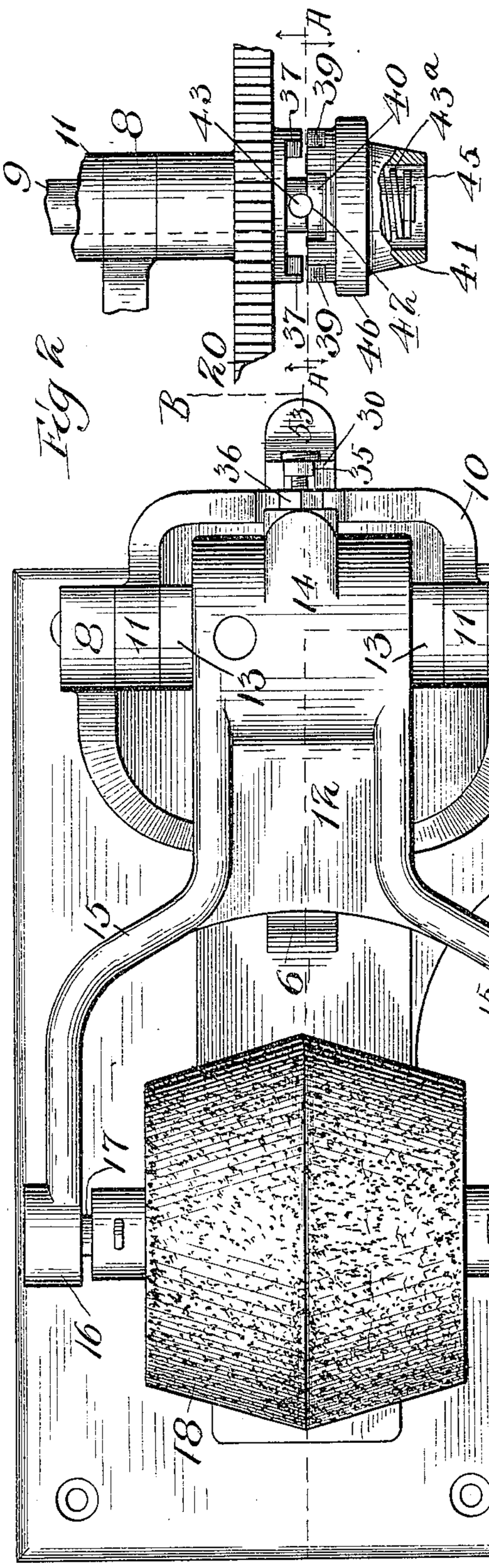
No. 654,234. Patented July 24, 1900.

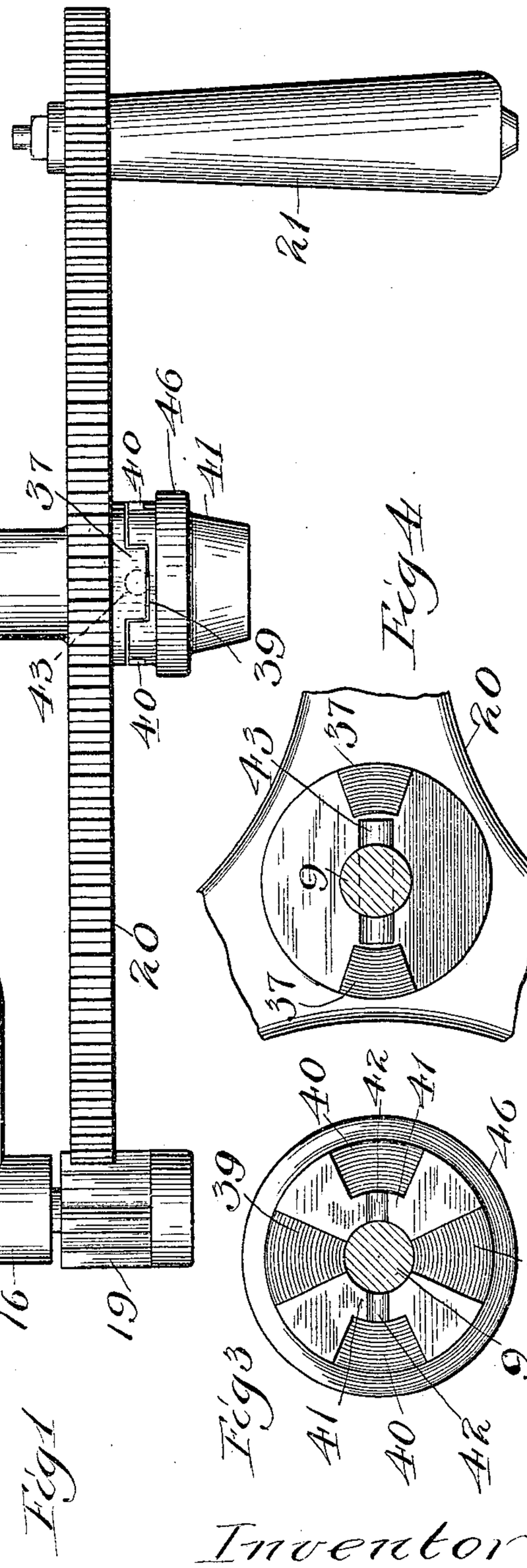
S. K. DENNIS.

