A. JOHNSTON.

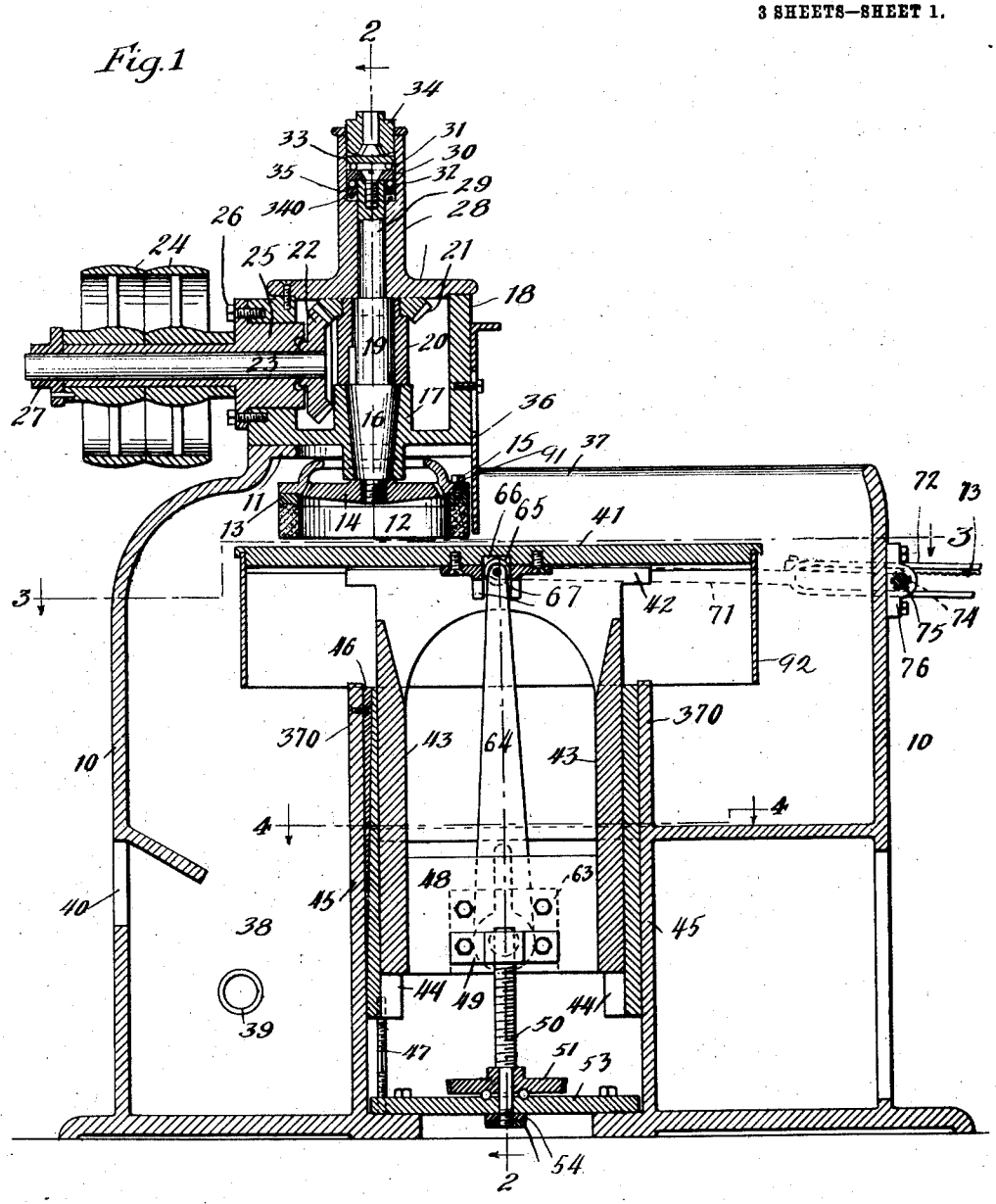
GRINDING MACHINE.

APPLICATION FILED MAR. 18, 1907.

901,909. Patented Oct. 20, 1908.

