No. 719,297. PATENTED JAN. 27, 1903.

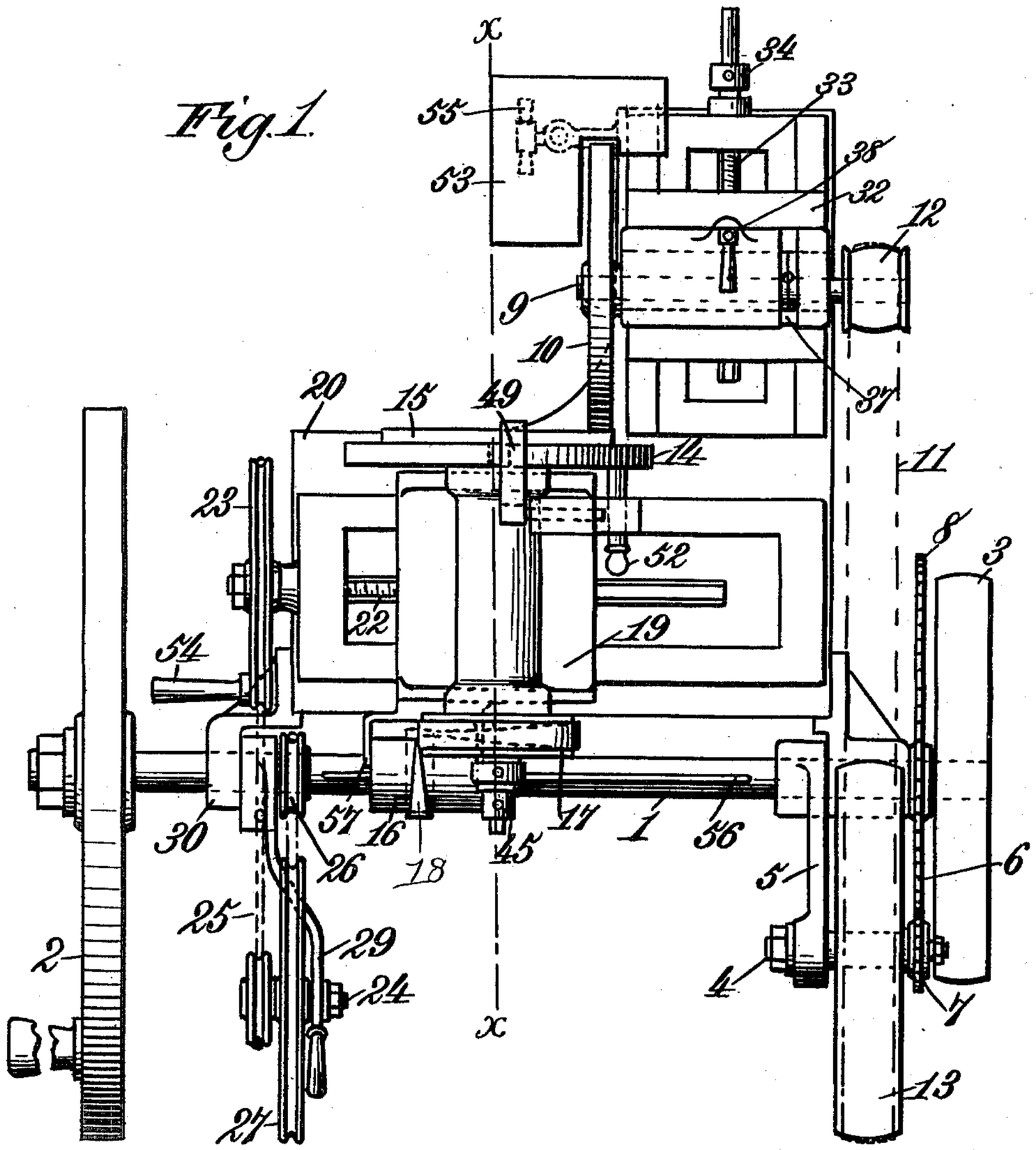
W. A. VAN BERKEL.

GRINDING OR SHARPENING MACHINE.

APPLICATION FILED JUNE 4, 1902.

NO MODEL. 3 SHEETS—SHEET 1.

Fig. 1.



Witnesses.
Robert Everett.
Francis R. Erney.

