F. E. GARDNER.

DISK GRINDER.

APPLICATION FILED MAY 7, 1915.

1,207,535.

Patented Dec. 5, 1916.

2 SHEETS—SHEET 1.

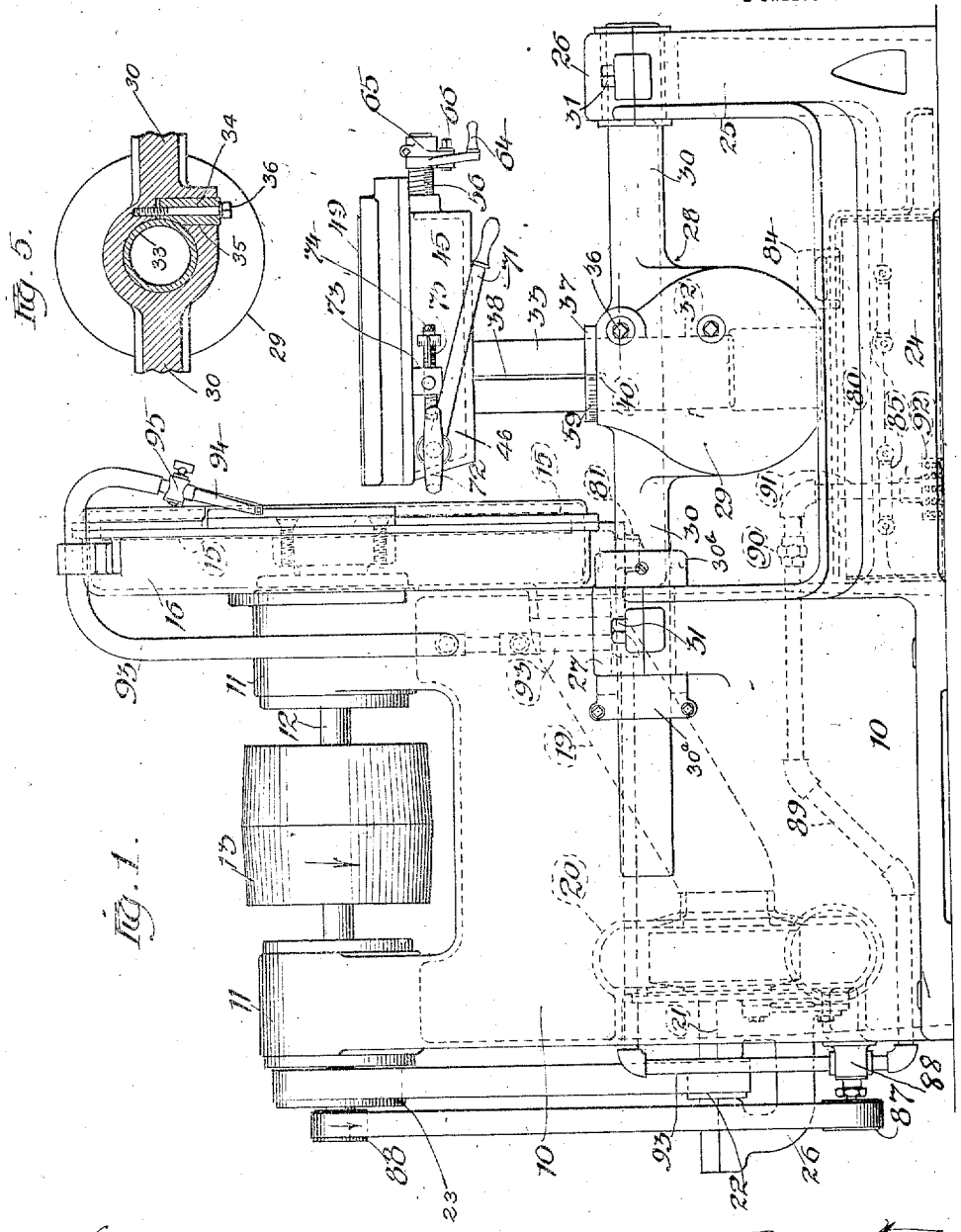


Fig. 1.

Fig. 5.

