

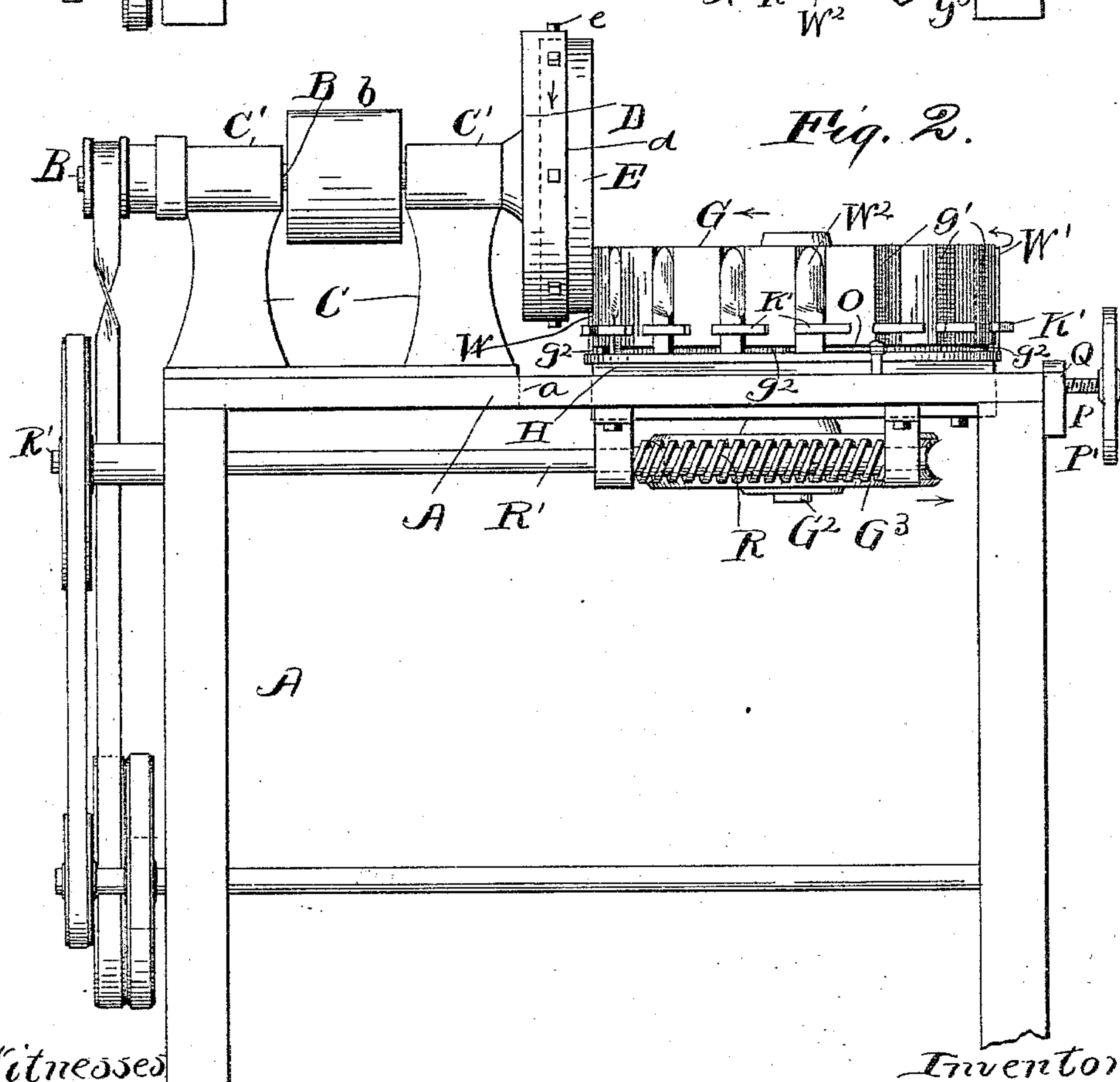
