-wheel frame, a grinding-wheel therein, means for vibrating the frame and rotating the wheel and means for changing the position or altitude of the arc described by the frame in its vibrations without affecting the extent of vibration.

7. A grinding-machine comprising a grinding-wheel, a pivoted frame carrying the wheel

at one end and having an extended portion at the other end beyond the pivotal point, an eccentric coöperating with such extended portion to vibrate such frame, and a frame carrying such eccentric and adjustable in position to vary the position of the arc of vibration.

8. A grinding device comprising a vibrating grinding-wheel frame, a grinding-wheel therein, mechanism for vibrating the frame, a driving-wheel operating said mechanism and simultaneously rotating the grinding-wheel and means for throwing said mechanism out of operation and simultaneously locking the same.

9. A grinding-machine comprising a stud, a frame pivotally mounted thereon and carrying a grinder, a bracket also mounted on said stud, means carried by said bracket and arranged to engage such frame, a drive-gear mounted on said stud and adapted to rotate said grinder, and means for rotarily adjusting said bracket on said stud.

10. A grinding-machine comprising a pivotally-mounted and vibratable frame carrying a grinder, a bracket mounted for angular adjustment with reference to the pivotal axis of said frame and carrying an eccentric arranged to engage said frame, and a drive-gear mounted concentric with said axis and arranged to actuate said grinder and eccentric.

11. A grinding-machine comprising a stud, a grinder-frame and a bracket mounted on the stud, a grinder in such frame, an eccentric carried by said bracket and arranged to vibrate said frame upon the stud, a main drive-gear for rotating said grinder and actuating said eccentric, and a spring arranged to oppose the action of said eccentric in one direction.

12. A grinding-machine comprising a standard or support, a stud mounted therein, a rotatable grinding-wheel, a frame pivoted on said stud, carrying at one end the grinding-wheel and having a bifurcated arm extending beyond its pivotal point, an eccentric located between the bifurcations of said arm and adapted to vibrate the frame, a gear-wheel actuating said eccentric, means for removing it from mesh with its driving-pinion to prevent vibration of the frame and a main driving gear-wheel adapted to rotate the grinding-wheel and having a pinion to actuate the eccentric-actuating gear-wheel.

13. A grinding-machine comprising a pivoted frame, a grinding-wheel therein, mechanism for vibrating such frame, an adjustable frame in which such mechanism is mounted and means for operating said grinding-wheel and said mechanism.

14. A grinding-machine comprising a standard or support, a stud mounted in said standard, a grinding-wheel, a frame pivoted on the stud and carrying the grinding-wheel at one end and having an extension on its opposite end beyond its pivotal point, a bell-crank-shaped lever pivoted on the stud, one arm be-

ing substantially horizontal and projecting parallel to said extension of the frame, such arm having a longitudinal slot, a stud adjustable in said slot, an eccentric mounted on
 5 such adjustable stud and a driving-wheel for simultaneously rotating the grinding-wheel and the eccentric to vibrate the frame.

15. A grinding-machine comprising a stand-
 10 ard or support, a stud mounted therein, a grinding-wheel; a frame pivoted on the stud and carrying the grinding-wheel at one end and having an extension on its opposite end beyond its pivotal point, a bell-crank-shaped frame pivoted on said stud and adjustable
 15 with respect to the standard; an eccentric journaled in one of the arms of the bell-crank-shaped frame and adapted to contact said extension of the grinding-wheel frame to vibrate the same and means for rotating the grind-
 20 ing-wheel and for rotating the eccentric to vibrate the grinding-wheel frame.

16. A grinding-machine comprising a stand-
 25 ard or support, a stud mounted therein, a rotatable grinding-wheel, a frame pivoted on the stud and carrying the grinding-wheel at one end and having an extension on its opposite end beyond its pivotal point, a bell-crank-shaped frame pivoted on said stud and having one of the arms thereof projecting
 30 downward adjacent to said standard and provided with a slot, a clamping-bolt passing through the standard and received by said slot to hold said bell-crank-shaped frame in adjusted positions, the other arm thereof ex-
 35 tending rearwardly substantially horizontal and provided with a slot, a stud adjustable in said last-named slot, a gear-wheel provided with an eccentric and mounted on said last-named stud, such eccentric contacting
 40 said extension of the grinding-wheel frame, a main driving-gear rotating the grinding-wheel, and a pinion intermediate such driving gear-wheel and the eccentric-provided gear-wheel.