Witness:
Beulah Abbott
Margaret Mann

Inventor:
Frederic E. Gardner.
By Miller Chindahl
Atty

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2 SHEETS—SHEET 2.

Fig. 3.

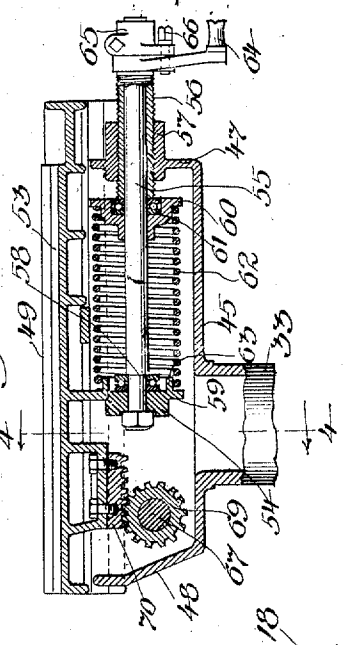


Fig. 4.

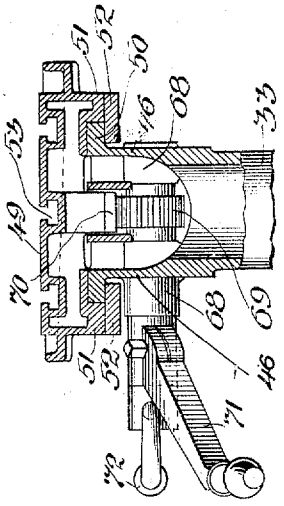
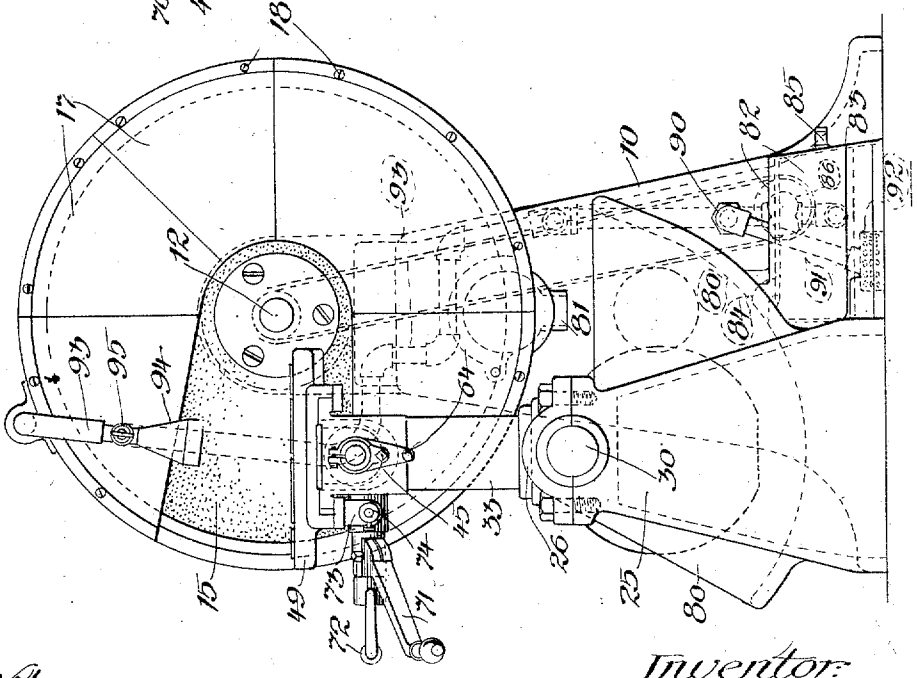


Fig. 2.



Witness:
Beulah Abbott
Margaret Mann

Inventor:
Frederic E. Gardner.
By Miller Chindahl
Attys.

UNITED STATES PATENT OFFICE.

FREDERIC E. GARDNER, OF BELOIT, WISCONSIN, ASSIGNOR OF ONE-HALF TO LOUIS WALDO THOMPSON, OF BELOIT, WISCONSIN.

DISK GRINDER.

1,207,535. Specification of Letters Patent. Patented Dec. 5, 1916.

