P. H. ROOT.

GRINDING MACHINE.

APPLICATION FILED MAR. 1, 1913.

1,077,306.

Patented Nov. 4, 1913.

2 SHEETS—SHEET 1.

Fig. 1.

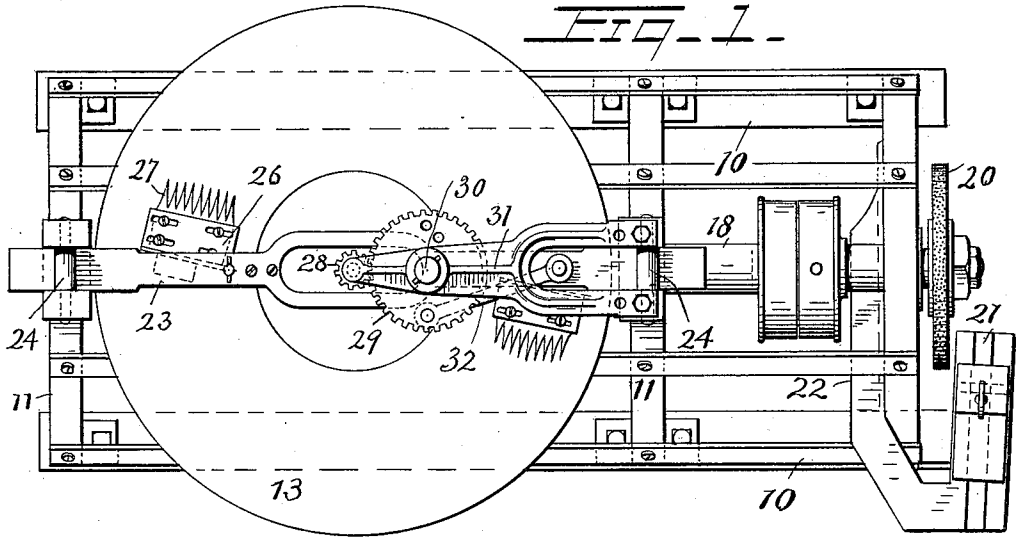
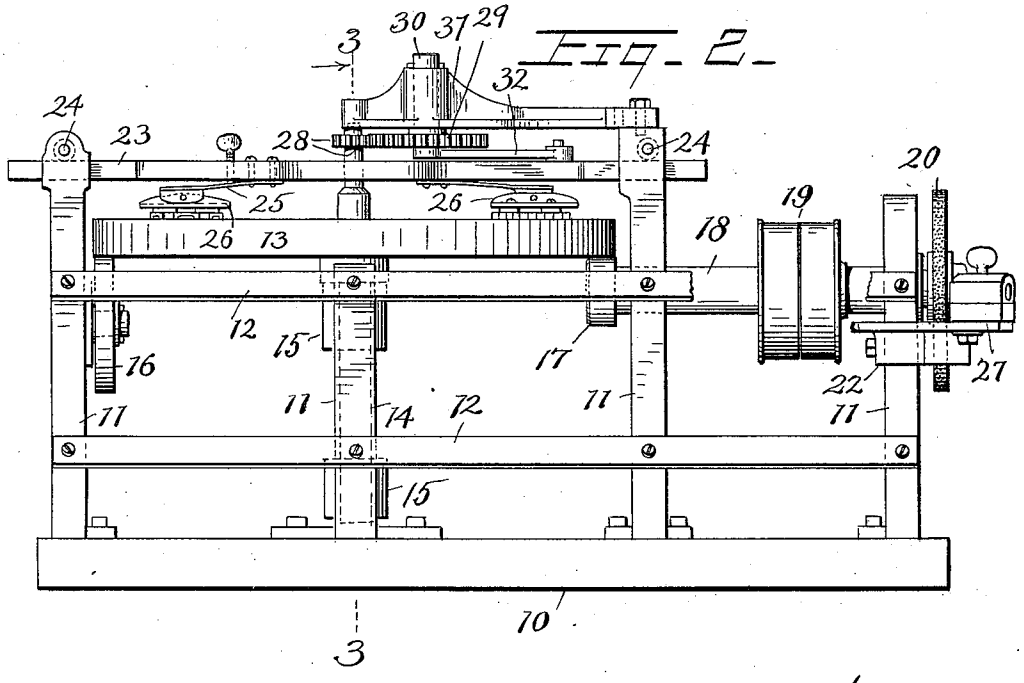


Fig. 2.



