

No. 645,018.

Patented Mar. 6, 1900.

F. SCHMALTZ.

MACHINE FOR GRINDING MILLING CUTTERS.

(Application filed Sept. 12, 1898.)

(No Model.)

2 Sheets—Sheet 1.

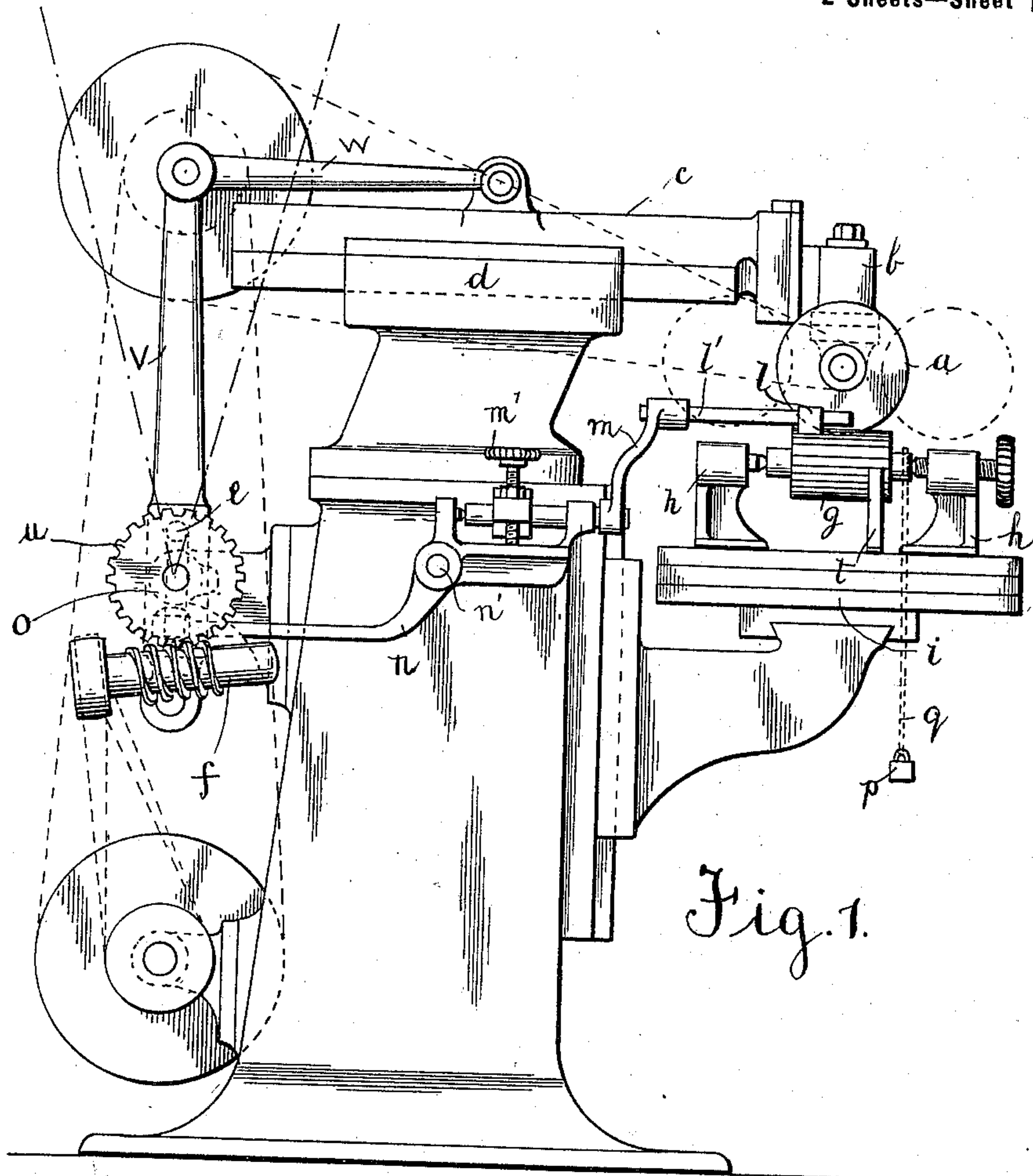


Fig. 1.

