

No. 641,422.

Patented Jan. 16, 1900.

J. WÜSTENHÖFER.

PENDULUM MILL.

(Application filed Dec. 5, 1898.)

(No Model.)

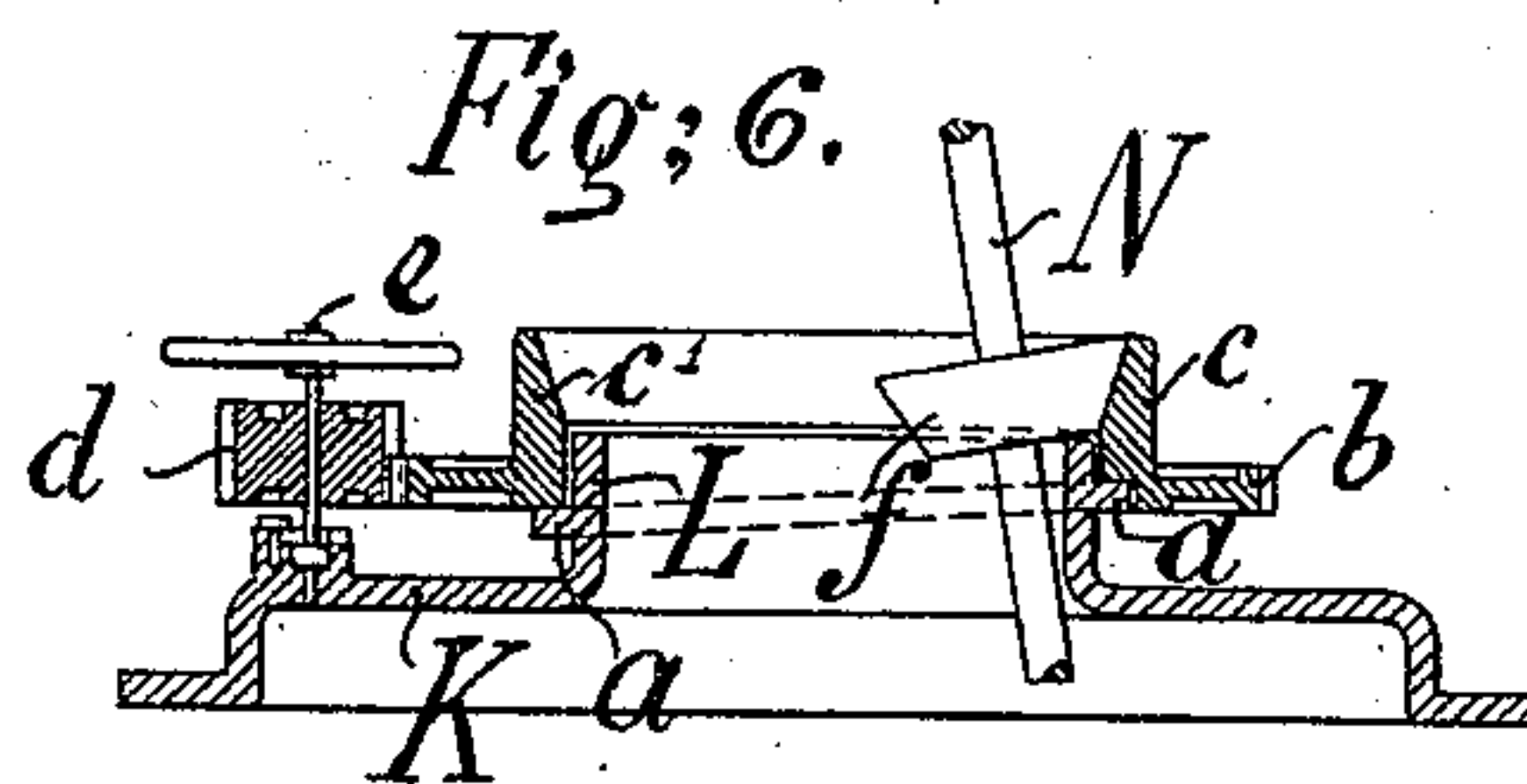
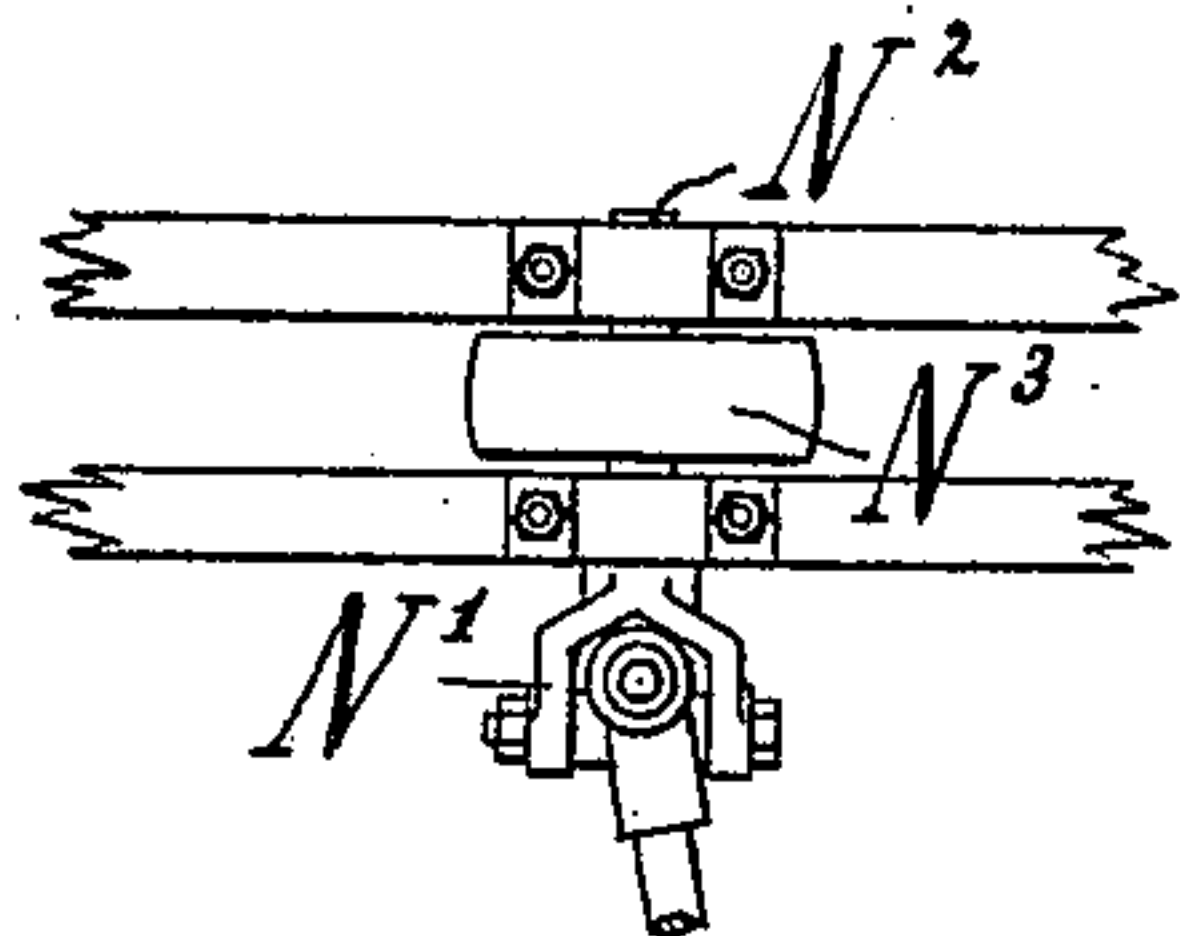