GRINDING MACHINE.

(Application filed Jan. 22, 1900.)

(No Model.) 3 Sheets—Sheet 1.





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(No Model.) 3 Sheets—Sheet 2.

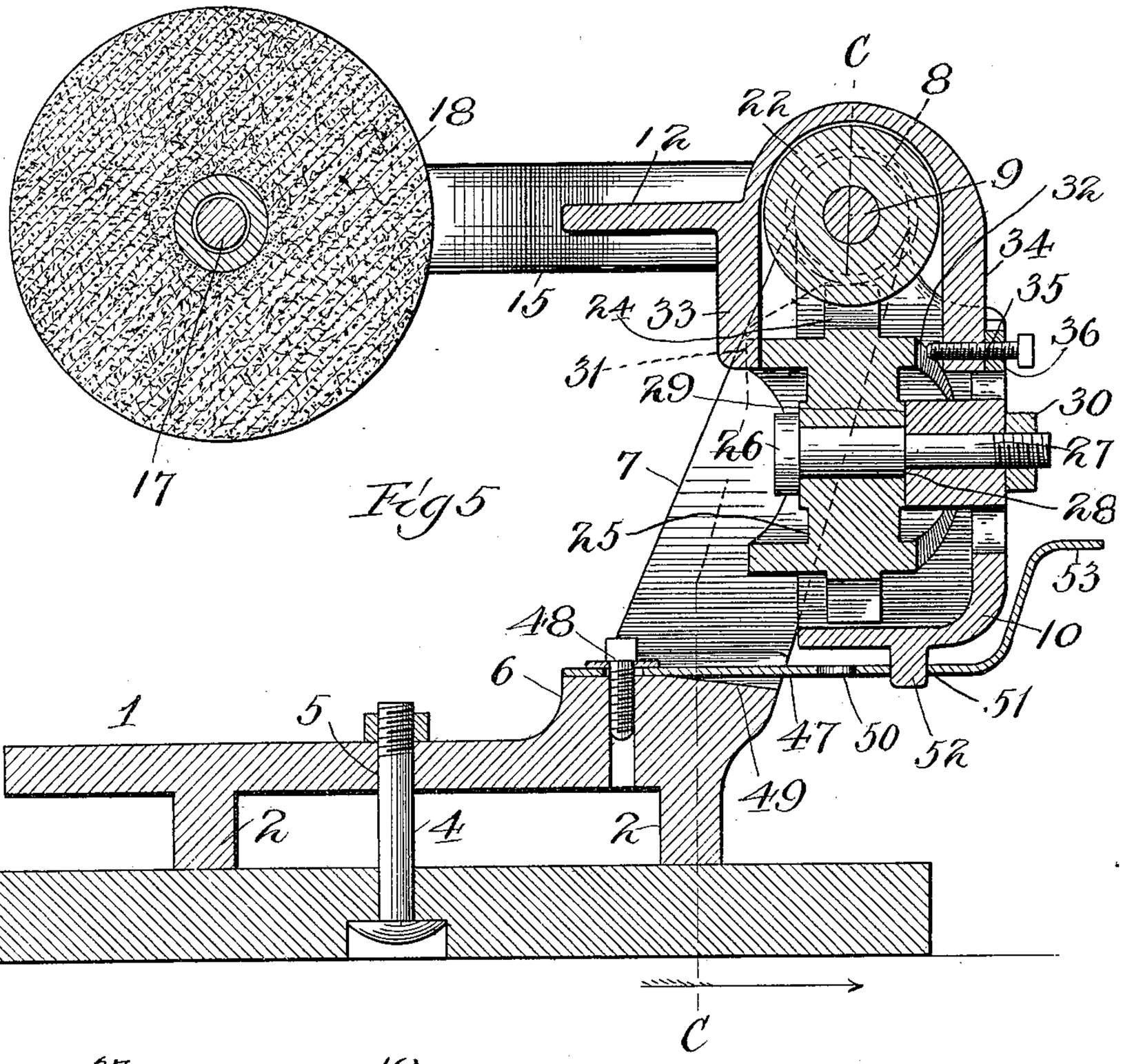

Fig 5

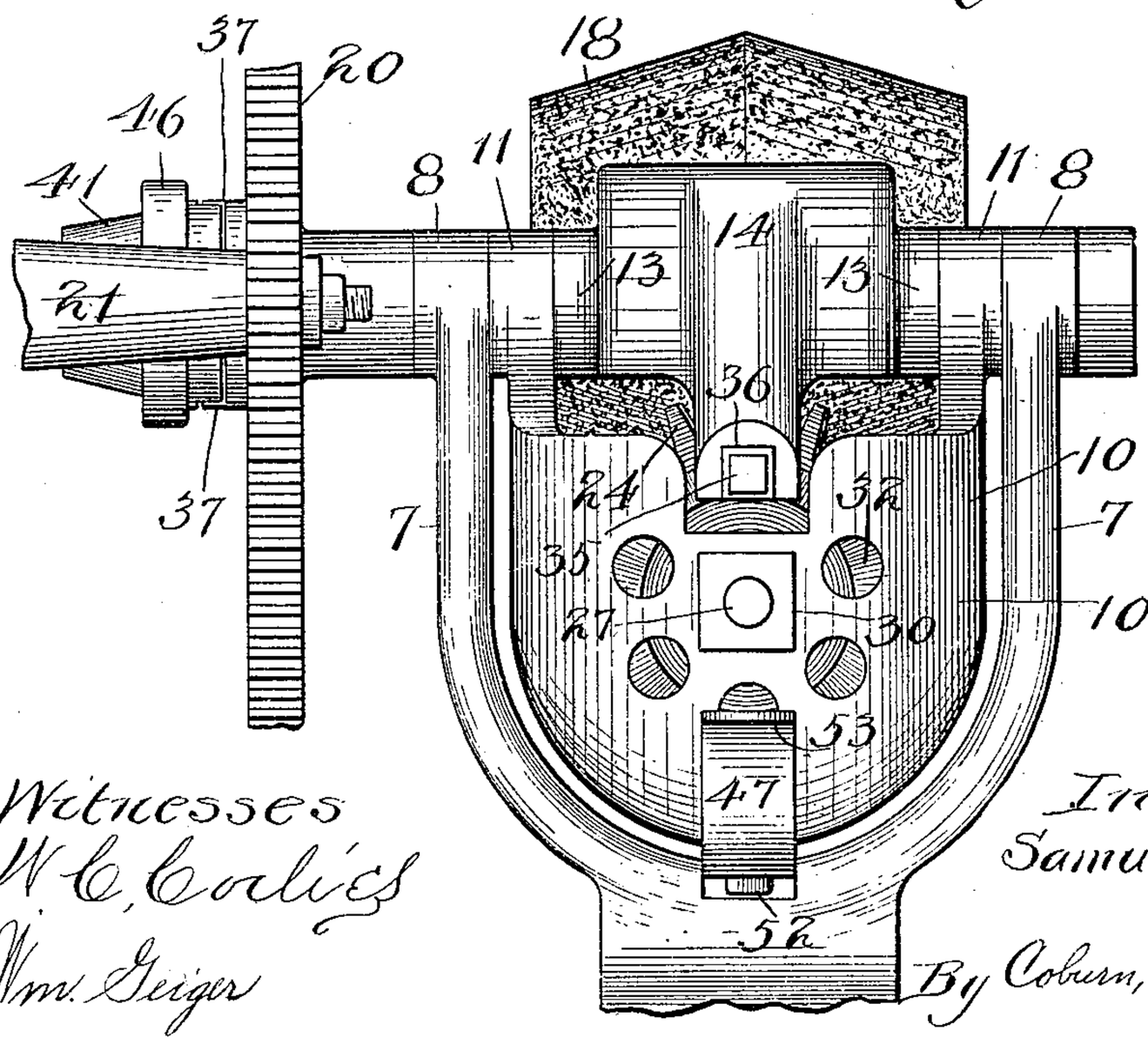

Fig. 6.

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(No Model.) 3 Sheets—Sheet 3.