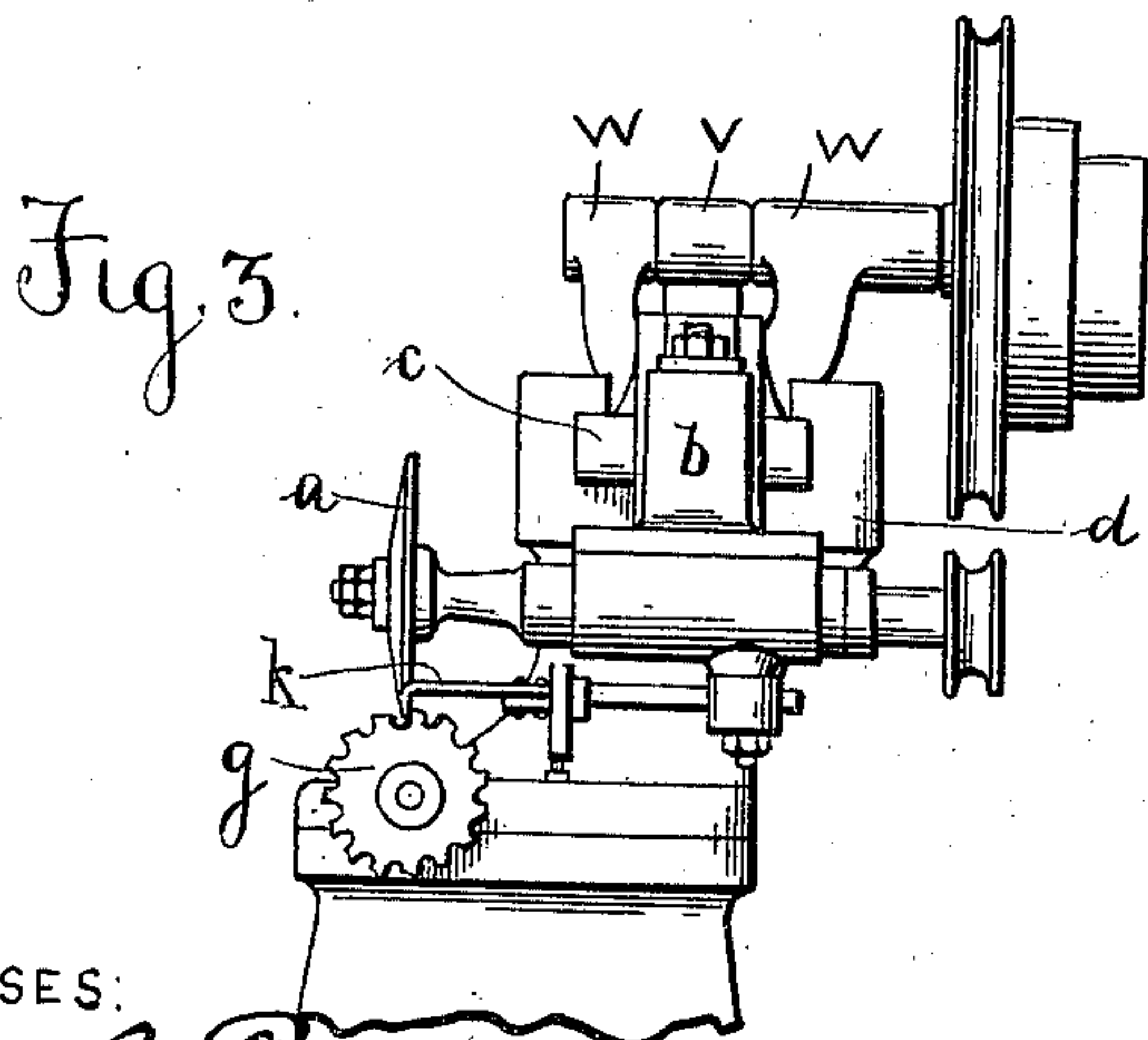


Fig. 3.