Fig. 3.

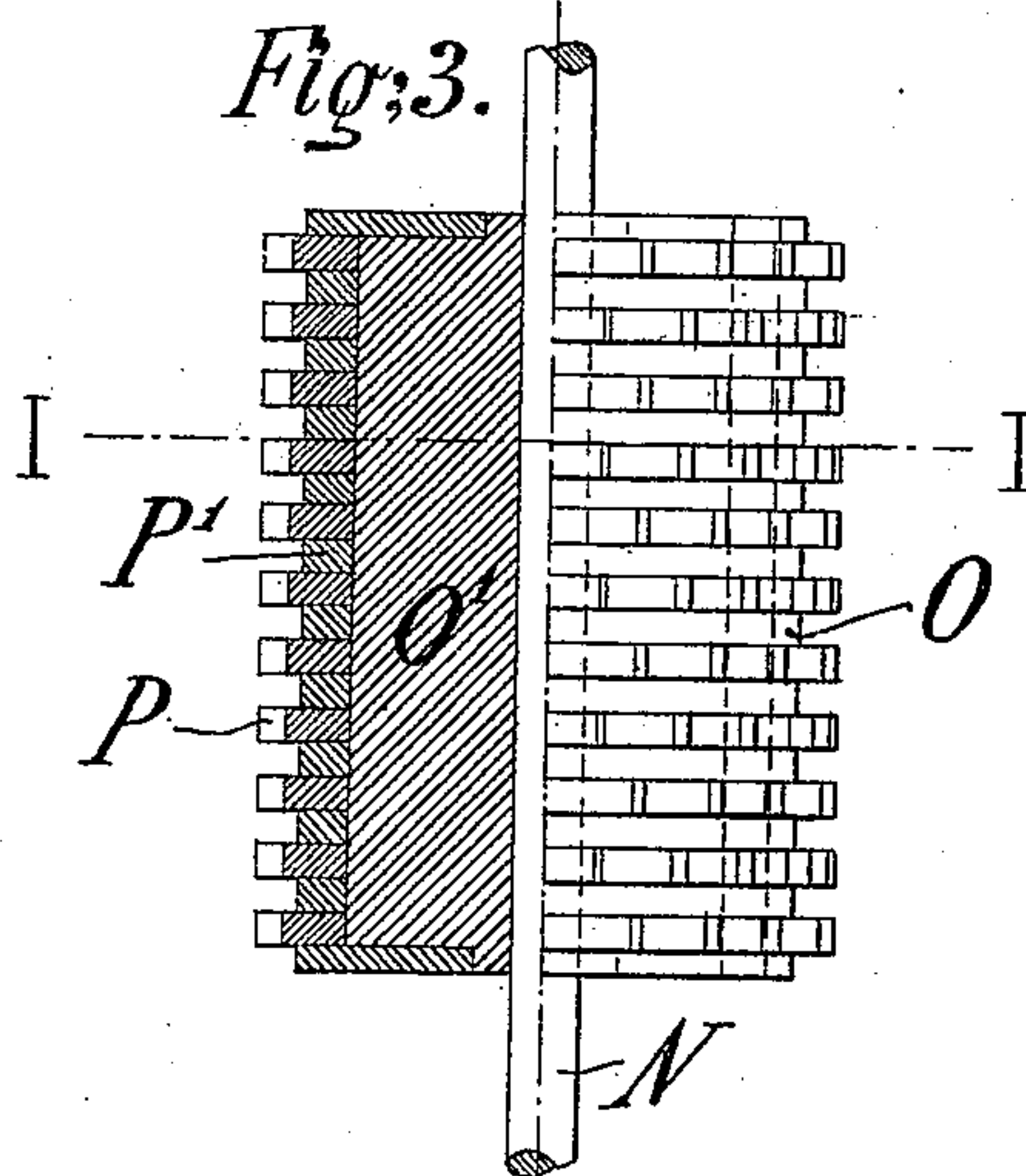


Fig. 5.

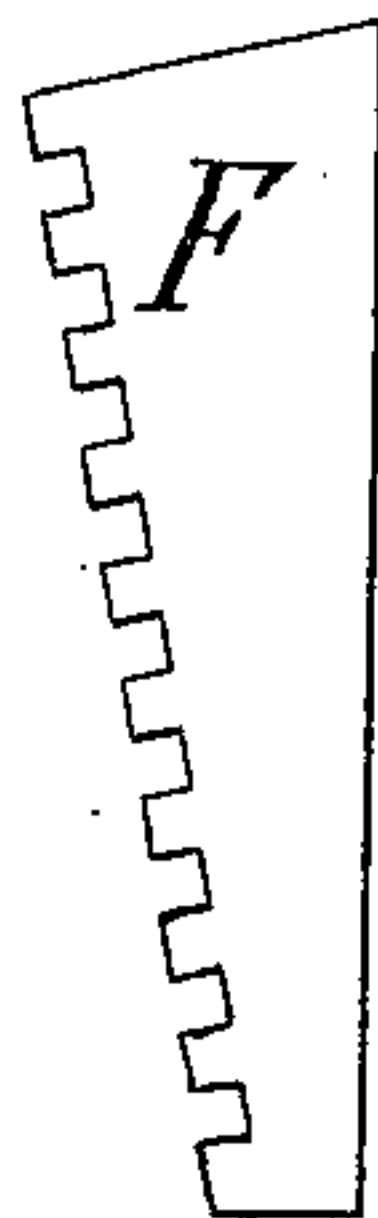


Fig. 4.