Inventor.
Wilhelmus A. van Berkel,
By James L. Norris.
Atty.

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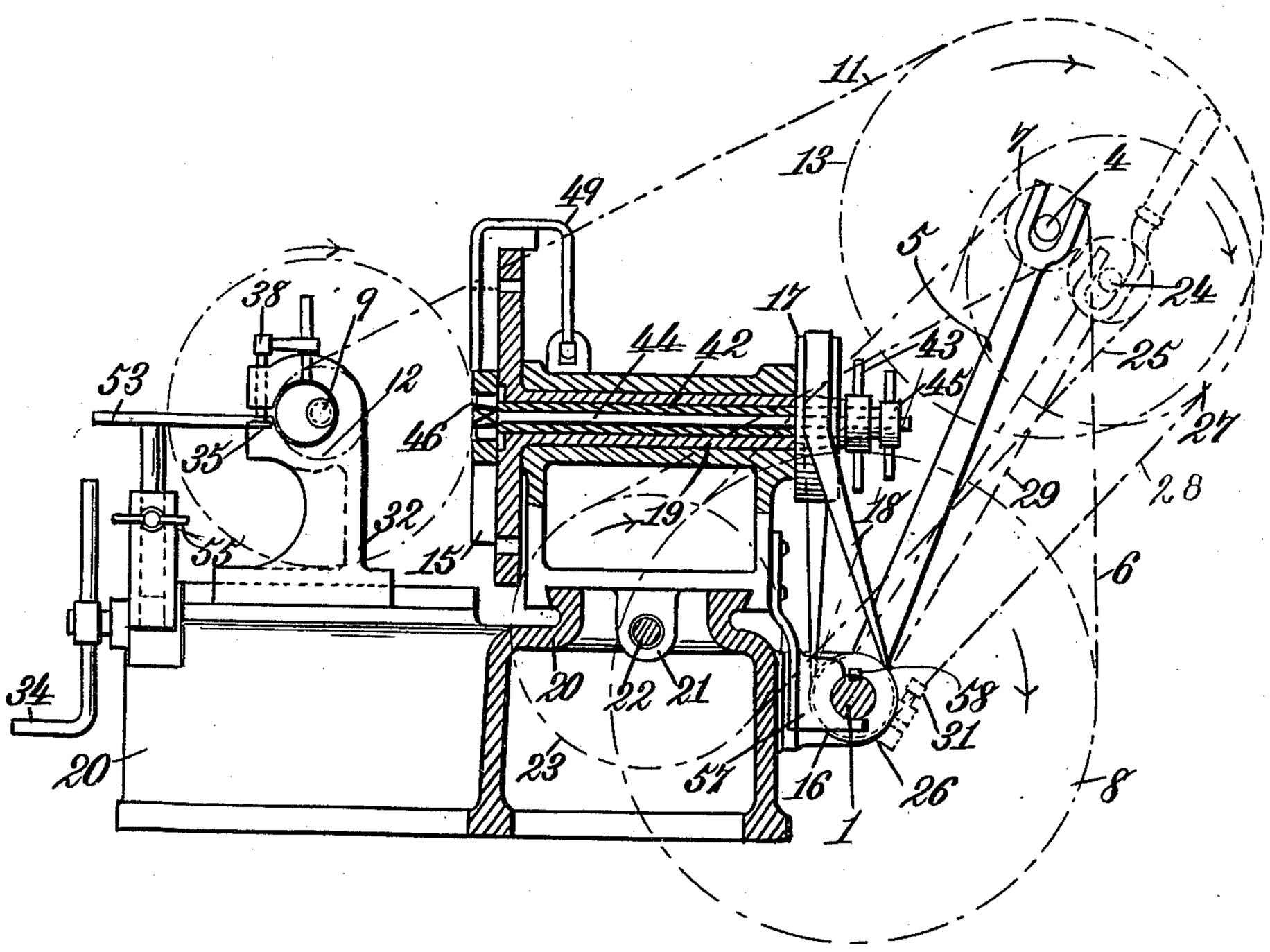
Fig. 2.



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NO MODEL. 3 SHEETS—SHEET 3.

Fig. 3.