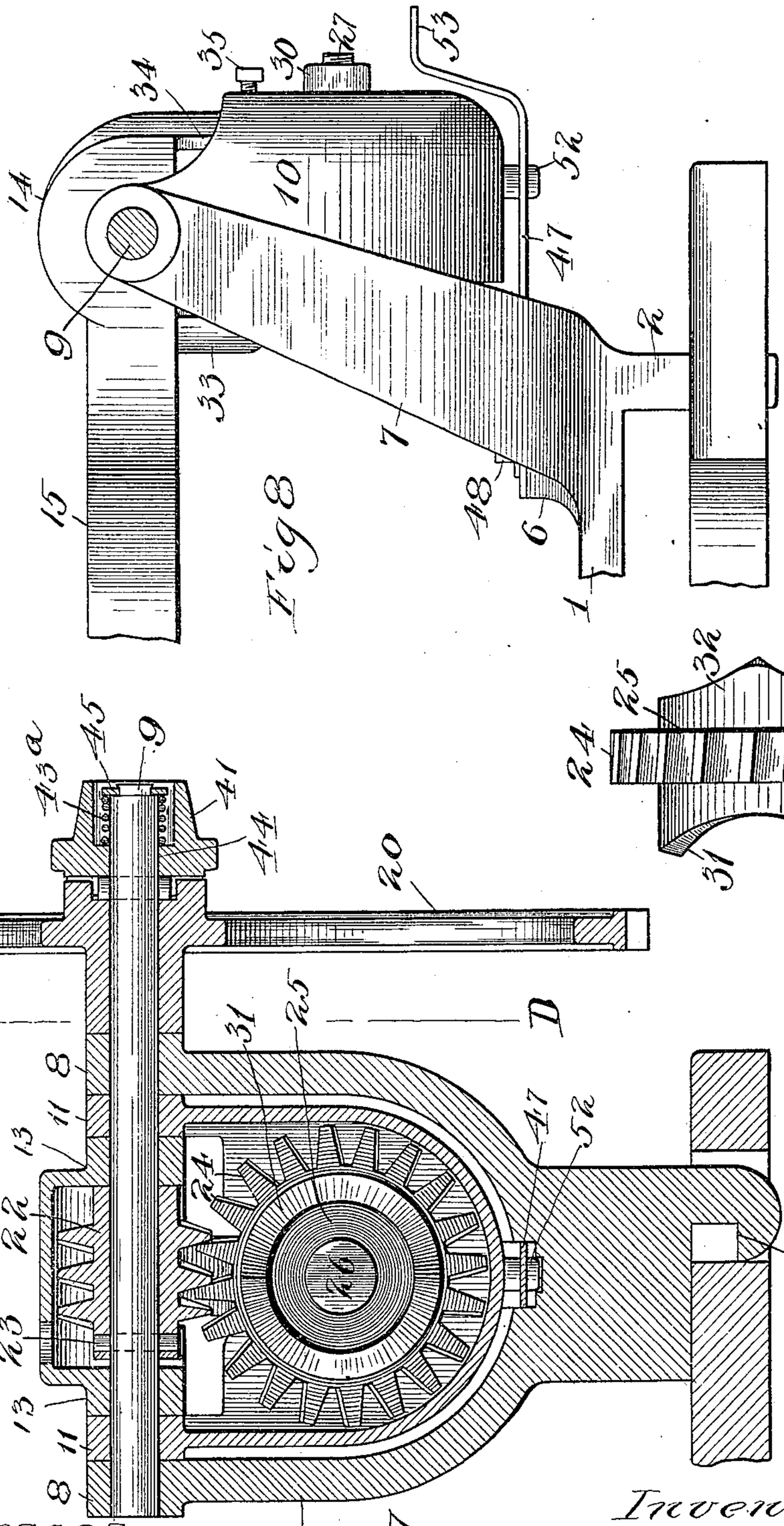

Fig 8

Fig 9.

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Fig 7

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UNITED STATES PATENT OFFICE.

SAMUEL K. DENNIS, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE PLANO MANUFACTURING COMPANY, OF SAME PLACE.

GRINDING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 654,234, dated July 24, 1900.

Application filed January 22, 1900. Serial No. 2,258. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL K. DENNIS, a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Grinding-Machines, of which the following is a specification.

My invention relates to certain improvements in that class of grinding-machines which are commonly known as "sickle-grinders" and which are specifically adapted to grind the blades of sickle-bars for mowing and reaping machines, but which may also be used for grinding other devices.

My invention relates more specifically to that class of sickle-grinders in which the rotating grinding-stone is mounted in a frame which is vibrated as the stone is rotated, so as to grind the different portions of the blades, and is concerned, primarily, with the mechanism by which this automatic vibration is given to the frame carrying the grinding wheel or stone.

It is further concerned with the construction by which the vibrating mechanism can be thrown out of operation and the stone be held in a fixed position, where it may be employed as a universal grinder.

My invention is finally concerned with the novel mechanism employed for adjusting the stone in different positions to vary the position it shall assume during its vibrations.