Application filed May 7, 1915. Serial No. 26,475.

To all whom it may concern:

Be it known that I, FREDERIC E. GARDNER, a citizen of the United States, residing at Beloit, in the county of Rock and State of Wisconsin, have invented certain new and useful Improvements in Disk Grinders, of which the following is a specification.

The general object of the present invention is two-fold, first, to produce a machine which will give improved results, and second, to provide for the betterment of the operating conditions and general welfare of the workmen.

Along the line of the first mentioned phase, the invention aims to arrive at a construction which is strong and durable so that it is well adapted for heavy duty and so that its accuracy will not be impaired by wear. To this end the general type of supporting means for the work-table heretofore used by all manufacturers has been departed from materially and the work-table itself has been improved in several particulars.

In following out the second phase of my general object, a heavy compression spring is incorporated in the work-table in such a manner that its force may be used to press, or assist the operator to press, the work against the grinding wheel. Furthermore, there is embodied in the machine a unitary or self-contained water-supplying system for use in wet grinding, and also an improved means for drawing off the dust in dry grinding.

The nature and objects of the invention in its more specific aspects will be fully understood from the following detailed description taken in connection with the accompanying drawings, in which:

Figure 1 is a side elevation of a disk grinder embodying the features of my invention. Fig. 2 is a front elevation thereof. Fig. 3 is a longitudinal central section through the work-table, and Fig. 4 is a transverse section therethrough. Fig. 5 is a horizontal sectional detail view illustrating the means for clamping the work-table-supporting pedestal.

The machine shown in the drawings represents the preferred embodiment of my invention and will be herein described in detail, without, however, intending to limit the invention to the construction disclosed. In the appended claims I aim to cover all modifications and equivalents falling within the scope of my invention.

A suitable base 10 has bearings 11 at its upper end in which is mounted the main shaft or arbor 12. A drive pulley 13 is mounted on said arbor between the bearings 11 and on the front end of the arbor is rigidly fixed a grinding wheel 15 which may be of any suitable form. This wheel is completely inclosed, except for a small space in front, by a housing or hood 16 stationarily mounted in the base, the front wall of the housing preferably consisting of a plurality of independent sector plates 17 which are removably secured in place by cap screws 18, an opening of suitable size being left adjacent to the work-table to permit the work to be moved against the grinding wheel. One or more of the sector plates 17 may be removed so as to expose a larger portion of the grinding wheel, if necessary or desirable, and, of course, all of the sections may be removed to permit renewal of the grinding disk or other repair of the wheel.

Within the base 10 is a conduit 19 which communicates at one end with the lower portion of the housing 16 and at its other end with an exhaust fan 20 located within the base and adapted for connection at its outlet to a suitable conduit (not shown), so that the fan may draw dust from around the grinding wheel and discharge it to a suitable place. The shaft 21 of the fan has a pulley 22 thereon which is arranged to be belted to a pulley 23 fixed on the main arbor 12. The lower portion of the base comprises a forward extension 24 and at the forward end of this extension is an upright support 25 having a bearing 26 at its upper end which is alined with a bearing 27 on the base proper. In these two bearings is mounted a rocker member 28 which carries the work-table. This member comprises a central enlargement 29 which serves as a counterbalancing weight for the work-table and two oppositely extending trunnions 30 which occupy the bearings 26 and 27 and may be rotatable therein. The two trunnions together constitute a unitary shaft. The central enlargement 29 has a vertical hole 32 which preferably passes therethrough and receives a hollow post or pedestal 33 on the upper end of which the work-table proper is carried. Means is provided for clamping the pedestal 33 in place so that it may, if desired, be adjusted to different heights and also different rotary positions

with respect to the weight 29. This means comprises a bearing block 34 movably mounted in an opening 35 in the weight 29 and having an arcuate face adapted to bear against the pedestal 33. A bolt 36 passes through the bearing block and is threaded in the weight 29, the head of the bolt overlying the bearing block so that when the bolt is rotated the block will be tightly jammed against the pedestal 33.