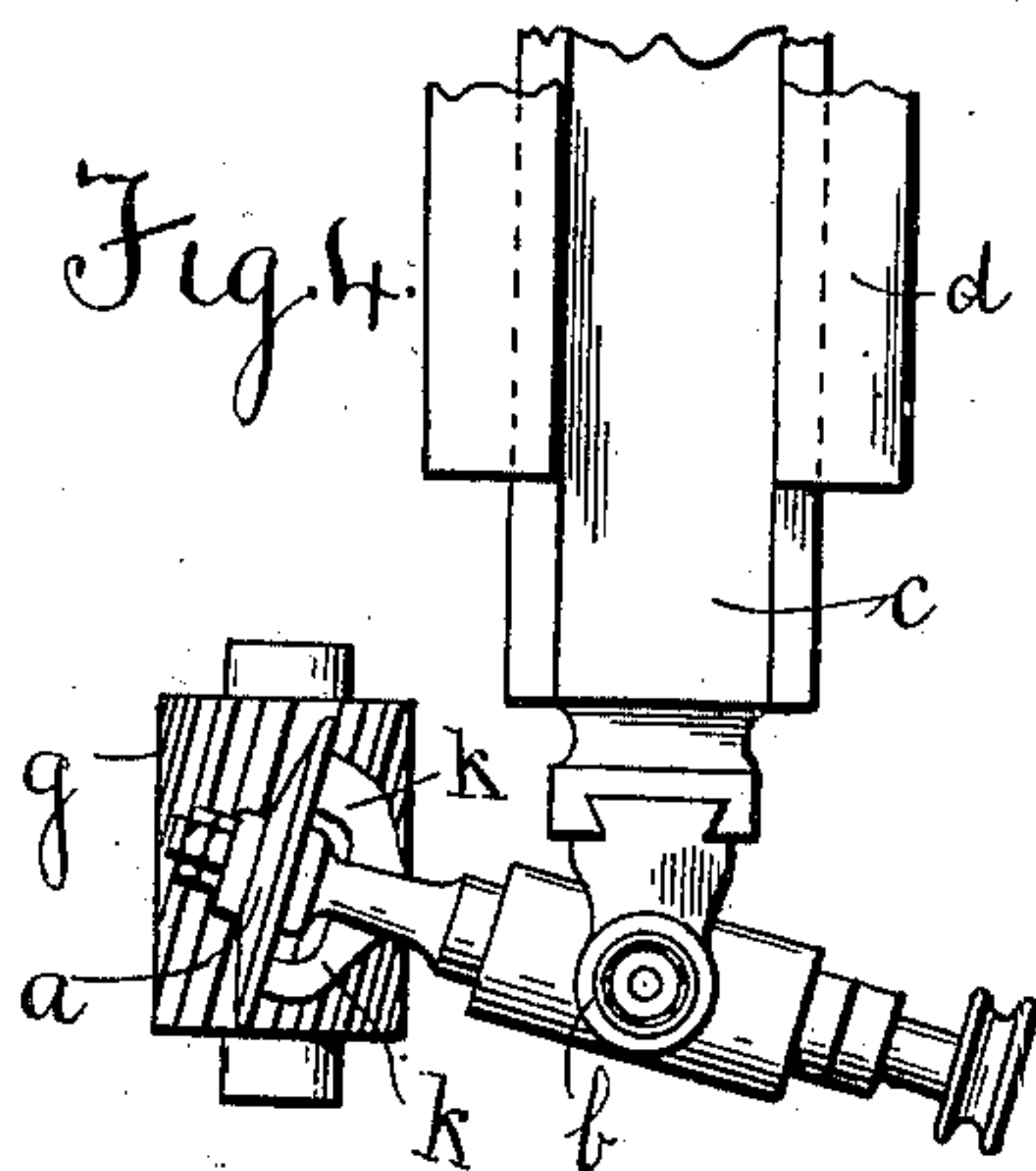


Fig. 4.