Referring to the accompanying sheets of drawings, in which the same figures of reference are used to designate identical parts in all the views, Figure 1 is a plan view of a complete machine, except that the sickle-holder, which may be of any desired construction, is omitted. Fig. 2 is a similar fragmentary view partly broken away and with the clutch mechanism in another position from that occupied by it in Fig. 1. Fig. 3 is a sectional view through the clutch mechanism, as on the line A A of Fig. 2, but on an enlarged scale. Fig. 4 is a similar detail in section on the same line, but looking in the opposite direction—*i. e.*, toward the machine. Fig. 5 is a central vertical section on the line B B of Fig. 1. Fig. 6 is a rear elevation of a portion of the machine. Fig. 7 is a vertical section on the line C C of Fig. 5. Fig. 8 is a fragmentary view in section on the line D D of Fig. 7, and Fig. 9 is a side elevation of the cam and worm-wheel disk detached.

The base 1 of the machine may be of any desired shape and construction to support the grinding mechanism, but preferably consists of a rectangular plate having the supports 2 formed on the under side thereof and terminating in the hooks 3, which are adapted to take over the edge of some convenient support, such as the bull-wheel of a harvesting-machine, to which it may be securely clamped by a bolt 4, passing through a centrally-located aperture 5 in the base-plate. One end of the base-plate may be made higher than the rest, as at 6, and projecting upwardly therefrom and preferably formed integral with said base are the standards 7, which together form a bearing-yoke, the upper ends being formed with the bearings 8, in which is journaled the shaft 9. Journaled upon this shaft 9 is the frame 10, which is supported by the bearings 11, projecting upwardly therefrom and mounted just inside of the bearings 8, previously referred to. Also journaled upon this shaft 9 and between the bearings 11 is the swinging frame 12, which is supported upon the shaft 9 by the bearings 13, which in turn are located just within the bearings 11. The frame 12, just between the bearings 13, is provided with the substantially semicylindrically-shaped cap 14, from which project the arms 15, which are of the shape best shown in the plan view in Fig. 1 and which terminate in the bearings 16 for the grinding-wheel shaft 17, which has secured thereon to rotate therewith the grinding-wheel 18, which I preferably form of a considerable diameter, so as to give weight thereto and a constant steadiness of motion to the machine while it is being operated. Upon the outer end of the shaft 17, outside of the bearing 16, I secure the gear-pinion 19, which is engaged by the gear-wheel 20, which is loosely mounted on the outer end of the shaft 9 and provided with the handle 21, by which it may be turned. If the wheel 20 is free to turn on the seaft 9, as is the case under certain conditions, and if the frame 12 is held from swinging movement by the mechanism to be described, it will be apparent that as the wheel 20 is rotated slowly by

the handle 21 the grinding-wheel 18 will be rotated rapidly and will remain in a fixed position, during which time it can be used as a universal grinder for grinding any tools or implements desired.

The portion of the shaft 9 between the bearings 13 is provided, as best shown in Fig. 7, with a worm-gear 22, which is rigidly secured thereto, as by the pin 23. As the shaft 9 is rotated when the driving-wheel 20 is clutched thereto, this worm-gear 22, meshing with the teeth 24 on the worm-gear and cam-disk 25, serves to rotate said disk slowly. This disk is mounted on a pintle or bearing preferably formed by passing a stud or bolt 26 therethrough, the said bolt having the reduced portion 27, forming the shoulder 28, which takes against the end of the support 29, which is preferably cast integral with the back of the frame 10, the body portion of which is preferably shaped somewhat like a scoop, so as to inclose the disk 25 on its lower and outer sides. The reduced portion 27 of the bolt 26, passing through the aperture formed in the support 29, is secured in place by the nut 30. The cam-disk 25 has secured thereon and preferably formed integral therewith the reciprocal cam-flanges 31 and 32, with which coöperate the fingers 33 and 34, projecting downwardly from the frame 12. While both of these fingers 33 and 34 may cooperate directly with the working faces of their corresponding cam-flanges 31 and 32, I preferably form an adjustable bearing-surface on one of them, as 34, by passing a round-nosed bolt 35 therethrough and securing the same in place, as by a lock-nut 36. By means of this bearing I am enabled to take up any wear that may be occasioned by the use of the machine.

As previously stated, the working surfaces of the cams 31 and 32 are complementary, the cam 31 being depressed where the cam 32 is raised, so that the distance between the adjacent points of the two cams is always the same. Each of the cams being provided with two depressions and two projections, it will be apparent that as the shaft 9 rotates and the cam-disk 25 is slowly rotated thereby each complete rotation of the cam-disk 25 will give two complete vibrations up and down to the frame 12, which carries the grinding-wheel.