3 SHEETS—SHEET 1.

Fig. 1



Witnesses:

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Inventor:

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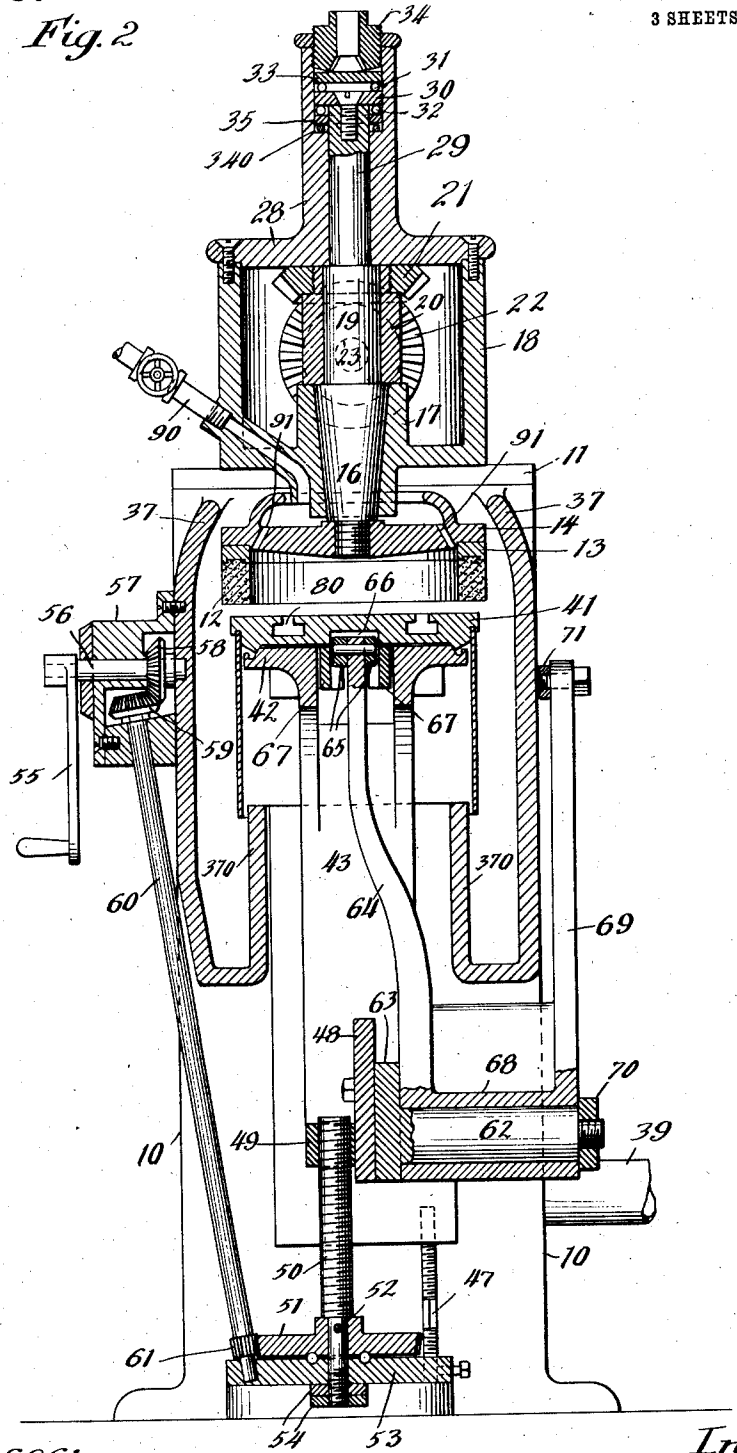
3 SHEETS—SHEET 2.

Fig. 2



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3 SHEETS—SHEET 3.