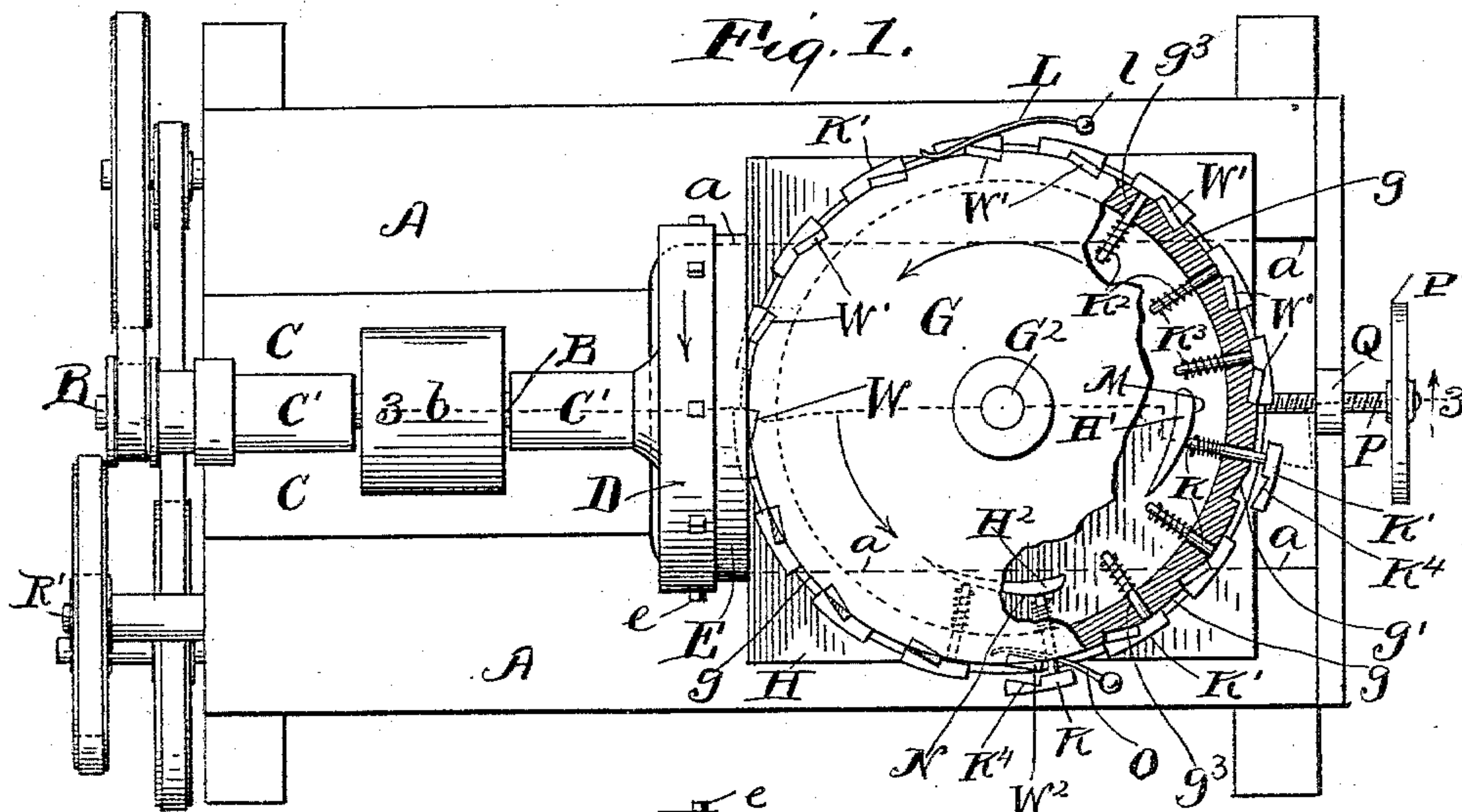
(No Model.)