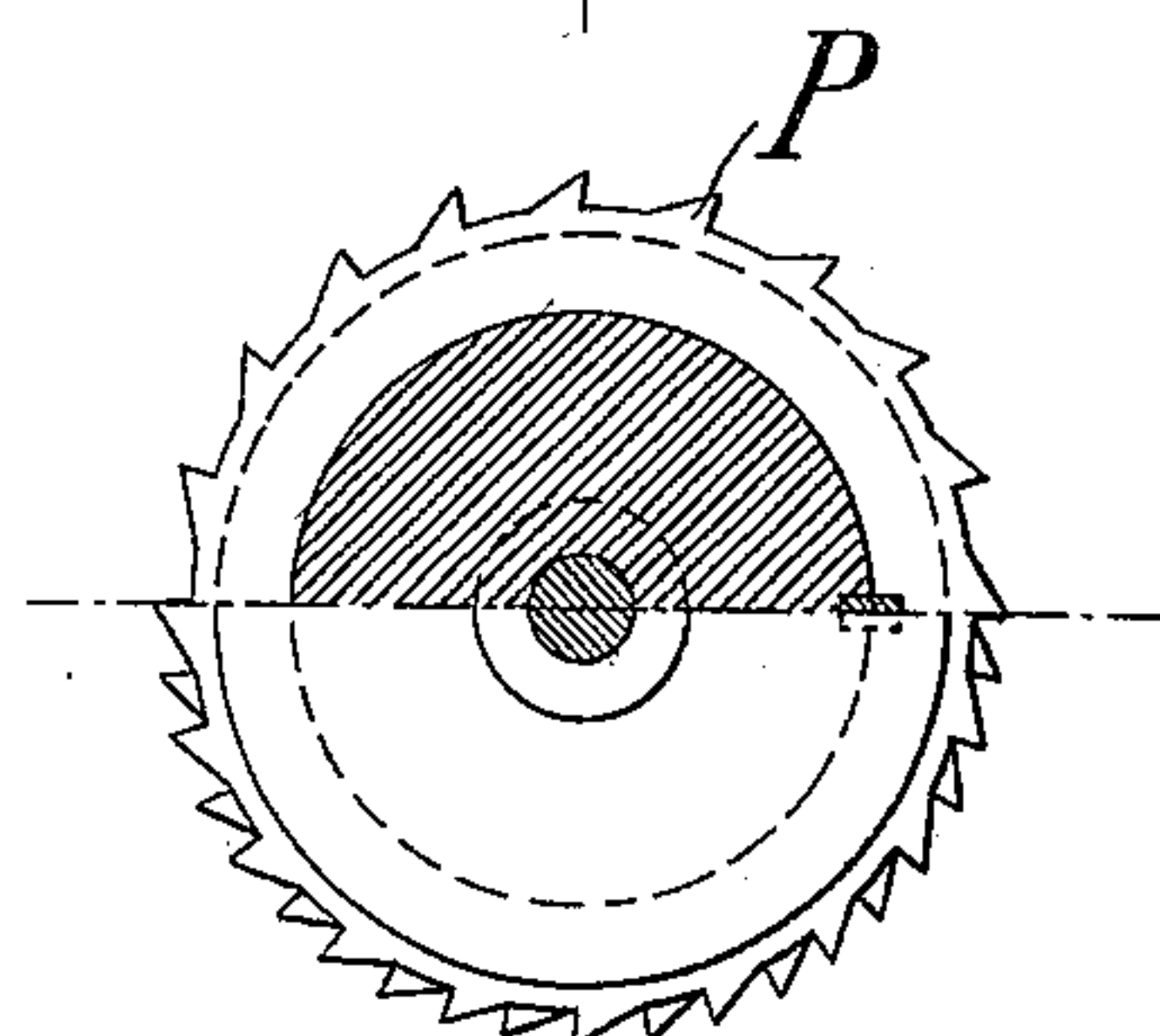