Fig. 3

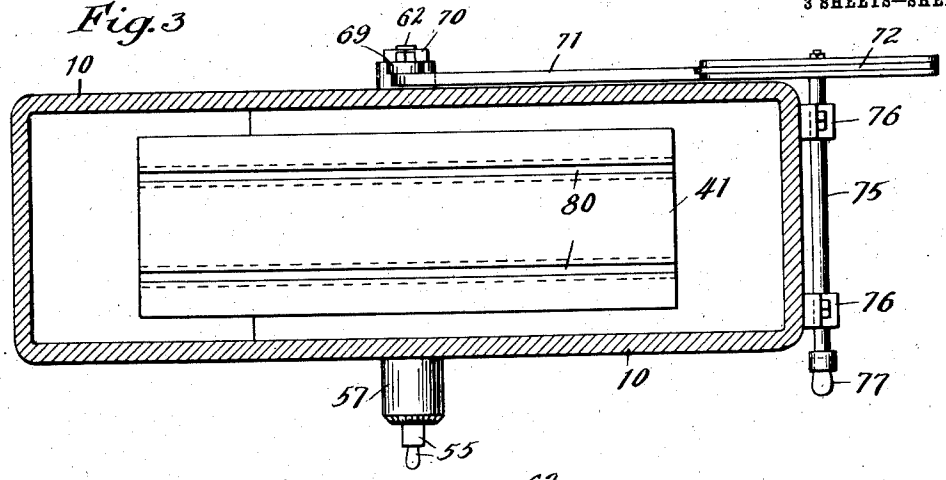


Fig. 4

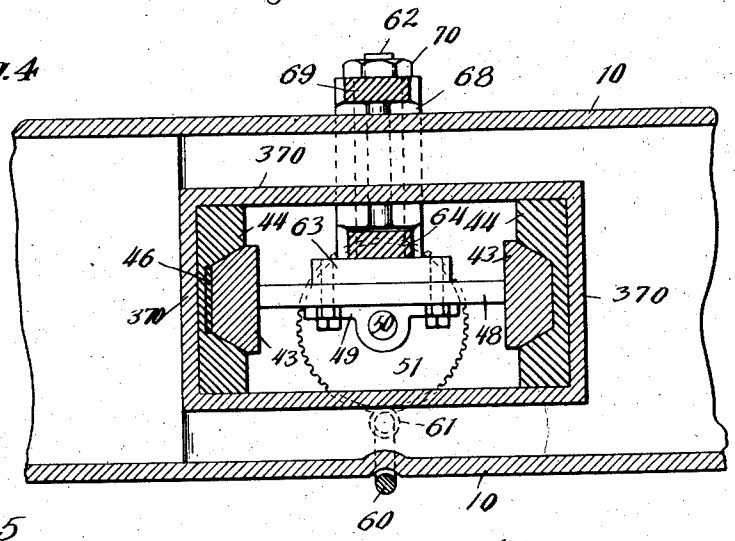


Fig. 5

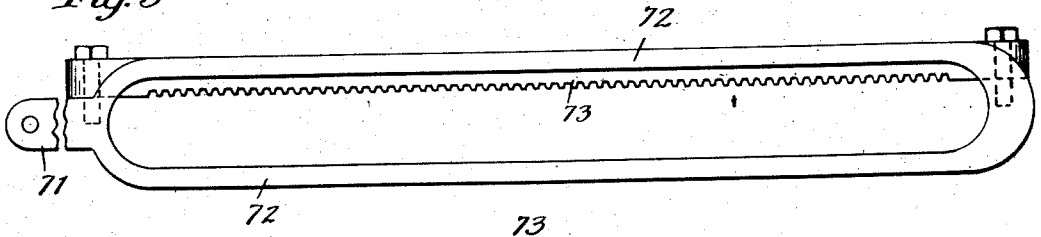
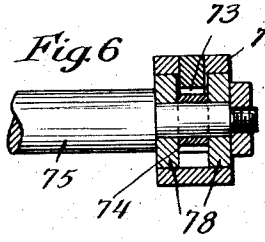


Fig. 6



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UNITED STATES PATENT OFFICE.

ALLEN JOHNSTON, OF OTTUMWA, IOWA.

GRINDING-MACHINE.

No. 901,909. Specification of Letters Patent. Patented Oct. 20, 1908.

Application filed March 18, 1907. Serial No. 362,890.

To all whom it may concern:

Be it known that I, ALLEN JOHNSTON, a citizen of the United States, residing in Ottumwa, in the county of Wapello and State of Iowa, have invented a new and useful Improvement in Grinding-Machines, of which the following is a specification.