As previously explained, it is desirable at times to throw the cam-disk 25 out of operation, so that the grinding-wheel may be rotated without vibrating it in any position to which it may have been moved, thus adapting the machine for use as a universal grinder. For the purpose of readily preventing its vibration with the minimum motion of the parts the driving-wheel 20 is loosely journaled on the end of the shaft 9 and a clutch mechanism is interposed between the shaft and the wheel. This clutch mechanism is preferably formed as best shown in Figs. 1 to 4, where it will be seen that I have provided the wheel 20 with the oppositely-disposed segmental lugs or projections 37, which are adapted to coöperate with the notches 39 and 40, formed on the inner edge of the sleeve 41, which constitutes a part of the clutch mechanism. The notches 39 extend entirely through to the circular aperture formed in the center of the sleeve 41, while the notches 40 extend inwardly only far enough to accommodate the lugs 37, thus leaving the surfaces 41 on the same level with the inner face of the end of the sleeve. In these surfaces 41 I preferably form the slight grooves 42, which are adapted to coöperate with the pin 43, secured to and passing through the shaft 9, when the parts are in the position shown in Fig. 2. The outer end of the sleeve 41 is cut away on its inside to accommodate the helically-coiled expanding spring 43ª, which is secured between the inner portion 44 of the sleeve 41 and the washer 45, secured on the outer end of the shaft 9.

It will be apparent that when the parts are in the position shown in Fig. 1 the pin 43 of the shaft engaging with the inner portions of the notches 39 will clutch the sleeve 41 to the shaft, and with the lugs 37 on the drive-wheel 20 engaging with the outer portions of the notches 39 will clutch the wheel 20 to the sleeve 41, and thus the wheel 20 is ultimately clutched to the shaft 9. It will also be equally apparent that when the parts are moved to the position shown in Fig. 2 the pin 43 engaging with the recesses 42 will hold the lugs 37 out of clutch with the notches 40, so that as the wheel is turned the shaft will not be actuated. It will also be apparent that the sleeve 41 is held yieldingly in this unclutched position, so that it can be turned by applying a slight force to the boss 46 on the outer surface of said sleeve.

It is desirable in this class of machines to furnish means for adjusting the position of the arc through which the grinding-wheel shall swing, and I have devised a novel combination for this purpose. As these adjustments have been hitherto made, the adjustments were usually formed by a nut coöperating with a segmental slot, so that any desired degree of adjustment could be obtained. These adjustments have been found to be unsatisfactory, as there is the constant tendency to slip, and to obviate this difficulty I provide a simple and positive adjustment to two or more positions, two positions being all that is ordinarily required, as the majority of the blades of a sickle-bar have to be ground to a maximum depth, while a few at the pitman end of the blade can only be ground to a minimum depth on account of interfering with the bar to which the pitman is connected. For the purpose of forming this positive and quickly-operated adjustment I secure upon the base 2, preferably upon the upper side of the projection 6, a strong flat leaf-spring 47, which may be secured in place by the set-screw 48 and movement thereof,

except in a vertical direction, prevented by its being placed in the channel 49. Formed at suitable intervals apart in this leaf-spring 47 are the apertures 50 and 51, which coöperate with the lug 52, projecting downward from the bottom of the frame 10. It will be readily seen that when the lug 52 is in the aperture 51 the frame 10 is swung backward, so that the grinding-wheel will swing down far enough to give the maximum grinding to the blades, and that when the blades are reached to which the minimum grinding is to be given all that is necessary to be done is to press down the end 53 of the spring 47 until the lug 52 is freed from the aperture 51, after which the frame 10 is swung into position to coöperate with the aperture 50, in which position it will be seen that the grinding-wheel will only descend low enough to give the minimum grinding to the blades.

Any desired form of a sickle-holder may be employed to present the sickle yieldingly to the grinding-wheel, and I have not illustrated the holder, inasmuch as it forms no part of my invention, which is concerned with the mechanism heretofore shown and described.

While I have shown my invention as embodied in the form which I at present consider best adapted to carry out its objects, it will be understood that it is capable of modifications and that I do not desire to be limited in the interpretation of the following claims, except as may be necessitated by the prior art.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In a device of the class described, the combination with the stationary frame having the shaft with the worm-gear thereon journaled therein, of a cam-disk mounted to rotate in said frame and having teeth on its periphery coöperating with said worm-gear, and a swinging frame pivotally mounted in said stationary frame and coöperating with said cam-disk so that as the shaft is rotated the swinging frame will be slowly reciprocated.

2. In a device of the class described, the combination with the stationary frame having the shaft with the worm-gear thereon journaled therein, of an auxiliary frame pivoted on said shaft and adjustable to vary its position relative to the main frame, a cam-disk mounted to rotate in said auxiliary frame and having teeth on its periphery coöperating with said worm-gear, and a swinging frame pivotally mounted in said stationary frame and coöperating with said cam-disk so that as the shaft is rotated the swinging frame will be slowly reciprocated.