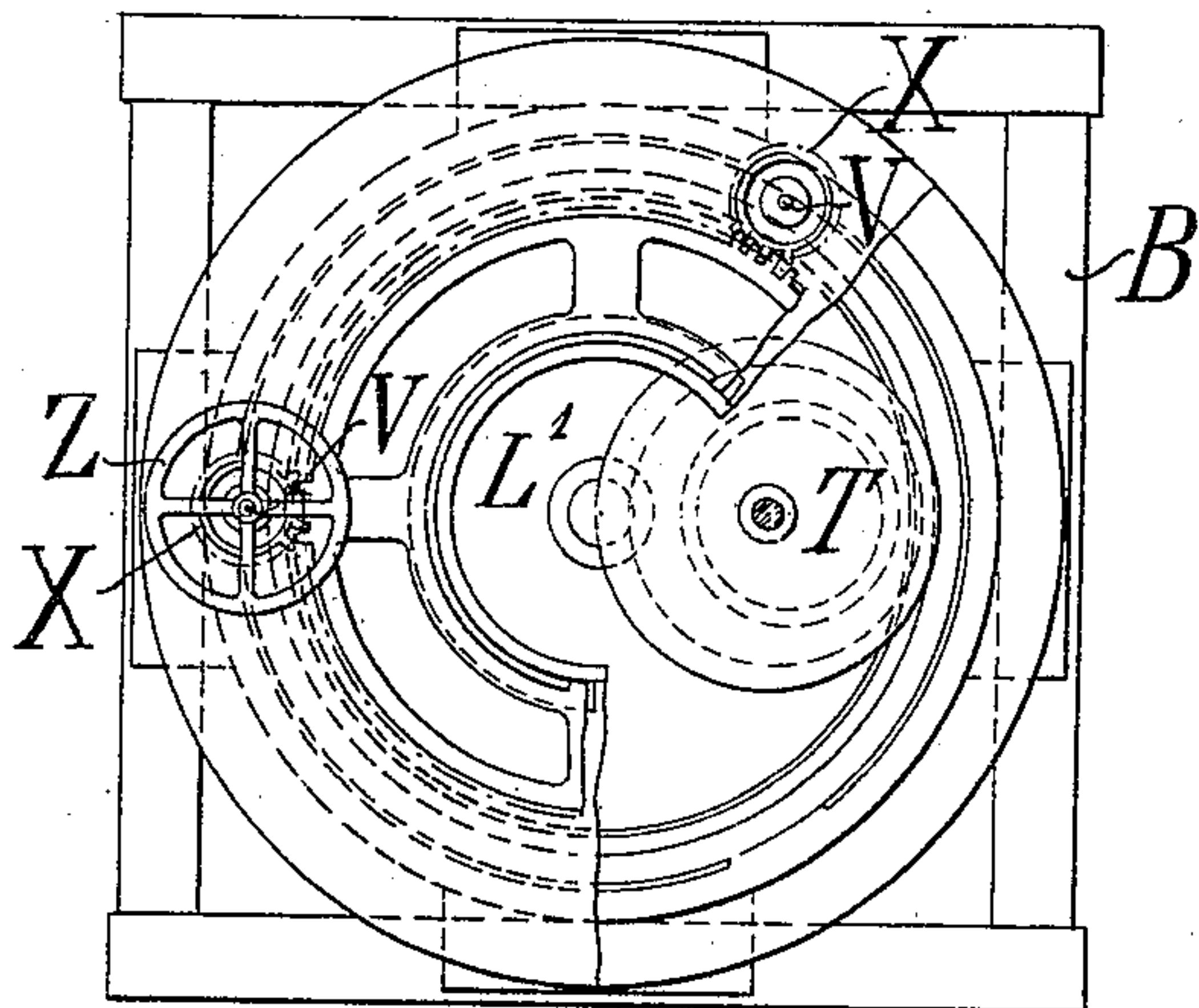