A collar 37 surrounds the pedestal above the weight 29 and has a key lying in a slot 38 in the pedestal, so that it is non-rotatable with respect thereto, but is capable of relative vertical adjustment so as to lie at all times on the top of the weight 29. This collar has a series of suitable graduation marks 39 thereon to coöperate with a mark 40 on the weight, so that the angle to which the pedestal 33 may be turned in the weight is conveniently indicated. In addition to the adjustment of the work-table afforded by vertically moving and by rotating the pedestal in its support, the work-table may be adjusted toward and from the grinding wheel 15 by sliding the trunnions 30 in their bearings. When the table has been adjusted to the desired position, the shaft 30 may be secured against sliding movement by means of a thrust collar 30^a and a collar 30^b fixed upon the shaft at opposite sides of the bearing 27.

By extending the base and providing the forward bearing 26 to support the forward end of the trunnion or shaft 30, a very marked improvement in the accuracy of the machine is attained. In prior disk grinders, the rear end only of the shaft was supported, and the work-table was mounted on a relatively short sleeve or bearing which surrounded the shaft and was rotatable thereon. In such a construction it is impossible to prevent slight springing of the forward end of the shaft and it is also impossible to prevent play of the short supporting sleeve or bearing on the shaft, and both of these movements are fatal to nice accuracy of work, because the movements are much exaggerated in the plane of the top of the work-table where the work is supported. In the present machine, the shaft is mounted in two bearings which are spaced a material distance apart and the shaft itself is arranged to rotate in the bearings, the work-table being rigidly fixed to the shaft so that both of the objectionable forms of looseness or movement above mentioned are completely eliminated. Furthermore, a construction is produced which will stand up under heavy duty and the accuracy of which will not be impaired by wear.

The work-table comprises a base 45, which, in the present instance, is cast integral with the upper end of the pedestal 33. The base comprises a bottom plate, and side walls 46 and end walls 47 and 48 rising from the edges thereof, thus providing a hollow housing. A table-top 49 is mounted on the upper side of the base 45 for horizontal sliding movement toward and away from the grinding wheel, the table being guided by suitable means such as outstanding flanges 50 on the upper edge of the side walls 46 which are engaged by depending flanges 51 on the top, the latter flanges carrying plates 52 to engage beneath the flanges 50. The upper face of the top is provided with a plurality of undercut or T slots 53 adapted to receive bolts for securing various work-supporting fixtures (not shown) to the table. The lower side of the table is provided with a downwardly projecting lug 54 located intermediate the ends of the table. In this lug is rotatably mounted one end of a shaft 55 which shaft is additionally supported in a sleeve 56 screw-threaded in a bearing 57 in the rear end wall 47 of the base. Adjacent to the lug 54 the shaft 55 has a shoulder 58 and between this shoulder and the lug is positioned a ball bearing 59. A collar 60 surrounds the shaft 55 adjacent to the inner end of the screw-threaded sleeve 56 and between the collar and the end of the sleeve is positioned a ball bearing 61. A strong coiled compression spring 62 surrounds the shaft 55 and bears at one end against the collar 60 and at its other end against the lug 54; the latter preferably having an annular flange 63 extending into the end of the spring.

A crank handle 64 is rigidly fixed on the screw-threaded sleeve 56, and a collar 65 is fixed on the outer end of the shaft 55. A bolt 66 is provided for rigidly connecting the collar and crank handle, if desired. When the two are not connected, rotation of the crank handle will serve to rotate the sleeve 56 and compress the spring 62. This is done only when it is desired to adjust the tension of the spring. When the crank handle and collar 65 are rigidly connected by the bolt 66, rotation of the crank handle will simultaneously rotate the shaft 55 and the sleeve 56 as a rigid unit with the result that the spring will be neutralized and the table top 49 will be fed toward the face of the grinding wheel by the screw sleeve 56. In this movement, the bearing 59 acts as a thrust bearing between the shoulder 58 on the shaft and the lug 54 on the table top.

A transverse shaft 67 is mounted in bearings 68 in the rear end of the side walls 46 and has fixed thereon within the base a pinion 69 which meshes with a short rack bar 70 fixed to the underside of the table top 49 at a point rearward from the depending lug 54. A hand lever 71 is adjustably fixed on the shaft 67 outside of the table base and provides means for rotating the pinion 69 so as to move the table top 49. A looped handle 72

is mounted upon the outer end of the shaft 67 and is adapted to be grasped by the left hand of the operator facing the machine for oscillating the work-table on the axis of the trunnions or shaft 30.