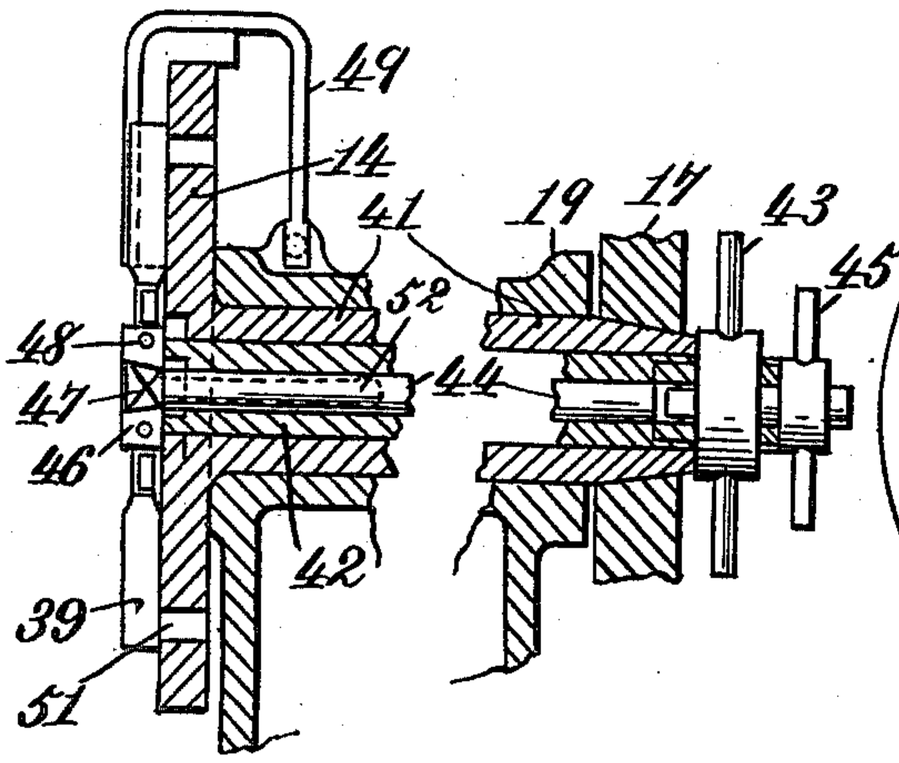


Fig. 4.

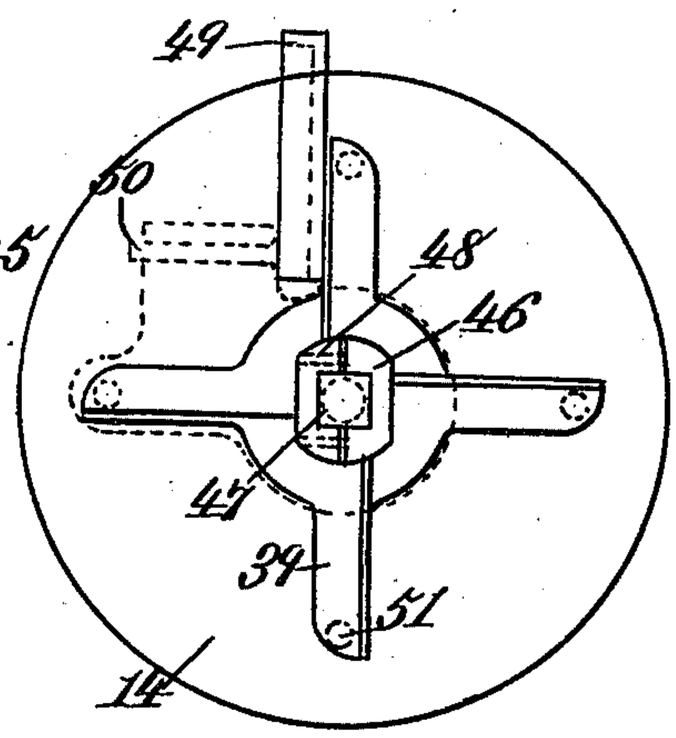


Fig. 5.