Fig. 2.



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PENDULUM-MILL.

SPECIFICATION forming part of Letters Patent No. 641,422, dated January 16, 1900.

Application filed December 5, 1898. Serial No. 698,405. (No model.)

To all whom it may concern:

Be it known that I, JULIUS WÜSTENHÖFER, a subject of the Emperor of Germany, residing at Hagen, in the Province of Westphalia, Germany, have invented certain new and useful Improvements in Pendulum-Mills; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in so-called "pendulum-mills;" and it has for its object to make these mills fit for cutting or chipping wood ready for making paper-pulp thereof, or also for reducing dye-wood in small suitable chips. In order to answer these purposes, the machine is provided with two sorts of special cutting-tools. One sort, resembling a circular saw, is fixed to the revolving and rotating pendulum-roller. The other sort, resembling either the knives in a rag-engine with a straight cutting edge or with a cutting edge of saw shape with rectangular teeth, is fixed around the inner circumference of the mill-trough. These cutting-knives work against each other, or rather upon the wood between them, and they, of course, must be prevented from coming in contact, though they must be enabled to approach very close, and this requires special setting and adjusting devices, which also allow adjustment for wear and tear. I attain these objects by the mechanisms shown in the accompanying drawings, in which—

Figure 1 is a vertical central section. Fig. 2 is a top view, cover partly broken away. Fig. 3 shows the cutter-roller, left part in vertical diametrical section. Fig. 4 shows a plan of Fig. 3, partly in section, along line I I. Fig. 5 shows a toothed knife of the groundwork. Fig. 6 shows the cover of the machine in section with a varied adjusting device for the cutter-roller.

The machine consists of a circular trough A, suitably seated on a timber frame B and provided at its top with a flange C. Rising from the center of the bottom of the trough there is arranged a hub D, the object of which will be explained further on, and a few inches above the bottom there is a circular projection or shoulder E. This shoulder serves as a rest

for the knives F, by means of which the inner circumference of the trough is armed in groups, as indicated in Figs. 1 and 2. These knives are held in place vertically by the ring G, bolted to the top flange C of the trough by a corresponding flange C'.

For the purpose of holding down the knives F an inner flange H is arranged near the lower edge of the ring G, and this flange projects obliquely downward, so that when the ring is bolted upon the flange C of the trough the knives are wedged in between the flange H and the shoulder E and cannot get loose. In radial and circumferential direction they are secured by wedges driven in between the different sets.

The trough, with the ring G upon it, is covered by a cover K, having a central neck L, with an opening L' and at one side a feeding-chute M. Through this central opening reaches the pendulum-shaft N of the cutter-roller O. The shaft N is suspended at a convenient height, by means of a universal joint N', to a short driving-shaft N², carrying a driving-pulley N³. This is all of known construction and needs no further description.

The cutter-roller O at the lower end of the shaft N consists of an internal solid block or core O', keyed fast to this shaft. To this core are fixed the ring-knives P, resembling a circular saw, alternately changing with plain rings P', and just below the cutter-roller the shaft is provided with a plain disk R of somewhat larger diameter than the extreme diameter of the cutter-knives P. This disk bears against the central hub D when the mill is at rest, and thus hinders the roller-shaft N from hanging perpendicularly, so that when it is turned at a sufficient speed it will fly outward and roll along the inner circumference of the trough and along the knives F.

Below the disk R there is fixed to the roller-shaft a stirrer S of screw shape, stirring up material that otherwise would settle at the bottom. A similar stirrer S' is arranged a little above the cutter-roller and the object of which is to drive downward particles of the material to be reduced, which may float about at the surface of the water in the trough.

Now in consequence of the centrifugal force

the cutter-roller would be thrown right against the knives F, and both sorts of knives—the circular ones in the roller and the straight ones in the trough—would grind against each other and get soon destroyed. In order to prevent this and also for the sake of preventing the material from being reduced to a too small size, I arrange above the roller, at such a height that it will reach above the flange H of the ring G, a conical guide-roller T, which, with its conical circumference, in working state runs along a corresponding guide-ring U, suspended movably and securely guided inside of the ring G. When this ring is raised or lowered, it allows the guide-roller T and with it the cutter-roller O to fly out more or less and to come closer to the knives F.