2 Sheets—Sheet 1.

H. S. BUCKLAND.
GRINDING MACHINE.

No. 559,842.

Patented May 12, 1896.



Witnesses
E. B. Gilchrist
[Signature]

Inventor
Horace S. Buckland
By M. D. Leggett & Co.
his Attorneys.

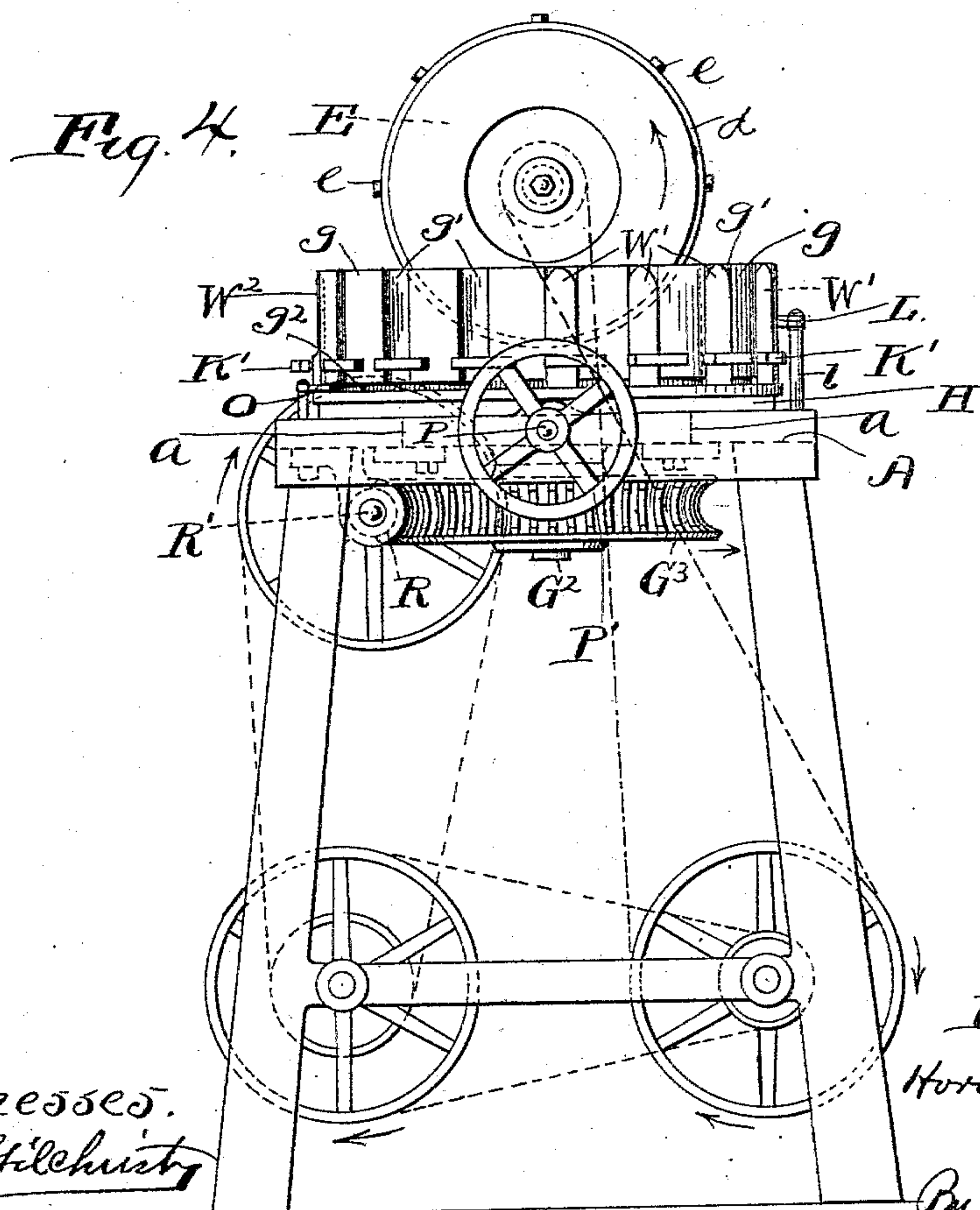
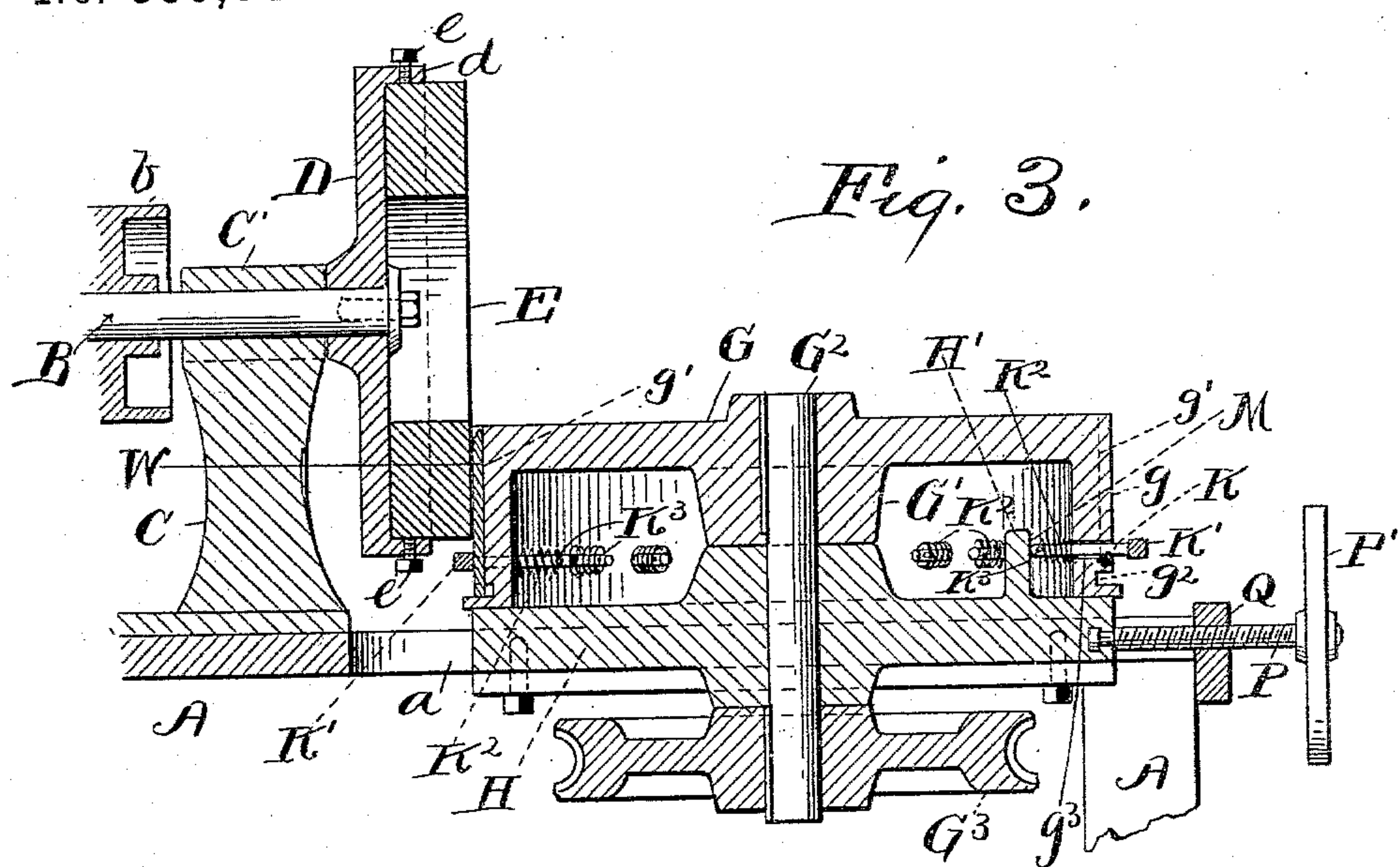
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UNITED STATES PATENT OFFICE.