This invention relates to the construction of grinding machines employing cup shaped or ring grinding wheels, and is a modification of and in some respects an improvement upon the machine shown in my Patent No. 504,389 of Sept. 5th. 1893.

The general object of the invention which is contained in the construction of the machine hereinafter described is to facilitate the grinding of iron and steel surfaces, to improve the character of the work and to effect an economy in the operation. As in my said patent, the cup shaped or ring grinder is supported in an inverted position so that its grinding surface is underneath, and the work holder is beneath the wheel, but the work holder instead of being stationary is made movable and adapted to carry the work to and fro past the grinder, and the grinder is stationary as to location, the machine in these respects being different from the patented machine.

The invention also includes a swinging actuating device for the work holder and other novel features, all of which are fully described below and illustrated in the accompanying drawing forming a part of this specification.

In said drawing, Figure 1 is a longitudinal section of the invention. Figs. 2, 3, and 4 are sections on the lines 2—2, 3—3 and 4—4 respectively of Fig. 1. Fig. 5 is a detail elevation of the rack for swinging the work holder and Fig. 6 is a detail section of the device for operating said rack.

In said drawing, 10 represents the main frame of the machine, and is provided with a horizontal portion or table 11 upon which the grinding wheel or ring and its actuating devices are supported. The ring is shown at 12 and it is dovetailed to a metal ring 13 which is secured to a disk 14 in any suitable way as for instance, by the screws 15. The disk receives at its center the threaded end of the grinder spindle 16. This spindle at its lower end is made tapering and is supported in a bearing 17 in a housing 18 resting on the table 11. Above the tapered bearing portion of the spindle is a straight portion 19 integral therewith, and surrounded by a sleeve 20 keyed to the part 19. This sleeve carries a beveled pinion 21 which meshes with another like pinion 22 on a shaft 23 carrying the fast and loose pulleys 24. Said shaft is sustained by a long bearing 25, having flanges by which it is bolted to the housing 18, as shown at 26. The pulleys are confined on the shaft 23 by a nut 27. On top of the housing 18 is a cap 28, in which the upper section of the grinder spindle 29 is journaled, and in this cap is located a ring 30 rigid on said section 29 and confined between upper and lower series of balls 31 and 32. The upper series of balls is arranged under a washer 33 confined in the cap by a screw plug 34 and the under series is located upon a washer 35 loose in the cap and supported by springs 340. With this construction, the upward end thrust on the spindle is effectually resisted, and the springs 340 prevent the tapered part of the spindle from becoming wedged in its bearing.

At that side of the grinder toward the open space through which the work holder moves, the grinder is provided with a shield 36 as shown in Fig. 1, intended to prevent the water being spattered or thrown from the wheel into said space. The frame at the top of each of the longer sides approaches closely to the grinder, as plainly seen at 37, Fig. 2, and each of the said sides is provided at the bottom with inwardly and upwardly turned flanges 370 adapted to catch the water from the wheel and conduct it to the end 38 of the machine, where a deep receptacle is formed into which it may fall and flow out at the pipe 39. 40 is an opening giving access to this portion of the frame for the removal of solid matter.

Centrally of the main frame and under the grinding wheel is located the work holder 41. It is adapted to slide on ways 42 having depending members 43 adjustable in vertical ways formed in the vertical pieces 44 confined between the ends of an interior frame 45 of which the flanges 370 may form a part. A wedge 46 is inserted between one of said vertical pieces 44 and the end of the frame and is adapted when the adjacent piece 44 is adjusted by the screw 47, to take up the wear occurring between the ways and the depending members 43. The members 43 are connected by a cross brace 48 and to this cross brace is bolted a plate 49 having a vertical threaded opening therein to receive the

adjusting screw 50 whereby the work holder is raised and lowered relative to the wheel. The screw 50 is supported on the hub of a pinion 51 and is keyed thereto by a pin 52 passing through a reduced portion of the screw. The pinion is supported by balls upon a base 53 and the reduced portion of the screw is extended through said base and provided with locking nuts 54 below the same. The turning of the pinion to effect the adjustment of the work holder is effected by a crank 55 on a shaft 56 supported in a bracket 57 attached to the main frame and carrying a bevel gear 58 meshing with another like gear 59 on the upper end of a shaft 60 provided at its lower end with a pinion 61 meshing with pinion 51.