The raising and lowering of the ring U are carried out by the following mechanism: The ring is suspended at three points uniformly distributed on its circumference on spindles V, which are provided with screw-threads where they pass through the cover K. Here they are guided in a boss W with female thread, and outside of the cover K a small pinion X is keyed to each of them, which all are in gear with a spur-wheel Y, seated on a shoulder L² of the neck L of the cover K, so that it can turn around on the same freely. To one of the spindles V a hand-wheel Z is fastened, so that when this hand-wheel is turned around its pinion is also turned, and this again sets in motion the wheel Y, and this then also turns around the other two pinions and their spindles, and so they are raised in their nuts or bosses W and lift up evenly the adjusting-ring U or lower it according to the direction in which the hand-wheel Z is turned around.

It is evident that the raising and lowering of the ring U may be carried out by other devices without altering anything in the working of my machine. So, for instance, the same result would be attained if the pinions X were provided with female screw-threads, in which the spindles V are guided, and if then the wheel Y would be turned around by taking hold of its spokes or of handles specially provided for this purpose. Another device which would answer the same purpose and which has the further advantage of bringing the guide-ring U and the guide-roller T quite out of the interior or lower part of the trough A and ring G is shown in Fig. 6. This device is as follows:

The outer circumference of the neck L in the cover K is provided with a shoulder *a*, forming a screw-thread. Upon this, with a corresponding female thread in its boss or nave *c*, is put the spur-wheel *b*, which at its inner hollow part is turned out conically where it rises above the edge of the neck L, so as to form a guide-ring *c'* like the guide-ring U in Fig. 1. The wheel *b* engages with the teeth of a pinion *d* on a spindle *e*, held fast in the cover K, and it will be readily understood that when the spindle *e* with the pinion *d* on

it is turned it will turn the wheel *b*, and then this will be raised on its shoulder *a*, and consequently also the guide-ring *c*. On the pendulum-shaft N there is keyed fast in this case a small conical guide-roller *f*, rolling along the guide-ring *c* when the shaft N is rotated, and thus it will be seen that when the wheel *b* is raised or lowered, as described, the cutter-roller at the end of shaft N can be approached or kept farther away from the knives at the inner circumference of the trough A.

I am aware that pendulum-mills for reducing quartz, minerals, cement, and other hard materials have been in use for some time, and I therefore do not claim such mills broadly; but

What I do claim, and desire to secure by United States Letters Patent, is—

1. In a machine for reducing wood, the combination of a circular trough having a hub in the middle of its bottom and a shoulder around its inner circumference near its bottom, a ring on the said trough having a flange projected inwardly, knives held in place between the said shoulder and flange, a cover on top of the said ring, a feed-chute secured to the cover, a neck on the cover and having a central opening, a pendulum-shaft, a cutter-roller on the free end of the shaft, an internal solid core for said cutter-roller, ring-knives and plain rings alternating with each other on the core, a disk on the shaft below the roller, stirrers on the shaft one above and the other below the outer roller, a conical guide-roller on the shaft above the upper stirrer and a guide-ring on the trough for the guide-roller substantially as described.

2. In a machine for reducing wood the combination of a circular trough having a hub in the middle of its bottom and a shoulder around its inner circumference near its bottom, a ring on the said trough having a flange projected inwardly, knives held in place between the said shoulder and flange, a cover on top of the said ring, a neck on the cover and having a central opening, a gear-wheel movable on said neck, a series of screw-threaded spindles provided at their upper ends with pinions which engage the said gear-wheel, a hand-wheel on one of the said spindles, a conical guide-ring suspended by said spindles, a conical guide-roller arranged for contact with the inclined inner face of said guide-ring, a shaft having the said guide-roller fast thereon, means for causing the said shaft and roller to travel around the inner circumference of the said guide-ring, knives carried by the said shaft and coöperating with the fixed knives of the ring first above mentioned, and stirrers also carried by the said shaft, the said spindles passing through screw-tapped fixed parts and engaging the same, in order that the said guide-ring may be adjusted upward or downward at will substantially as set forth.

3. In combination with a circular series of fixed knives and a series of rotating knives coacting therewith, a shaft carrying the latter

knives, a guide-roller on said shaft, a guide-
ring internally in contact with the said roller,
adjusting devices for raising and lowering the
said ring and means for rotating the said shaft
5 and causing the said roller to travel around
the interior of the said guide-ring substan-
tially as set forth.

In testimony whereof I have affixed my sig-
nature in presence of two witnesses.

JULIUS WUSTENHÖFER.

Witnesses:

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