3. In a device of the class described, the combination with the stationary frame having the shaft with the worm-gear thereon journaled therein, of a cam-disk mounted to rotate in said frame and having teeth on its periphery coöperating with said worm-gear, a swinging frame pivotally mounted in said stationary frame and coöperating with said cam-disk so that as the shaft is rotated the swinging frame will be slowly reciprocated, a grinding-wheel journaled in said swinging frame, and means for rotating it and said shaft.

4. In a device of the class described, the combination with the stationary frame having the shaft with the worm-gear thereon journaled therein, of a cam-disk mounted to rotate in said frame and having teeth on its periphery coöperating with said worm-gear, a swinging frame pivotally mounted in said stationary frame and coöperating with said cam-disk so that as the shaft is rotated the swinging frame will be slowly reciprocated, a grinding-wheel journaled in said swinging frame, and means for rotating it and said shaft, said means comprising a gear-pinion on the grinding-wheel shaft, a driving-wheel mounted on the main shaft and having gear-teeth meshing with said pinion.

5. In a device of the class described, the combination with the stationary frame having the shaft with the worm-gear thereon journaled therein, of a cam-disk mounted to rotate in said frame and having teeth on its periphery coöperating with said worm-gear, a swinging frame pivotally mounted in said stationary frame and coöperating with said cam-disk so that as the shaft is rotated the swinging frame will be slowly reciprocated, a grinding-wheel journaled in said swinging frame, and means for rotating it and said shaft comprising a gear-pinion on the grinding-wheel shaft, a driving-wheel loosely mounted on the main shaft and having gear-teeth meshing with said pinion, and clutch mechanism between said driving-wheel and said main shaft.

6. In a device of the class described, the combination with the stationary frame having the shaft with the worm-gear thereon journaled therein, of an auxiliary frame pivoted on said shaft and adjustable to vary its position relative to the stationary frame, a cam-disk mounted to rotate in said auxiliary frame and having teeth on its periphery cooperating with said worm-gear, a swinging frame pivotally mounted in said stationary frame and coöperating with said cam-disk so that as the shaft is rotated the swinging frame will be slowly reciprocated, a grinding-wheel journaled in said swinging frame, and means for rotating it and said shaft.

7. In a device of the class described, the combination with the stationary frame having the shaft with the worm-gear thereon journaled therein, of a disk mounted to rotate in said frame and provided with teeth on its periphery coöperating with said worm-gear and supplemental cam-flanges projecting from its opposite faces, and a swinging frame pivotally mounted in said stationary frame and having a pair of fingers coöperating with said cam-flanges so that as the shaft

is rotated the swinging frame will be slowly reciprocated.

8. In a device of the class described, the combination with the stationary frame having the shaft with the worm-gear thereon journaled therein, of a disk mounted to rotate in said frame and provided with teeth on its periphery coöperating with said worm-gear and supplemental cam-flanges projecting from its opposite faces, and a swinging frame pivotally mounted in said stationary frame and having a pair of fingers coöperating with said cam-flanges so that as the shaft is rotated the swinging frame will be slowly reciprocated, one of said fingers having an adjustable bearing formed by a set-screw passing therethrough and having its end arranged to coöperate with the adjacent cam-flange.

9. In a device of the class described, the combination with the stationary frame having a driving-shaft journaled therein, of an auxiliary frame supported thereby, a swinging frame pivotally mounted therein, connections between said shaft and the swinging frame whereby the rotation of said shaft causes the swinging of the frame, the place of vibration being controlled by the position of the auxiliary frame, and spring-catch connections between the main and auxiliary frames to rigidly connect them in any desired position of adjustment.

10. In a device of the class described, the combination with the stationary frame having a driving-shaft journaled therein, of an auxiliary frame supported thereby, a swinging frame pivotally mounted therein, connections between said shaft and the swinging frame whereby the rotation of said shaft causes the swinging of the frame, the place of vibration being controlled by the position of the auxiliary frame, and spring-catch connections between the main and auxiliary frames to rigidly connect them in any desired position of adjustment, said connections comprising a stiff leaf-spring supported by the stationary frame and located adjacent said auxiliary frame at its free end and provided with two or more apertures therein, and a lug on said auxiliary frame adapted to enter said apertures.

11. In a device of the class described, the combination of a stationary frame having a driving-shaft journaled in the standards thereof, with a yoke-shaped auxiliary frame pivotally mounted in said standards between the standards of the main frame, a swinging frame also mounted on said shaft between the bearings of the auxiliary frame, and connections between said shaft and said swinging frame to cause the reciprocation of the swinging frame as the shaft is rotated.