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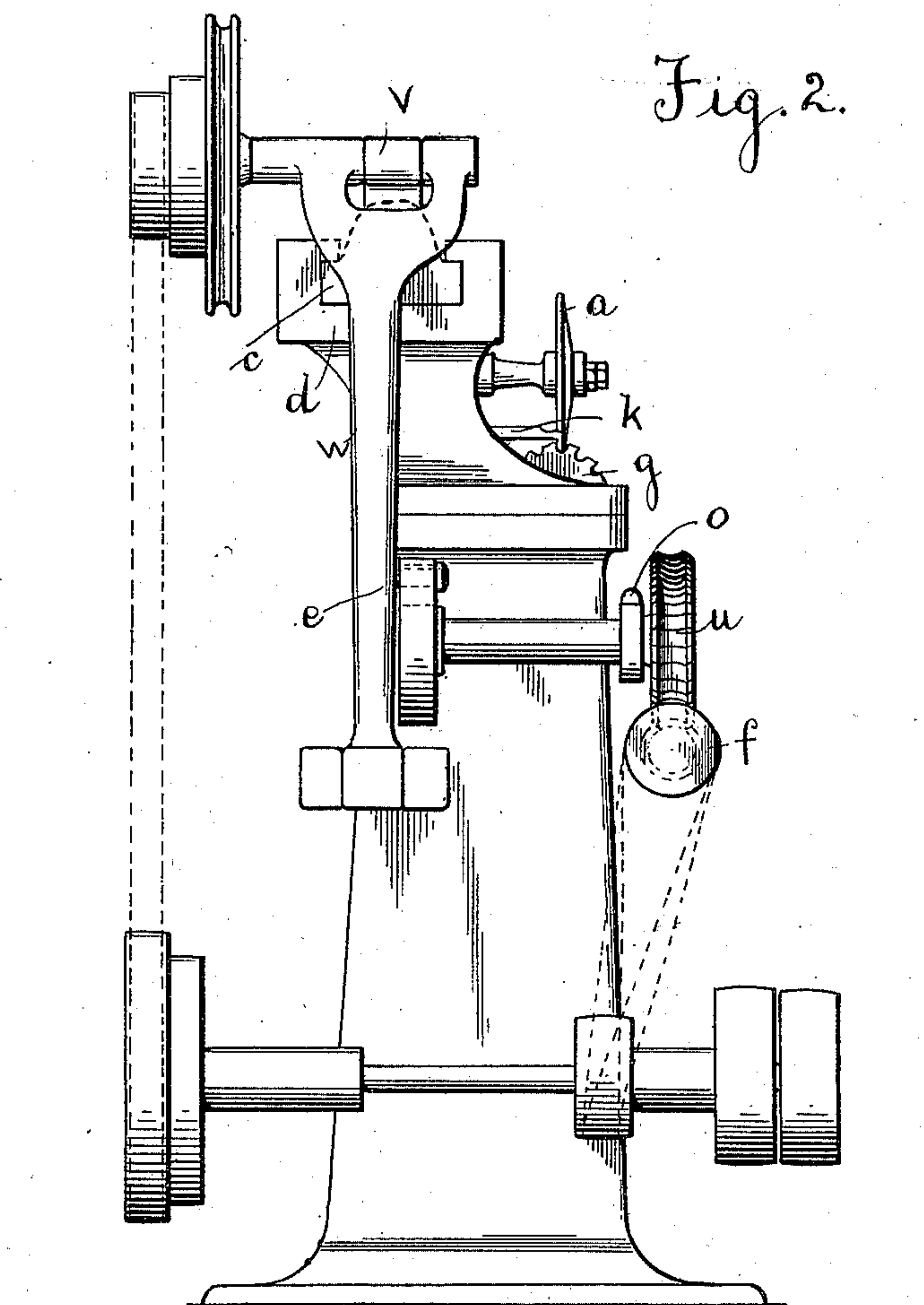


Fig. 2.