HORACE S. BUCKLAND, OF FREMONT, OHIO.

GRINDING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 559,842, dated May 12, 1896.

Application filed December 21, 1894. Serial No. 532,566. (No model.)

To all whom it may concern:

Be it known that I, HORACE S. BUCKLAND, of Fremont, in the county of Sandusky and State of Ohio, have invented certain new and useful Improvements in Grinding-Machines; 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 pertains to make and use the same.

My invention relates to improvements in grinding-machines more especially designed for grinding knife-blades to form the cutting edge of the blades; and the invention consists in certain features of construction and in combinations of parts hereinafter described, and pointed out in the claims.

A preferable construction of machine embodying my invention is illustrated in the accompanying drawings, wherein—

Figure 1 is a top plan of the machine, portions being broken away and in section in said figure to more clearly show the construction, ground and unground blanks being shown in position in the work-holder of the machine, one, W, of the blanks being operated upon by the grinding-surface, others, W', not having yet reached the grinding-surface, one, W², having been brought into position ready to be removed from the work-holder, and three of the work-holding pockets in the work-holder being vacant or ready for the reception of a blade to be ground. Fig. 2 is a side elevation of the machine. Fig. 3 is a side elevation, mostly in vertical section, on line 3 3, Fig. 1. Fig. 4 is an end elevation looking from the end of the machine at which the work-holder is located.

Referring to the drawings, A designates the supporting-frame of the machine, and B the driving-shaft that is arranged horizontally of the machine and has suitable bearing in boxes C' C', that are rigid with standards C, borne by the supporting-frame, said shaft being shown provided with a driving-pulley b between boxes C' C'. Said shaft extends from one end to near the central portion of the machine and is provided at its inner end with the holder of the grinding substance. Said holder consists, preferably, of a disk or plate D, that is operatively mounted in any

approved manner upon the inner end of the driving-shaft, and at its periphery is provided with an annular flange or rim d, projecting laterally in the direction of the work-holder hereinafter referred to, thereby forming a chamber for the reception of the grinding substance.

A ring E of emery is preferably employed to present the grinding-surface, and this ring is adjustably secured within the chamber of the holder by means of screws e, the work in the machine illustrated being designed to be ground upon the outer annular face of said ring, and the latter being adjustable endwise upon loosening the aforesaid screws to accommodate the wear of the grinding-surface and being again secured in the desired adjustment by retightening the screws. A grinding-surface revolving in a vertical plane is thus provided, and said surface is preferably just wide enough to grind the side of the blank to be ground, as required, to form a knife-blade having a cutting edge, or perhaps a little wider.

The work-holder in the machine illustrated is arranged in a horizontal plane, and is consequently rotated, as will hereinafter appear, in a plane at right angles to the plane of revolution of the grinding-surface.

The work-holder, as shown very clearly in Fig. 3, comprises a horizontally-arranged disk or plate G, that is provided with a hub G', operatively mounted in any approved manner upon the upper end of an upright shaft G², that has suitable bearing in a horizontally-movable carriage or slide H and is operatively connected, as will hereinafter appear, with the driving-shaft in such a manner as to cause the work-holder to be rotated at a desirable speed relative to the speed given to the grinding-surface. The speed of the work-holder of course should be very slow as compared with the speed of the grinding-surface, and the work and grinding-surface are preferably caused to revolve in opposite directions, respectively, as the arrows upon the drawings indicate. Disk or plate G at its periphery is provided with a laterally and downwardly projecting annular flange or rim g, thereby forming a chamber within the work-holder. Annular flange or rim g of the work-

holder, upon its outer side and at suitable intervals, is provided with grooves or pockets g' , designed to receive the work to be ground, said grooves or pockets in the case illustrated being vertically arranged and extending transversely of said flange or rim and being open at the upper end for the reception of the work. Flange or rim g at the lower ends of the work-holding pockets is provided with an annular groove or recess g^2 , designed for a purpose that will hereinafter appear, and the work is adapted to rest upon the lower wall of annular recess g^2 . The work-holding pockets have such shape in cross-section that when the work is placed therein so much of the work as is to be ground away shall protrude at the external periphery of the work-holder, and consequently if it is desired to form a knife-blade from a bar of metal quadrangular in section, as in the case illustrated, the work-holding pockets should be so shaped in cross-section that a cutting edge shall be formed upon the bar of metal during the grinding operation. The arrangement of the work-holder relative to the grinding-surface is such that the blank shall be ground as required during the grinding operation and so as to form the requisite length of cutting edge.