Witnesses:
E. B. Gilchrist
H. C. Hubbard

Inventor
Percy H. Root
by Thurston & Kwis
Attys.

COLUMBIA PLANOGRAPH CO., WASHINGTON, D. C.

P. H. ROOT.

GRINDING MACHINE.

APPLICATION FILED MAR. 1, 1913.

1,077,306.

Patented Nov. 4, 1913.

2 SHEETS—SHEET 2.

Fig. 3.

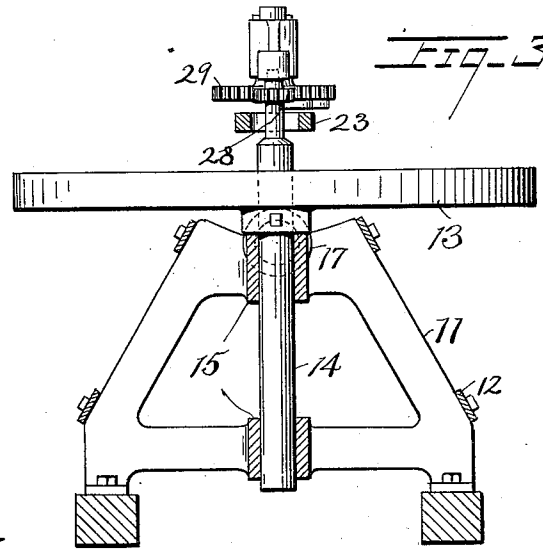


Fig. 4.

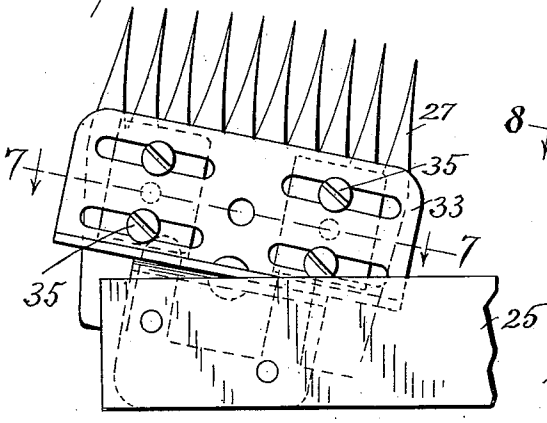
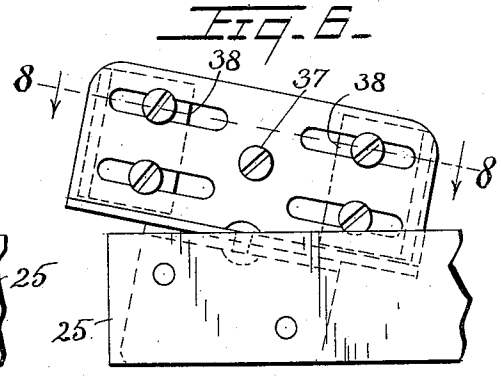


Fig. 6.



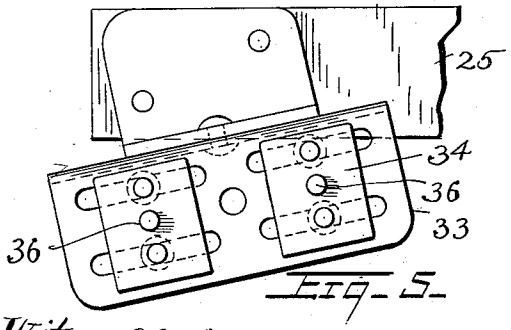


Fig. 5.

Fig. 7.

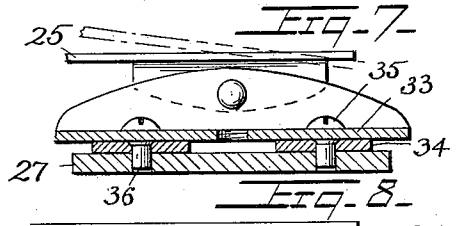
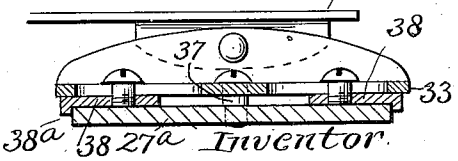


Fig. 8.



Witnesses
E. B. Gilchrist.
H. C. Hubbard.

Inventor.
Percy H. Root
by Thurston & Kwis
Attys.

UNITED STATES PATENT OFFICE.