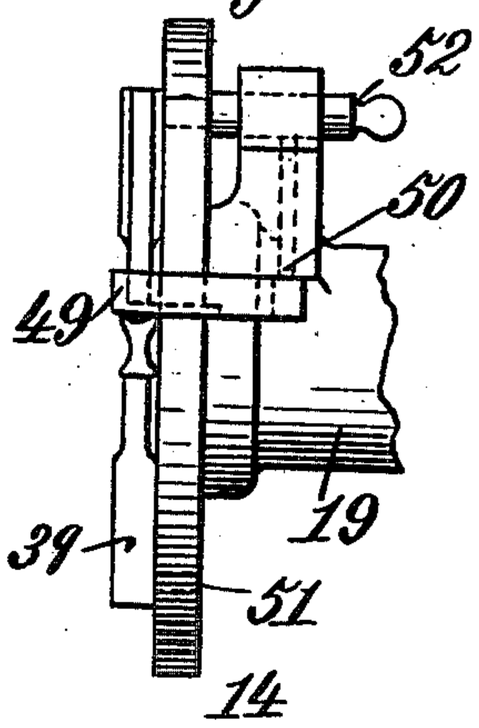
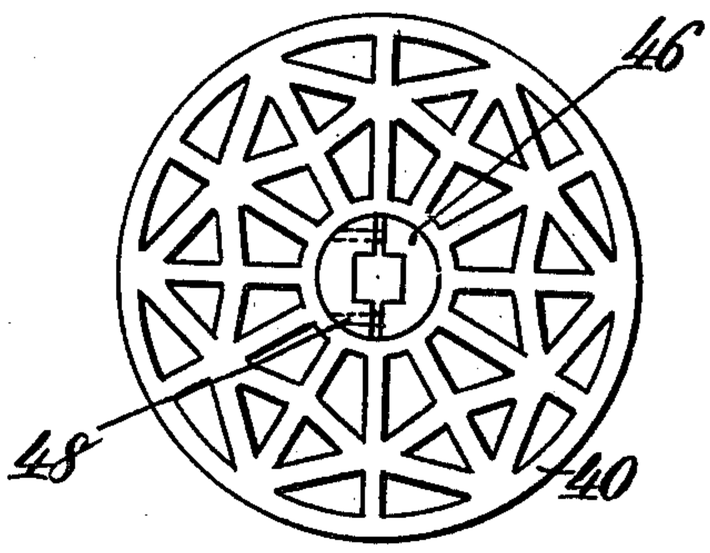


Fig. 6.



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UNITED STATES PATENT OFFICE.

WILHELMUS ADRIANUS VAN BERKEL, OF ROTTERDAM, NETHERLANDS.

GRINDING OR SHARPENING MACHINE.

SPECIFICATION forming part of Letters Patent No. 719,297, dated January 27, 1903.

Application filed June 4, 1902. Serial No. 110,228. (No model.)

To all whom it may concern:

Be it known that I, WILHELMUS ADRIANUS VAN BERKEL, manufacturer, a subject of the Queen of the Netherlands, residing at 56 Boezemsingel, Rotterdam, in the Kingdom of the Netherlands, have invented certain new and useful Improvements in Grinding or Sharpening Machines, of which the following is a specification.

This invention relates to improvements in machines for grinding and sharpening disk-shaped and cross-shaped knives, especially such as are employed in mincing-machines for sausage-making. As is well known, in such mincing-machines the pieces of meat are cut as with shears by being pressed through a flat steel disk provided with openings. In front of this steel disk a knife-disk rotates, and these two disks work like the two halves of shears.

The invention which forms the object of the present application has for its object to provide a machine by means of which these kinds of knives can be ground by the butcher himself.

This improved grinding or sharpening machine is essentially characterized by a clamp device for fixing the tool to be ground on the tool-holder by the method in which the rotary movement of the grindstone and the rotating and alternating movement of the tool to be ground are transmitted from a shaft operated by hand or by power and by the peculiar method in which the tension of the belts and cords for transmitting the movement is produced. The intermediate means of transmission is, in fact, located on an arm freely revoluble on the main shaft, and this rotation is only impeded by the belt leading to the shaft of the grindstone, which causes a stretching of this belt, while by the use of a chain as an intermediate means of transmission the belt may be always further stretched according as more power is required for rotation.

The grinding-machine is shown in the accompanying sheets of drawings, in which—

Figure 1 is a plan view; Fig. 2, a cross-section of the machine on the line *x x* of Fig. 1. Fig. 3 is a detail longitudinal section of the device for holding the tool which is to be sharpened. Fig. 4 is an end view of the tool-holding device. Fig. 5 is a detail plan view of the tool-holding device, and Fig. 6 is a detail view of a cutting-disk and the means for attaching it to the tool-holding device.