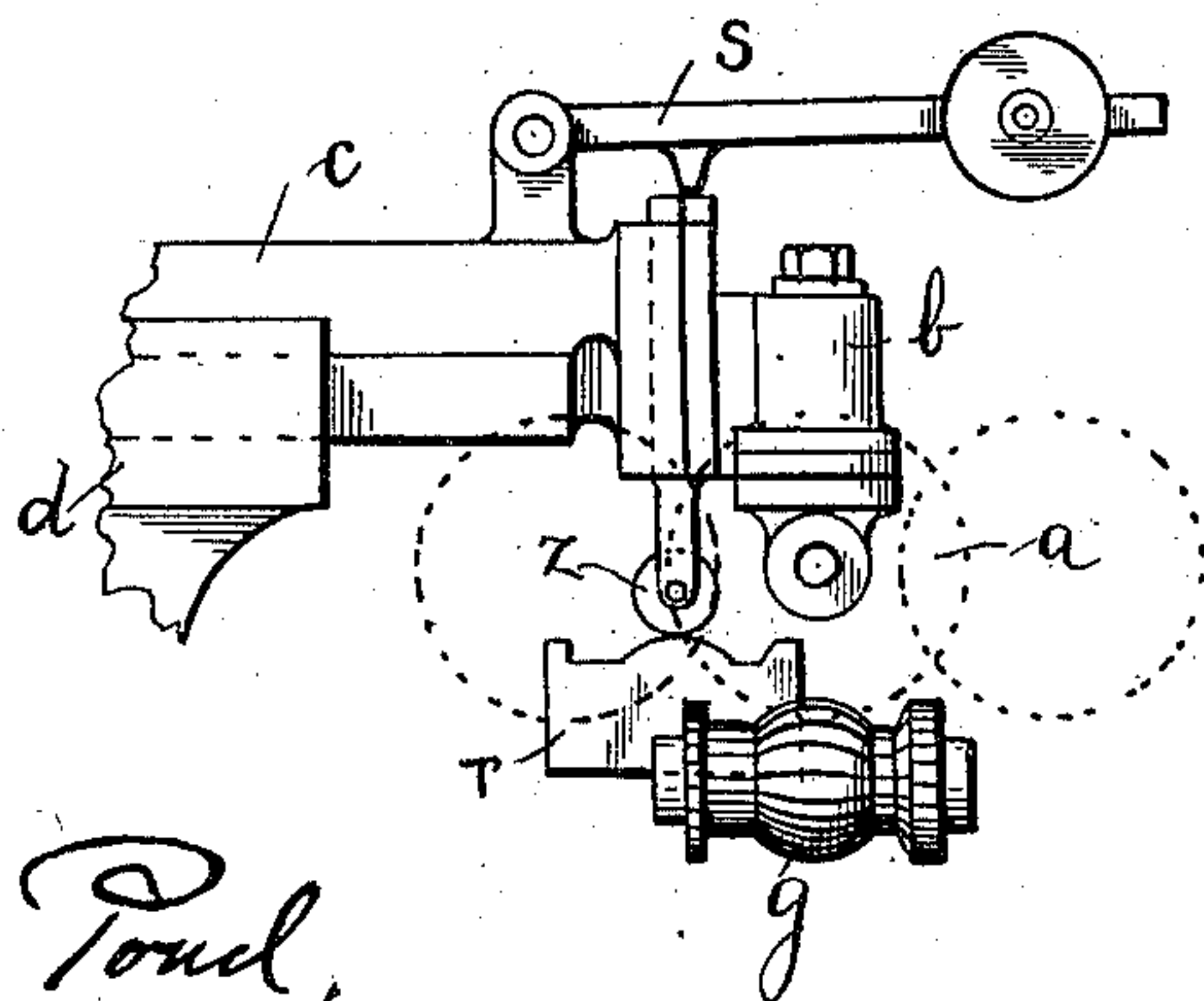


Fig. 5.