Means acting in the direction to retain the work within the pockets of the work-holder from the time of the insertion of the work into the respective pocket to the time of the engagement of the work by the grinding-surface is provided, and consists, preferably, of a longitudinally-movable bar K , provided in suitable proximity to each of the work-holding pockets—that is, there are as many of said bars as there are work-holding pockets, and said bars are arranged radially of the work-holder and extend easily through radially-arranged holes g^3 in the annular flange or rim g of said holder. Each of bars K at its outer extremity, at the outer periphery of the work-holder, is provided with a head K' , adapted to engage the outer side of the work, and a spring K^2 is confined upon each bar K between the internal periphery of rim or flange g of the work-holder and a shoulder K^3 , formed upon bar K , said spring acting in the direction to cause the head of the respective spring bearing-bar to bear against the outer side of the work and retain the latter in position within the respective pocket of the work-holder, and heads K' of bars K are preferably notched or recessed, as at K^4 , to conform to the protruding part of the work.

The arrangement of parts of course is such that heads K' of bars K do not engage that portion of the work that is ground, but that portion that forms the shank of the blade. The work is introduced into the work-holding pockets preferably at a point approximately diametrically opposite the point at which the work engages the grinding-surface, and some suitable means adapted to bear more firmly upon the work before the latter reaches or

comes into engagement with the grinding-surface, and thereby more positively press the work against said seat in the work-holding pocket, is preferably provided at a point intermediate between the place at which the work is introduced into the work-holding pocket and the point at which it comes into engagement with the grinding-surface, and said additional work-engaging device consists, preferably, of a spring L , shown secured to an upright post l , that is rigid with the supporting-frame of the machine, said spring being adapted to engage the outer side of the work and firmly press the same against its seat in the respective work-holding pocket, the spring having such location that it shall perform its function preparatory to the engagement of the work by the grinding-surface.

Suitable means for actuating bars K outwardly at the point where the work is introduced into the work-holding pockets to enlarge the space between the head of the bars and the respective work-holding pocket, and thereby facilitate the introduction of the work into the pocket, is provided, and consists, preferably, of a relatively stationary incline M , that is provided in any suitable manner—such, for instance, as upon an upwardly-projecting lug II' on carriage or slide II —the location and trend of said incline being such that the inner extremities of movable bars K during the revolution of said bars shall come into engagement with said incline and be thereby pushed outwardly to enlarge the space between the heads of the bars and the respective work-holding pocket, and thereby, as already indicated, facilitate the introduction of the work.

Suitable means for automatically effecting the discharge of the work after being ground, as hereinbefore described, is provided, and is preferably as follows: At any suitable point between the place at which the work is ground and the place at which the work is introduced into the respective work-holding pocket is located a relatively stationary incline N , that is also provided in any suitable manner—such, for instance, as upon a lug II^2 , formed upon carriage or slide II —and whose location and trend is such that bars K shall during their revolution between the point of grinding and the place of introducing the work be engaged by said incline and pushed outwardly and thereby separate the heads of said bars from the work, permitting the latter to be positively removed from the respective pocket by means of a stationary finger O , that extends into recess g^2 and is adapted to engage the back side of the work, the location of said finger being adjacent to the point where heads K' of bars K are separated from the work by means of incline N , and said finger being arranged at such an angle or inclination to the periphery of the work-holder that the work shall be positively removed from the respective pocket during the further revolution of the work,

annular recess g^2 in the work-holder having the depth required to accommodate the location of the free end of work-removing finger O at the inner side of the path through which the work is revolved.

As already indicated, the work-holder is borne by a carriage or slide H, and said slide or carriage is adjustable toward and from the grinding-surface, said slide or carriage being constructed to engage guideways a , formed upon and arranged longitudinally of the supporting-frame. Said carriage or slide is operatively connected in any approved manner with a screw P, that engages the threads of a nut Q, rigid with the supporting-frame, and terminates at its outer end in a hand-wheel P' for turning the screw. Hence it will be observed that the slide or carriage, and consequently the work-holder, is adjustable toward and from the grinding-surface according as screw P is turned in the one direction or the other.