45 17. A grinding-machine comprising a stand-ard or support, a stud mounted therein, a rotatable grinding-wheel, a frame pivoted on the stud and carrying the grinding-wheel at one end and having a bifurcated extension
 50 on its opposite end beyond its pivotal point, an arm mounted on said stud and extending rearwardly, a gear-wheel, an eccentric thereon embraced by said bifurcated extension to vibrate the grinding-wheel frame, a stud for
 55 said gear-wheel and adjustably mounted in said arm, a driving-wheel rotating the grinding-wheel and having a pinion meshing with said gear-wheel and a projection on said arm to engage in and lock said gear-wheel when
 60 adjusted out of mesh.

18. A grinding-machine comprising a base, a vibrating grinding-wheel frame mounted thereon and having a bifurcated extension, an eccentric embraced by such extension and
 65 having a stud, a bracket arranged on the base and having a slot in which the stud is adjustably secured, driving mechanism for op-

erating said eccentric, and a lug or tooth on said bracket adapted to engage the eccentric when adjusted out of operation with the driv- 70
 ing mechanism, whereby the eccentric is held in different positions to adjust and hold the frame from vibrating and at different altitudes.

19. A grinding-machine comprising a stand- 75
 ard or support, a stud mounted therein, a rotatable grinding-wheel, a frame pivoted on the stud and carrying the grinding-wheel at one end and having a bifurcated extension, an arm extending rearwardly from said stud 80
 and having its extreme end turned at an angle and there provided with a rib or lug, a stud or spindle adjustably mounted on said arm, a gear-wheel mounted on said spindle, an eccentric thereon embraced by said bifur- 85
 cated extension, and a driving-wheel rotating the grinding-wheel and having a pinion meshing with said gear-wheel to rotate the same and cause the eccentric to rock the grinding-wheel frame. 90

20. A grinding-machine comprising a vibrat-
 ing frame, a grinding-wheel rotatably mount-
 25 ed therein, a pinion for such wheel, a drive-gear for vibrating such frame and for rotating such wheel through its pinion, and a fly- 95
 wheel also driven by the gear by engagement therewith at a point on the said gear substantially diametrically opposite the point where the grinding-wheel pinion meshes.

21. A grinding-machine comprising a vibrat- 100
 ing frame, a grinding-wheel rotatably mounted therein and having a pinion, a fly-wheel having a pinion, a driving gear-wheel having teeth engaging said pinions to rotate said grinding-wheel and the fly-wheel, such pin- 105
 ions meshing with said gear on opposite sides thereof, and a connection between said driving-gear and said grinding-wheel frame to vibrate such frame.

22. A grinding-machine comprising a stand- 110
 ard, a vibrating frame mounted thereon, a grinding-wheel rotatably mounted in said frame and having a pinion, an arm connected with the standard and extending rearwardly, a journal in the extreme end of such arm, a 115
 fly-wheel having a shaft mounted in such journal, a pinion on said shaft, a gear-wheel having an eccentric and mounted in said arm, such eccentric contacting the frame to vibrate it, a main driving gear-wheel meshing 120
 with said pinions at its opposite sides and having a pinion meshing with said eccentric-provided gear-wheel.

23. A grinding-machine comprising a base, a vibrating frame mounted thereon, a grind- 125
 ing-wheel rotatably mounted in such frame, an eccentric contacting said frame to vibrate it, a bracket providing a bearing for the eccentric and having a journal at its end, a shaft bearing in such journal and having a 130
 fly-wheel, and a wheel driving the grinding-wheel, eccentric and fly-wheel.

24. A grinding-machine comprising a base having upwardly-projecting bearing-lugs, a

grinding-wheel rotatably supported thereon, means for rotating such wheel and a workholder comprising a frame having downwardly-projecting bearing-lugs coöperating with the lugs of said base, one of said lugs on the frame extended below its pivotal point and a set-screw in said base engaging such extended portion and a rotatable clamp screwing through the frame and against the work in such frame.

25. A grinding-machine comprising a pivoted frame, a grinding-wheel therein, a bracket, an eccentric adjustably mounted in such bracket and arranged to engage said frame and vibrate it and means for operating the grinding-wheel and the eccentric.

26. A grinding-machine comprising a vibrating grinding-wheel frame, a rotatable grinding-wheel therein, an eccentric for vibrating said frame, mechanism for rotating the eccentric and means whereby the eccentric may be shifted out of operation and locked in dif-

ferent positions to hold the frame stationary and at different altitudes.

27. A grinding-machine comprising a vibrating frame, means for varying the position of arc of the frame's vibration, a grinding-wheel rotatable in such frame and having a pinion, a fly-wheel having a pinion and adjustable simultaneously with said vibrating frame and a drive-wheel rotating said pinions which mesh upon its opposite sides.

28. In a grinding-machine, the combination of a supporting-frame, a driver, a journal pivoted on the frame, a fly-wheel mounted therein and driven by such driver, such journal and fly-wheel being adjustable with respect to the driver and in the arc of a circle with the frame as a center.

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