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# UNITED STATES PATENT OFFICE.

FRIEDRICH SCHMALTZ, OF OFFENBACH-ON-THE-MAIN, GERMANY.

## MACHINE FOR GRINDING MILLING-CUTTERS.

SPECIFICATION forming part of Letters Patent No. 645,018, dated March 6, 1900.

Application filed September 12, 1898. Serial No. 690,787. (No model.)

*To all whom it may concern:*

Be it known that I, FRIEDRICH SCHMALTZ, manufacturer, residing in Offenbach-on-the-Main, in the Empire of Germany, have invented certain new and useful Improvements in Machines for Grinding Milling-Cutters and the Like, of which the following is a specification.

In the grinding-machines hitherto known on which milling-cutters and the like could be ground the arrangement has always been adopted of passing the cutter to be sharpened by hand over a stationary grinding-disk.

This invention has for its object to provide a perfectly automatically working grinding-machine wherein the cutters to be sharpened or ground are stationary while the grinding-disk itself is moved over them. This arrangement has a number of important advantages. In the first place it allows of the parts (fingers, grippers, or the like) which hold the cutters during their treatment by the grinding-disk being also made to travel with the disk. Moreover, these parts no longer need, as previously, be specially adjusted for each cutter, but need only be adjusted to correspond to the wearing away of the disk. Finally, the improved machine may be employed without further trouble for any suitable form of milling-cutter or the like.

A form of construction of this machine is shown in the accompanying drawings, in which—

Figure 1 is a side elevation; Fig. 2, a rear elevation; Fig. 3, a front view of the upper part of the machine. Fig. 4 illustrates the grinding of spiral milling-cutters, and Fig. 5 the grinding of shaped milling-cutters.

In this improved automatic grinding-machine the grinding-disk *a* is mounted in the grinding-disk head *b* in such a way that it may be adjusted in all directions and may execute an up-and-down movement. The grinding-disk head *b* is mounted on a slide *c*, which is horizontally movable in the upper part of a frame *d*. This slide *c* is connected by a link *W* to a lever *V*, adapted to be oscillated by any suitable mechanism, preferably by an adjustable crank-pin *e* on a crank-disk mounted on the shaft of a worm-wheel *u*, driven by a worm *f*, in order to impart to said slide, and thereby to the head *b*, a reciprocating move-

ment. The milling-cutters *g* to be sharpened are fixed between pointed pins or centers *h* on a support *i* and only require to be fixed at such a height that the grinding-disk can engage therewith in order that the grinding may commence at once. This is rendered possible by the fingers *k*, which hold the cutters during the grinding, being mounted in front of and behind the disk and fixed in such a way on the grinding-disk head *b* that they describe a reciprocating movement along with the disk. They thus require only to be adjusted when the grinding-disk is considerably worn or when the position of the grinding-disk is altered. Otherwise they are always ready for a correct engagement in the teeth of the cutter.

The movement or turning of the cutter which is to be sharpened may take place by means of any suitable pawl mechanism such as is well known already in similar machines. In such case the pawl *l* is arranged on a bar *l'*, so that it may be adjusted or moved to and fro according to the kind of cutter to be sharpened. The bar *l'* is mounted on an arm *m*, which is capable of being rotated or turned by means of a set-screw *m'* in such a way that the position of the pawl *l* may be adjusted somewhat more forward or backward, according to requirements. The whole mechanism forms together the one arm of the lever *m n*, which is pivoted at *n'* and moved by the cam *o*. The set-screw *m'* and the arm *m* are adjustable in a horizontal plane. This adjustment, however, is effected by hand and only when the cutters of different thickness are to be ground. In working, the parts *n m' m l'* may be regarded as a rigid whole pivoting on the point *n'*.