Motion is imparted by hand to the driving-shaft 1 by the rotation of a crank arranged on a fly-wheel 2 or from a means of transmission operated by power and driving the machine by the belt-pulley 3. The movement is transmitted from this shaft 1 to the tool to be ground and the grindstone. An intermediate shaft 1, Figs. 1 and 2, is provided for the movement of the grindstone, which shaft is mounted in an arm 5, pivoted on the driving-shaft 1. Movement is transmitted to the shaft 4 from the shaft 1 by means of a chain 6 and chain-wheels 7 and 8 and from the shaft 4 to the shaft 9 of the grindstone 10 by a belt 11, running over belt-pulleys 12 and 13. The tool-holder 14, in which the tool 15, Figs. 1 and 2, which is to be ground, must be firmly clamped, receives two movements—a rotary one and a movement along the grindstone. The first movement it receives directly from the shaft 1 by means of belt-pulleys 16 and 17 and belt 18, Figs. 1 and 2. The tool-holder 14 is mounted in a carriage 19. This carriage 19 is mounted in a prismatic guide on the underframe 20 of the machine and is moved by a nut 21 and screw-spindle 22, which latter is located in the underframe 20. A belt-pulley 23, driven by a transmission-gear much reduced in speed from an intermediate shaft 24 by a cord 25, is provided for slowly turning this spindle 22, while the shaft 24 receives its movement, which is also very much slower, from a main shaft 1 by means of cord-pulleys 26 and 27 and cord 28. The intermediate shaft 24 is mounted on an arm 29, which arm has formed integral therewith or attached thereto a split sleeve that embraces or surrounds a bearing 30, Fig. 1, in which the shaft 1 is adapted to turn. This split sleeve is tightened or loosened on the bearing 30 by means of the clamp-screw 31 when it is desired to adjust the position of the arm 29. The shaft 9, upon which the grindstone rotates, is also mounted in a carriage 32, which also may be moved in a prismatic guide over the frame 20, but at right angles to the direction of movement of the first-named carriage. This second carriage is moved by means of a screw-

spindle 33, located in the underframe 20, which for this object is provided with a crank-handle 34. The shaft 9 of the grindstone is eccentrically mounted on a pivot 35, which can turn in the carriage 32. In consequence of this eccentric mounting the shaft 9 of the grindstone may be moved around in the center of the pivot 35, so that the grindstone may be placed higher or lower. This is effected by means of a pin 36, which is inserted in the pivot 35 and moves in a slot 37 in the carriage 32. The stone is maintained at the desired height by a clamp-screw 38.

The clamping device for the tool to be ground is shown in Figs. 3, 4, and 5. The two tools employed in the mincing-machine are the actual four-armed knife-disk 39, Fig. 4, and the counter-disk 40, Fig. 6. The former has in the center a round-ended opening with two flattened sides, the latter a circular opening. The tool-holder 14 is formed at the rear as a hollow spindle 41, with which it is mounted in the carriage 19 and which carries a belt-pulley 17. A bush 42 is passed through this spindle and threaded at its end and may be drawn tight by means of a nut 43. In this bush a pin 44 is inserted, which at its front end 47 is rectangular and is thickened, while at the rear end it is threaded and may be tightened up by a nut 45. On this pin 44 the tool to be ground is firmly clamped, and for this object a clutch or clamp disk 47 is employed which is formed in two parts and which fits exactly in the opening existing in the tool and itself ends in the front in a rectangular and enlarging bore, which fits over the rectangular part 47 of the pin 44, Fig. 3. If then the nut 45 be turned, the pin 44 is drawn back, and the two halves of the disk 46 are pressed apart by the tapering surface of the rectangle 47 and firmly clamped into the tool, the tool being drawn against the bush 42. When the tool has become a "whole," so to speak, in this manner, with the bush 42, it is fixed on the tool-holder by turning the nut 43. For grinding the counter-disk 40 a round clamp-disk 46, Fig. 6, is employed. For holding together the two halves small guide-pins 48 are provided. As may be seen in Fig. 4, the four-armed knife-disk 39 has four cutting edges, and I employ the following arrangement for correctly adjusting these cutting edges. The vertical position is indicated by a small bar 49, which is suitably guided in the carriage 19, Figs. 4 and 5, by means of a pin 50 and rests on the tool-holder 14. Four holes 51, lying exactly in a square, are provided in the tool-holder, and the tool-holder 14 is fixed by the insertion of a pin 52, which is passed through the carriage 19. The tool is then turned until one of the cutting edges lies parallel with the bar 49. If then the four holes 51 be brought successively opposite the pin 52, the result is the correct position for each of the four cutting edges of the knife. An adjustable support 53 is also provided on the underframe 20, on which the tool is supported when it is desired to grind it at once.