In the use of the machine, assuming the crank handle 64 and collar 65 to be free from each other, and further assuming that it is desired to place a new piece of work on the table for grinding, the hand lever 71 is swung down, which rotates the pinion 69 and thus moves the table-top 49 away from the grinding wheel. In this movement of the top, the lug 54 compresses the spring 62 and slides the shaft 55 in the sleeve 56, the collar 65 moving away from the crank handle 64. The piece of work is then placed in the fixture (not shown) on the table-top, and the hand lever 71 is then permitted to rise to allow the spring to move the table-top so as to carry the work thereon into engagement with the grinding wheel. The spring thus furnishes the grinding pressure, or, if desired, it may be supplemented by the operator pushing directly upon the rear end of the table-top or raising the hand lever 71 to press the top toward the grinding wheel through the medium of the pinion 69 and rack 70. In prior disk grinders, the grinding pressure was furnished entirely by the workmen pressing the work against the wheel, and this is very hard and tiresome work. The present invention relieves the operator of all or a portion of this labor.

On the side of the table-top 49, next to the operator, is a depending lug 73 (Fig. 2) located outside of the table-base 45 and in this lug is threaded a micrometer screw 74 arranged to coöperate with a stationary indicator blade 75 fixed to the lug, the forward end of said screw being adapted to abut against a stop on the base 45 to limit the forward movement of the table-top.

The front portion or extension 24 of the base is shaped to provide a basin 80 adapted to catch water or compound escaping through an outlet 81 from the lower portion of the hood or housing 16 surrounding the grinding wheel. The extension or base is also provided, at the side opposite that where the operator stands, with walls 82 forming a chamber adapted to receive a receptacle 83 into which the water from the basin 80 flows through a passage 84 in the basin wall. The receptacle 83 may be a sheet-metal pan provided with handles 85 so that it is adapted to be horizontally withdrawn from the inclosing walls 82 to permit of emptying the fluid therefrom and providing a supply of fresh fluid.

Means is provided for drawing fluid from the pan 83 and forcing it against the grinding wheel 15 or the work. This means comprises a pump 86 of any preferred construction, provided with a pulley 87 which is arranged to be belted to a pulley 88 fixed on the main arbor 12. The inlet to the pump is connected to a pipe 89 and the end of this pipe is connected by a removable coupling 90 to an angular pipe 91 which passes down through the top wall 82 and into the receptacle 83, the lower end of the pipe having a strainer 92 thereon to prevent sediment and foreign matter from being drawn into the pipe. The coupling 90 is provided for the purpose of permitting the pipe section 91 to be detached and raised out of the way to permit withdrawal of the receptacle 83. The outlet from the pump 86 is connected by a pipe 93 with a nozzle 94 located in front of the grinding wheel and adapted to direct a stream of fluid against the wheel or against the work as desired. The nozzle is preferably provided with a shut-off cock 95. For the sake of appearance, the pipes 89 and 93 are preferably inclosed within the base as far as possible. It will be seen that the same fluid is used over and over again and passes in a continuous or circuitous path and that the fluid-supplying means is embodied as a unitary part of the machine. The receptacle 83 is made removable so that a fresh supply of fluid may be conveniently provided at suitable intervals. The granular material worn off in the grinding operation collects in the basin 80 and may be conveniently scraped therefrom, since the basin is low at one side and shallow. The outlet passage 84 is located at some distance forward from the plane of the outlet 81 from the housing for the grinding wheel.

From the foregoing it will be apparent that I have produced a machine which is more accurate and durable and is also easier on the workman and more agreeable to operate than machines of the prior art.

I claim as my invention:

1. A disk grinder having, in combination, a base, a grinding wheel mounted therein, two bearings located a substantial distance apart, a rocker member comprising a shaft having its ends mounted in said bearings and a central depending counterweight located between the bearings and below the axis of the shaft, a work-table positioned in front of said driving wheel, and a pedestal supporting the work-table at its upper end and vertically adjustably mounted in said rocker member.