PERCY H. ROOT, OF PLYMOUTH, OHIO.

GRINDING-MACHINE.

1,077,306. Specification of Letters Patent. Patented Nov. 4, 1913.

Application filed March 1, 1913. Serial No. 751,415.

To all whom it may concern:

Be it known that I, PERCY H. ROOT, a citizen of the United States, residing at Plymouth, in the county of Richland and State of Ohio, have invented a certain new and useful Improvement in Grinding-Machines, of which the following is a full, clear, and exact description.

This invention relates to grinding machines of the general type disclosed in my prior patent for grinding machine, No. 1,044,575, issued Nov. 19th, 1912.

The invention relates particularly to the workholder and to the means for reciprocating the same, and has for one of its objects to provide between the workholder and the rotary grinding disk, or the spindle to which the disk is secured, reciprocating mechanism by which the workholder is positively actuated, and in timed relationship with respect to the grinding disk.

Further, the invention aims to provide for reciprocating the workholder, positive driving or actuating means, which does not require a reciprocating arm or other device which extends about or around the periphery of the grinding disk from below the disk, where the power is applied, to a point above the disk or at the side thereof, at which the workholder is reciprocated.

In another respect, the invention aims to provide a simple and effective form of work holder which holds the work down onto the face of the grinding disk, and which has a range of adjustment to enable the holder to receive or accommodate work of varying dimensions, especially cutter blades of various widths.

My invention may be briefly summarized as consisting in certain novel details of construction and combinations and arrangements of parts which will be described in the specification and set forth in the appended claims.

In the drawings, Figure 1 is a top plan view of a grinding machine embodying my improvements; Fig. 2 is a side view of the same; Fig. 3 is a sectional view substantially along the line 3—3 of Fig. 2, with the grinding disk shown in elevation; Fig. 4 is a top plan view on an enlarged scale of a portion of the workholder to which the work is secured; Fig. 5 is a bottom view of the same with the work removed from the holder; Fig. 6 is a view, similar to Fig. 4, showing a slight modification, and with the work removed from the holder; Fig. 7 is a sectional view substantially along the line 7—7 of Fig. 4, and Fig. 8 is a similar sectional view substantially along the line 8—8 of Fig. 6.

Referring now to the drawings, it will be seen that the machine includes a base 10 which in this case consists of a pair of parallel bars or beams, and a suitable frame or framework including a plurality of upright substantially V-shaped brackets 11, which are secured to the base and are connected together by suitable bracing strips 12. The work is ground upon the top face of a horizontal rotary grinding disk 13, which is preferably a metal disk adapted to be provided on its upper face with a grinding paste for grinding the work, which may consist of blades of various kinds of cutting implements. This grinding disk is secured to a vertical spindle 14 which projects above and below the disk, the part above the disk being provided for a purpose to be presently referred to, and the part below being mounted for rotary movement in bearings 15, of one of the brackets 11.

It is immaterial, as far as the present invention is concerned, in what manner or by what specific mechanism the disk 13 is driven. In the present case, however, the disk rests and is partly supported upon a pair of rollers 16 and 17, the latter of which is secured to a driving shaft 18 having loose and tight pulleys 19, which may be engaged in the well known manner by a driving belt. The grinding disk is therefore driven frictionally or by the frictional driving engagement of the wheel 17 on the lower side or face of the grinding disk. The outer end of the shaft may be provided with a rough-grinding disk 20 on which the work may be ground preliminarily to the grinding which is done on the grinding disk 13. While the work is rough ground on the grinding disk 20, it may be supported on a suitable workholder 21, carried by an arm 22, secured to the frame work of the machine.

Above the grinding disk is a horizontal reciprocating workholding bar or slide 23, which extends across the top of the grinding disk in the center plane thereof. This bar 23 is supported for reciprocating movement in the upper ends of two of the brackets, as shown, the latter having at their upper ends rollers 24, which are engaged by the top face of the bar. The bar 23 has secured to its

lower side, yieldable elastic spring strips or arms 25, to the free ends of which are pivotally secured holders 26, which hold the work 27 during the grinding operation. These spring arms 25 press the work down onto the face of the grinding disk and hold the reciprocating bar 23 up against the rollers 24. The construction of the work holding members 26 will be explained more fully later. It will be observed by reference to Figs. 1 and 3, that the reciprocating bar 23 is provided, substantially midway between its ends, with an enlarged portion having an elongated slot through which the upper part of the spindle projects, and which allows the bar to be reciprocated with reference to said spindle and grinding disk 13.