The handling of the machine for grinding the counter-disk 40, Fig. 6, is as follows: The bar 49 is removed, pin 52 drawn back, and disk 40 fastened in front of the tool-holder in the manner hereinbefore described. The screw-spindle 22 is revolved by the crank-handle 54, Fig. 1, in a direction opposite to that indicated by the arrow until the carriage 19 in its initial position has come to the right-hand side. The grindstone is brought into the position shown in Fig. 2, and then the shaft 1 is turned in the direction indicated by the arrow by hand or power, causing a movement of the various shafts and spindles in the directions indicated by the arrows in Fig. 2—that is to say, the grindstone 10 is caused to rapidly rotate while the tool turns slowly on its axis and also has a uniform progression or travel along the grindstone 10 in a direction from right to left. In this manner the disk is ground quite flat. The belt-pulley 16, which must follow the movement of the carriage 19, is adjustably mounted on the shaft 1 and is carried along with a bent arm 57, which is fixed on the carriage 19, while a key 58 is moved in the key-groove 56. The carriage 19 is returned to its initial position by hand by turning the crank 54. To allow of this, the cord 25 must be put out of action, which is easily done by slackening the clamp-screw 31, Fig. 2, drawing the arm back a little and fixing it in this position.

If it be desired to employ the machine for grinding the four-armed knife-disk 39, this disk is gripped on the tool-holder 14 in the manner hereinbefore described and adjusted by means of the bar 49 after the tool-holder 14 has been fixed by the insertion of the pin 52. The tool then only requires to make a movement in a horizontal plane, while its rotation is arrested by throwing off the belt 18. As shown in Fig. 4, the cutting edge of the knife which is to be ground lies beneath the horizontal axis and when the knife-disk 39 is rotated above the horizontal axis of the grindstone. The eccentric mounting of the grindstone 10 in the pivot 35 allows the stone to be raised or lowered until its axis lies at the same height as the cutting edge of the knife. After the clamp-screw 38 has been released the pivot 35 is turned around to left or right with the pin 36 until the desired position is attained, and this position is fixed by turning the clamp-screw 38. The grindstone is then exactly adjusted by turning the crank 34. When the cutting edge is ground, the pin 52 is drawn out, and the tool-holder and tool are turned until the pin 52 can be inserted in the next opening 51. When in this manner the four cutting edges have been ground, the knife-disk 39 is released and reversed. When the correct position has been fixed by means of the adjusting-bar 49, the

grindstone is suitably adjusted to correspond to the new position of the cutting edge, and the four cutting edges on this side of the knife-disk are then ground in the same manner.

The advantages which characterize this grinding-machine are as follows:

a. The machine is very simple, and the separate parts are so compact that the space required is very small.

b. The mounting of the intermediate shaft 4 in the freely-pivoted arm 5 allows the transmission of movement by the belts 11 to take place without the fear of any slipping of the belt, which would otherwise certainly occur with so short a distance apart of the belt-pulleys. By rotating in the direction indicated by the arrow the pressure on the belt 11 rises proportionately to the power produced in the chain 6 and is therefore proportionate to the resistance which is to be overcome, and thus the belt is not more strained than necessary. The shaft 4 may also follow the movement of the carriage 32, and the belt-pulley 13 always acts as a stretching-roller, so that the belt 11 always remains stretched.

c. The clamp device for the tool to be ground is very simple. It only requires the nuts 43 and 45 to be a little slackened. When the tool to be ground is brought upon the two-part clamp-disk 46, the two halves of the disk are pressed apart by screwing up the nut 45 and the tool is clamped firmly, while by screwing down the nut 43 the tool is drawn firmly against the disk 14.

d. The bar 49, together with the pin 52 and the four holes 51, renders it possible to ascertain quickly and with certainty the correct position for the cutting edge to be ground of the four-armed knife-disk.

e. The machine is suitable both for grinding flat disks and also for grinding the four-armed knife-disks, as the eccentric mounting of the grindstone allows of an adjustment in height to suit the edges of the latter.