2. A grinding machine having, in combination, a rotary grinding wheel, a work-table located in front of the wheel and comprising a base, a top slidable on the base toward and away from the wheel, a spring tending to move the top toward the wheel, and means for moving the top away from the wheel against the action of said spring.

3. A grinding machine having, in combination, a grinding wheel, a work-table com-

prising a base, a member slidable with relation to the base toward and away from said wheel, means tending to move said member toward the wheel, and means for moving the member away from the wheel in opposition to the first mentioned means.

4. A grinding machine having, in combination, a rotary grinding wheel, a work-table mounted in front of the wheel and comprising a base, a work support slidable thereon toward and away from said wheel, and a coiled compression spring tending to move said work support toward the grinding wheel.

5. A grinding machine having, in combination, a work table comprising a base, a top slidable thereon and having a depending lug, and a coiled compression spring mounted within the base and beneath said top and bearing at one end against said lug, the other end of said spring bearing against a part on the base.

6. A grinding machine having, in combination, a work-table comprising a base, a work-support slidable thereon, a spring tending to move said work support in one direction, a rack fixed with relation to said support, a pinion mounted in said base and meshing with said rack, and means for rotating said pinion to move said support in the opposite direction against the action of said spring.

7. A grinding machine having, in combination, a work-table comprising a base, a work-support slidable thereon, a shaft rotatably mounted at one end in said support, a sleeve screw-threaded in the base and in which the other end of said shaft is rotatably mounted, a coiled compression spring surrounding said shaft and bearing at one end against said support, said sleeve being operatively associated with the opposite end of the spring to form an abutment, said shaft being longitudinally slidable in said sleeve when the spring is compressed, a collar on the outer end of said shaft arranged to limit the spring-caused movement of the shaft, the shaft and said sleeve being arranged to be rigidly connected together, and means for rotating said sleeve and shaft to effect a screw feed of said work support with reference to the base.

8. A grinding machine having, in combination, a grinding wheel, a work-table comprising a base, a work support slidable thereon, a rack-and-pinion connection between the base and the work support, a lever for actuating the rack and pinion to move the work support toward and away from the grinding wheel, a screw carried by the base, a crank on the screw, and a disengageable connection between the work support and the screw.

9. A grinding machine having, in combination, a work-table comprising a base, a work support slidable thereon, a shaft rotatably mounted at one end in said support, a sleeve screw-threaded in the base and in which the other end of said shaft is rotatably mounted, a spring bearing at one end against said support, said sleeve being operatively associated with the opposite end of the spring to form an abutment for the spring, means to limit the action of the spring, the shaft and said sleeve being arranged to be rigidly connected together, and a crank on the sleeve for rotating the sleeve.

10. A grinding machine having, in combination, a grinding wheel, a work-table comprising a base, a work support slidable thereon, a spring for moving the work support toward the grinding wheel, a rack-and-pinion connection between the base and the work support, a lever for actuating the rack and pinion to move the work support toward and away from the grinding wheel and for compressing the spring, a screw carried by the base, a crank on the screw, and means for connecting the work support to the screw whereby rotation of the screw will positively move the work support.

11. A grinding machine having, in combination, a rotary grinding wheel, a work-table comprising a base, a work support slidable thereon, a spring tending to move said work support toward the grinding wheel, a rack fixed with relation to said support, a pinion mounted in said base and meshing with said rack, and a hand lever for rotating said pinion to move said support toward and away from the grinding wheel.

12. A disk grinder having, in combination, a base, a grinding wheel mounted thereon, two bearings located a substantial distance apart, a rocker member comprising a shaft having its ends rotatably mounted in said bearings, and a central depending counterweight located between the bearings and below the axis of the shaft, said rocker member having an opening therethrough extending transversely of the axis of said shaft, a pedestal mounted in said opening for rotation and for longitudinal movement transversely of the axis of the shaft, and a work-table on the upper end of the pedestal.

In testimony whereof, I hereunto set my hand in the presence of two witnesses.

FREDERIC E. GARDNER.

In the presence of—
MAUD SAGE,
DON. VAN WART.