In my prior patent above referred to, the work holding rod or bar is reciprocated by mechanism including a friction drive wheel which engages and is driven by the rotary grinding disk. In the present case, I provide a driving mechanism which is positively connected to the spindle, and reciprocates the same in positive timed relationship with respect to the spindle and the disk 13. In the present embodiment of my invention, the upper part of the spindle 14 is provided with a gear 28 which engages and drives a larger gear 29 carried by a vertical spindle 30, which is supported in a bearing provided in an arm 31 which is located above the bar 23, and which at one end is secured to one of the brackets 11 and at its opposite end has a bearing for the reduced upper end of the spindle 14 which is thus centered on said arm 31. Reciprocating movement is transmitted to the bar 23 by a horizontally arranged crank 32 which is located between the gear wheel 29 and the reciprocating bar 23, and which at one end has a pivotal connection with the bar and at its opposite end has a pivotal connection with the gear wheel 29 at an off-center point. The gear wheel 29 may have several holes or openings located different distances from the center of the gear wheel, and in any one of which the pin connecting the gear with the crank arm may be inserted. This allows for variation in the throw or length of stroke of the bar 23.

Reference is now had to Figs. 4 to 8, where the details of the workholder proper are shown. The workholder 26 previously referred to, comprises a plate 33 which has a pivotal connection with the elastic strip 25, so as to permit the work to adapt itself to irregularities of the grinding disk.

In the modification disclosed in Figs. 4, 5 and 7, the plate 33 has adjustably secured to its lower side a pair of smaller plates 34 which are secured to the plate 33 by screws 35, which extend through elongated slots in the plate 33. These pin and slot connections allow the two smaller plates 34 on the lower side of the plate 33 to be adjusted toward and away from each other. The plates 34 are, in the modification now being described, provided with downwardly extending pins 36, one depending from the center of each plate 34, which pins are adapted to be inserted in openings provided in the cutter blades or work 27 previously referred to. It is generally the case that blades or cutters which are adapted to be ground are provided with either a central opening or with the two openings. The structure just described is adapted to accommodate the blades having the two openings. These two pins prevent relative movement in any direction between the work and the holder, and the adjustable connection between the plates 34 and the plate 33 adapts the holder for blades of different widths or of different spacings of the said openings.

The construction shown in Figs. 6 and 8 is adapted for those blades having the single central opening. In order that blades of this character may be properly held in the holder, a centralizing pin 37 is secured in a central opening of the plate 33. Then plates 38 slightly different from the plates 34 are secured to the plate 33 in the same manner as previously described, *i. e.*, by screws which pass through elongated slots in the plate 33. The plates 38 have at their ends short downwardly extending flanges 38^a constituting abutments, which together with the central pin or screw 37 which extends in the central opening of the work (here designated 27^a) effectively hold the work against movement in any direction relative to the workholder. At the same time, this workholder has the requisite range of adjustment.

Having thus described my invention, what I claim is:

1. In combination in a grinding machine, a rotary grinding disk, a reciprocable work-holding member arranged at one side of the disk, and positive driving means between the said disk and the said member for reciprocating the latter, said driving means being located wholly at one side of the disk.

2. In combination in a grinding machine, a rotary grinding disk, a reciprocable work-holding member at one side of the disk, a spindle extending outwardly from the disk, and mechanism connected to the said spindle and to said member for reciprocating the member.

3. In combination in a grinding machine, a frame, a rotary grinding disk supported thereby, a reciprocable member arranged at one side of the disk, a spindle extending outwardly from the disk, and means for positively actuating said reciprocable member comprising a gear connected to the spindle, a second gear engaging the first gear, and a crank arm connected to an off center point

of the second gear and connected to said reciprocable member.

4. In combination in a grinding machine, a rotary grinding disk, a work holding support arranged at the side of the disk, a workholder between the disk and said support, and connected to the latter, said workholder having a pair of work-engaging members which are relatively adjustable toward and away from each other.

5. In combination in a grinding machine, a rotary grinding disk, a workholding member arranged at the side of the disk, and means connected thereto for holding the work and for pressing the same against the disk comprising a plate having a plurality of work engaging abutments relatively adjustable toward and away from each other, at least one of said abutments comprising a pin adapted to be inserted in an opening in the work.

In testimony whereof, I hereunto affix my signature in the presence of two witnesses.

PERCY H. ROOT.

Witnesses:
J. A. ROOT,
E. H. STEPHENS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."