I declare that what I claim is—

1. In a grinding-machine for sharpening rotary cutting-tools, the combination of two carriages, a guideway for each carriage one guideway being at right angles to the other, a grindstone revolubly mounted on one carriage, means for adjusting said grindstone vertically in said carriage, a main driving-shaft, intermediate gearing between said grindstone and said driving-shaft adapted to rotate said grindstone at increased speed, a tool-holder mounted on the other carriage, means for rotating the tool-holder from the driving-shaft, and means for slowly moving said tool-holder horizontally along its guideway.

2. In a grinding-machine for sharpening rotary tools, the combination of two carriages, a guideway for each carriage one guideway being at right angles to the other, a grindstone revolubly mounted on one carriage, means for rotating said grindstone, means for vertically adjusting the axis of said grindstone, a tool-holder mounted on the other carriage, means for rotating said tool-holder, and means for moving said tool-holder horizontally along its guideway.

3. In a grinding-machine for sharpening rotary cutting-tools, the combination of means for supporting the knife to be sharpened, a grindstone, a spindle secured to said grindstone, a carriage in which said spindle is mounted, a horizontal guideway for said carriage, means for moving said carriage along said guideway, a pulley on the said grindstone-spindle, a main driving-shaft, an arm pivoted about said shaft, a pulley pivoted at the end of said arm, a band passing over the pulleys on said arm and the grindstone-spindle, a chain-wheel on said main driving-shaft, a chain-wheel rigidly connected to the pulley on the end of said arm, and a chain adapted to transmit the rotation of the main shaft to said chain-wheel on the end of the arm, the pulley side of said chain being that farther away from the pulley on the grindstone-spindle, whereby the tension in the band which passes over the pulleys is increased as the driving tension is increased, whereby slipping of the driving-band is prevented, and whereby the band is kept in engagement with the pulleys as the grindstone-carriage is traversed longitudinally.

4. In a grinding-machine for sharpening rotary cutting-tools, the combination of two carriages, a guideway for each carriage one guideway being at right angles to the other, a grindstone revolubly mounted on one carriage, means for rotating said grindstone, a tool-holder mounted on the other carriage, a driving-shaft, means for rotating the tool-holder from the driving-shaft, an arm pivoted about the driving-shaft, wheels mounted at the end of said arm, means for rotating said wheels from the driving-shaft, and means driven from said wheels for slowly traversing the tool-supporting carriage, whereby the driving-bands are kept at the proper tension during the traversing of the carriage.

5. In a grinding-machine for sharpening rotary cutting-tools, a clamping device for the tools to be ground comprising a clamp-disk made in two parts with a central opening, a hollow shaft, a tool-holder at the end of said shaft, a hollow bush having an expanded forward end, a nut engaging with the rear end of said bush, a central pin, an enlarged rectangle at the forward end of said pin, and a nut on the rear end of said pin, whereby the clamp-disk may be forced outward into engagement with the tool to be sharpened, and the tool and clamp-disk may be drawn tightly against the tool-holder.

6. In a grinding-machine for sharpening rotary cutting-tools, an adjusting device for the tool to be ground comprising, a tool-holder having as many perforations as there are blades on the tool to be ground, a tool-clamping device, a tool-adjusting bar, means for

correctly supporting said adjusting-bar, and a stop-pin adapted to engage in the successive holes in said tool-holder.

7. In a machine of the character specified, the combination of a drive-shaft, a vertically and horizontally adjustable grindstone, a tool-holder, means for rotating said tool-holder from said drive-shaft and means for rotating said grindstone from said drive-shaft.

8. In a machine of the character specified, the combination with a drive-shaft, a grindstone, and a rotating traveling tool-holder, a longitudinally-movable sleeve on said drive-shaft, means for preventing said sleeve from rotating on said shaft, means on said traveling tool-holder for causing said sleeve to move longitudinally on said shaft, and a flexible connection between said sleeve and said tool-holder.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

WILHELMUS ADRIANUS VAN BERKEL.

Witnesses:

ADOLF ARIS KLEIN,

PETRAS VAN BERKEL.