As already indicated, upright shaft G^2 is operatively connected with driving-shaft B, and the means employed for establishing said operative connection is preferably as follows: A worm-wheel G^3 is operatively mounted upon shaft G^2 below slide or carriage H and meshes with a worm R, formed upon a shaft R', that is supported by the supporting-frame in any approved manner and is operatively connected—for instance, by means of a suitable system of shafting, pulleys, and belting—with driving-shaft B, preferably in such a manner as to cause the grinding-surface and work to be revolved in the directions indicated by the arrows, and the length of worm R of course is such as to accommodate the movement of worm-wheel in the adjustment of the work-holder relative to the grinding-surface.

I would here remark that it is obvious that the construction and arrangement of parts composing my improved machine might be changed more or less without departing from the spirit and purpose of my invention.

What I claim is—

1. In a grinding-machine, the combination with suitably-actuated revolving grinding-surface and a suitably-actuated hollow work-holder for conducting the work to the grinding-surface and provided with work-receiving pockets formed within and arranged transversely of its periphery, of a longitudinally-movable bar K extending through the peripheral shell of the work-holder adjacent to each work-receiving pocket and provided with a head K' adapted to engage the outer side of the work and retain the latter in place within the respective work-holding pocket, a spring acting to retain said bar in its operative position, and suitable means for actuating said bar outwardly at the place at which the work is introduced, substantially as and for the purpose set forth.

2. In a grinding-machine, the combination with a suitably-actuated revolving grinding-

surface and a suitably-actuated rotary hollow work-holder for conducting the work to the grinding-surface, and provided, upon its periphery, with pockets for holding the work, of a bar K arranged radially of the work-holder adjacent to each work-holding pocket and extending through the peripheral shell of the work-holder and provided with a head K' at its outer end, a spiral spring K^2 confined upon each bar K at the inner side of the peripheral shell of the work-holder, and suitable means for actuating said bar outwardly, all arranged and operating substantially as shown, for the purpose specified.

3. In a grinding-machine, the combination with a suitably-supported rotary grinding-surface and a suitably-actuated work-holder provided with pockets for receiving the work to be ground and adapted to conduct the work to the grinding-surface, of a longitudinally-movable bar adjacent to each work-holding pocket, said bar being provided with a head adapted to engage the outer side of the work and retain the latter in place within the respective work-holding pocket, suitable means acting to retain said head in its operative position, and a suitably-supported spring located at any suitable point between the place at which the work is introduced into the work-holding pocket and the point at which the grinding operation takes place, said spring being adapted to bear upon the work as the latter is revolved past the spring and thereby positively and firmly seat the work in the respective work-holding pocket preparatory to the grinding operation, substantially as set forth.

4. In a grinding-machine, the combination of a suitably-supported rotary grinding-surface and a suitably-supported rotary work-holder provided with an annular rim or ring g having, upon its external periphery and at suitable intervals, recesses or pockets for receiving the work to be ground, means for engaging the outer side of the work and holding the latter to its seat in the respective work-holding pocket preparatory to its engagement with the grinding-surface, and means for automatically effecting the discharge of the work after the grinding operation, substantially as set forth.

5. In a grinding-machine, the combination of a suitably-supported rotary grinding-surface; a suitably-supported rotary work-holder provided with an annular ring or rim g having upon its external periphery recesses or pockets g' for receiving the work to be ground and the annular recess g^2 at one end of said pockets, said annular recess having a greater depth than the work-holding pockets; means for engaging the outer side of the work and holding the latter to its seat in the respective work-holding pocket preparatory to its engagement with the grinding-surface; a finger or suitable device extending into said annular recess at the inner side of the path of the

travel of the work during the revolution of
the latter from the grinding-surface and
adapted to eject the work from the work-
holder, and suitable means for causing the
5 aforesaid work-holding means to release the
work after the grinding operation to enable
the aforesaid ejecting device to perform its
function, substantially as set forth.

In testimony whereof I sign this specifica-
tion, in the presence of two witnesses, this 10
31st day of October, 1894.

HORACE S. BUCKLAND.

Witnesses:

C. H. DORER,

ELLA E. TILDEN.