At 62 is a journal provided with an integral end plate 63 whereby it is secured to the said cross member 48. Upon this journal 62 is mounted a vibrating arm 64, the upper end whereof is provided with anti-friction rollers 65 which are entered in a recess 66 formed in the under side of the work holder and between two angle pieces 67 bolted to the work holder. The vibrating arm has a sleeve 68 surrounding the journal 62 and on the outer end of this sleeve is an upwardly extending arm 69 through which the sleeve and vibrating arm may be actuated. A nut 70 confines the sleeve upon the journal. Attached to the upper end of the lever 69 by an arm 71 is a rack frame 72, the teeth whereof are shown at 73. In this rack frame is a pinion 74 carried upon the end of a shaft 75 and provided with stationary bearings 76 at the end of the machine and operated by a hand crank 77. At each side of the pinion 74 are rollers 78 which bear upon the untoothed portions of the rack frame. By turning the shaft 75, it will be seen that the rack frame will be moved in such manner as to vibrate the arm 69 and this carries a like movement to the vibrating arm 64 which in turn moves the work holder to and fro relative to the grinder. The work holder is provided with grooves 80 adapted to permit the use of any ordinary form of chuck.

Water is supplied to the grinder by the pipe 90, the mouth of which discharges on top of the grinder supporting disk 14 which is flanged as shown so that it is adapted to hold water which can only escape from it by way of a series of eccentrically located passages 91 extending down though the disk. The passages 91 conduct the water to the interior of the grinder and deliver it near the inner wall thereof, from whence the centrifugal force will carry it outward and between the lower or acting edge of the grinder and the face of the work being ground.

A skirt 92 is attached to the work holder and extends all around the same, and depends below the top edge of the flanges 370. By means of it I prevent access by the water to the working parts immediately below the table. It will also be noted that the arms 64 and 69 and sleeve 68 form a U shaped lever for actuating the work holder, and that the only part of it exposed to the water and grit from the grinder is the bearing or journal 62. The sleeve, however, protects this part very thoroughly.

I claim:—

1. The combination in a grinding machine, of a reciprocating work holding table, a vertical spindle stationarily located, and a ring grinder supported by said spindle in an inverted position, and having means for admitting the water through its top, of means for rotating the grinder, a U shaped lever for actuating the table, means for protecting the journal of said lever from the water and grit, means for supplying the grinder with water.

2. The combination in a grinding machine, of a reciprocating work holding table, a vertical spindle stationarily located, and a ring grinder supported by said spindle in an inverted position, and having means for admitting the water through its top, of means for rotating the grinder, means for supplying it with water, a U shaped lever pivoted at its bottom, for reciprocating the table and a hand operated device for actuating the lever.

3. The combination in a grinding machine of a horizontal work holding table adapted to reciprocate below the grinder, a stationarily located ring grinder supported in an inverted position above the table, means for rotating the grinder, a swinging arm or lever for reciprocating the table, a second swinging arm rigidly connected to and moving in unison with the first mentioned one, a rack attached to said second arm, and extending at right angles therefrom, a pinion meshing with said rack, and a shaft supported in stationary bearings and carrying said pinion.

4. The combination in a grinding machine, of a horizontal work holding table adapted to reciprocate below the grinder, a support for said table whereby it may be vertically adjusted, a stationarily located inverted ring grinder, having water passages leading from its top to its interior, a vertical spindle carrying said grinder, means for supplying water to the top of the grinder, means for rotating the grinder, and means for reciprocating the table.

5. The combination with the work holder table, of the slide ways 42, the depending members 43, the vertical ways 44, the cross brace 48 connecting members 43, the adjusting screw 50, the wedge 46, the surrounding frame, and means for adjusting the ways 44 relative to the wedge.

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Witnesses:
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A. G. HARROW.