In order to always correctly press the cutter against the fingers *k*, a cord *q*, weighted by means of a weight *p*, is provided and adapted on the movement of the cutter to slightly wind up on the latter. In order that by means of this cord the cutters shall not turn back again when the grinding-disk leaves their teeth, a spring or spring-pawl *t* is provided, which engages in a tooth of the cutter and holds it until the fingers are reengaged. In place of this spring the foremost of the fingers *k* may also be made to have a spring action. In this case on the return of the disk



the said finger must no longer leave the cutter.

Instead of the spring *t* the turning mechanism may also be so operated that the pawl *l* only returns when the fingers have again engaged.

The grinding of shaped milling-cutters takes place by the insertion of a templet *r*, whereby the vertically-movable head *b*, carrying the grinding-disk, may be suitably raised and lowered in consequence of its reciprocating movement by means of a guide-roller *z*, a weighted lever *s* being preferably arranged to cause it to bear firmly against the templet.

I declare that what I claim is—

1. In a machine for automatically grinding milling-cutters and the like, the combination of a movable slide having an adjustable head; a grinding-disk mounted on said head to move therewith; a stationary support for the cutter to be ground; and means for reciprocating the slide and therewith the head and the grinding-disk over the cutter; substantially as hereinbefore described.

2. In a machine for automatically grinding milling-cutters and the like, the combination of a movable slide having an adjustable head; a grinding-disk mounted on said head to move therewith; a stationary support for the cutter to be ground; fingers on said head to hold the cutter while it is being ground; and means for reciprocating the slide and therewith the head, and the fingers and grinding-disk, over the cutter; substantially as hereinbefore described.

3. In a machine for automatically grinding milling-cutters and the like, the combination of a movable slide having an adjustable head; a grinding-disk mounted on said head to move therewith; a stationary support for the cutter to be ground; fingers on said head to hold the cutter while it is being ground; means for reciprocating the slide and therewith the head, and the fingers and grinding-disk over

the cutter; and means for turning the cutter to bring a fresh portion thereof under the action of the grinding-disk; substantially as hereinbefore described.

4. In a machine for automatically grinding milling-cutters and the like, the combination of a movable slide having an adjustable head; a grinding-disk mounted on said head to move therewith; a stationary support for the cutter to be ground; fingers on said head to hold the cutter while it is being ground; a lever *V* connected by a link *W* to the movable slide; a crank-disk having its pin *e* engaging said lever to oscillate it and to thereby reciprocate the slide and therewith the head, fingers and grinding-disk over the cutter; worm-gear *f* to drive said crank-disk; and a pawl *l* adapted to be actuated through levers *m n* by a cam-disk *o* mounted on the same shaft as the aforesaid crank-disk, to turn the cutter; substantially as hereinbefore described.

5. In a machine for automatically grinding milling-cutters and the like, having a stationary support for the cutter to be ground, and a movable support for the grinding-disk; the combination with the fingers for holding the cutter while it is being ground, of means for turning said cutter to bring a fresh portion thereof under the action of the grinding-disk, a weighted cord *q* adapted to be wound on said cutter as it is turned; and a spring-pawl *t* adapted to retain the cutter against backward turning until the fingers have engaged the teeth of said cutter, substantially as hereinbefore described.

In witness whereof I have hereunto signed my name, this 27th day of August, 1898, in the presence of two subscribing witnesses.

FRIEDRICH SCHMALTZ.

Witnesses:

JEAN GRUND,

FRANK H. MASON.