12. In a device of the class described, the combination of the stationary frame having a driving-shaft journaled in the standards thereof, a driving-wheel mounted on said shaft and provided with gear-teeth on or adjacent to its periphery, with a yoke-shaped auxiliary frame pivotally mounted in said standards between the standards of the main frame, a swinging frame also mounted on said shaft between the bearings of the auxiliary frame, a grinding-wheel journaled in the outer end of the swinging frame upon a shaft provided with a pinion meshing with said gear-teeth, and connections between said driving-shaft and said swinging frame to cause the reciprocation of the frame as the shaft is rotated.

13. In a device of the class described, the combination of the stationary frame having a driving-shaft journaled therein, with a swinging frame having a grinding-wheel journaled therein pivotally mounted thereon, connections between said driving-shaft and the swinging frame for reciprocating said swinging frame as the shaft is rotated, a driving-wheel loosely mounted on said shaft, driving connections between said wheel and the grinding-wheel, and clutch connections between said shaft and wheel whereby the shaft can be rotated with the wheel when desired.

14. In a device of the class described, the combination of the stationary frame having a driving-shaft journaled therein, with a swinging frame having a grinding-wheel journaled therein pivotally mounted thereon, connections between said driving-shaft and the swinging frame for reciprocating said swinging frame as the shaft is rotated, a driving-wheel loosely mounted on said shaft, driving connections between said wheel and the grinding-wheel, and clutch connections between said shaft and wheel whereby the shaft can be rotated with the wheel when desired, said connections comprising the pin on the shaft, projections on the driving-wheel, and a sliding sleeve having notches adapted to coöperate with the pin on the shaft and the projections on the driving-wheel to connect the sleeve to the shaft and to the wheel.

15. In a device of the class described, the combination of the stationary frame having a driving-shaft journaled therein, with a swinging frame having a grinding-wheel journaled therein pivotally mounted thereon, connections between said driving-shaft and the swinging frame for reciprocating said swinging frame as the shaft is rotated, a driving-wheel loosely mounted on said shaft, driving connections between said wheel and the grinding-wheel, and clutch connections between said shaft and wheel whereby the shaft can be rotated with the wheel when desired, said connections comprising the pin 43 on the shaft, the projections 37 on the driving-wheel having their inner ends beyond the outer end of the pin 43, and a sliding sleeve in the outer end of the shaft having the notches 39 adapted to coöperate with the pin 43 and the projections 37.

16. In a device of the class described, the combination of the stationary frame having a driving-shaft journaled therein, with a swinging frame having a grinding-wheel journaled

therein pivotally mounted thereon, connections between said driving-shaft and the swinging frame for reciprocating said swinging frame as the shaft is rotated, a driving-wheel loosely mounted on said shaft, driving connections between said wheel and the grinding-wheel, and clutch connections between said shaft and wheel whereby the shaft can be rotated with the wheel when desired, said connections comprising the pin 43 on the shaft, the projections 37 on the driving-wheel having their inner ends beyond the outer end of the pin 43, and the sleeve mounted on the outer end of the shaft and having the notches 39 adapted to coöperate with the pin 43 and the projections 37 and the recesses 42 coöperating with the pin 43.

17. In a device of the class described, the combination of the stationary frame having a driving-shaft journaled therein, with a swinging frame having a grinding-wheel journaled therein pivotally mounted thereon, connections between said driving-shaft and the swinging frame for reciprocating said swinging frame as the shaft is rotated, a driving-wheel loosely mounted on said shaft, driving connections between said wheel and the grinding-wheel, and clutch connections between said shaft and wheel whereby the shaft can be rotated with the wheel when desired, said connections comprising a pin on the shaft, projections on the driving-wheel, a sliding sleeve having notches at its inner end adapted to coöperate with the pin on the shaft and the projections on the driving-wheel to connect the sleeve to the shaft and the wheel, and a spring to hold said sleeve yieldingly in contact with the pin on the shaft and the projections on the wheel.

18. In a device of the class described, the combination of the stationary frame having a driving-shaft journaled therein, with a swinging frame having a grinding-wheel journaled therein pivotally mounted thereon, connections between said driving-shaft and the swinging frame for reciprocating said swinging frame as the shaft is rotated, a driving-wheel loosely mounted on said shaft, driving connections between said wheel and the grinding-wheel, and clutch connections between said shaft and wheel whereby the shaft can be rotated with the wheel when desired, said connections comprising the pin 43 on the shaft, the projections 37 on the driving-wheel having their inner ends beyond the outer end of the pin 43, the sliding sleeve mounted on the outer end of the shaft and having the notches 39 coöperating with the pin 43 and the projection 37 and the recesses 42 coöperating with the pin 43, and a spring interposed between the end of said shaft and the sleeve to hold the latter yieldingly in contact with the pin on the shaft and the projections on the wheel.

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