J. MILLER, JR.

SLIDING SPINDLE FOR GRINDING DISKS.

APPLICATION FILED JULY 16, 1907.

911,896.

Patented Feb. 9, 1909.

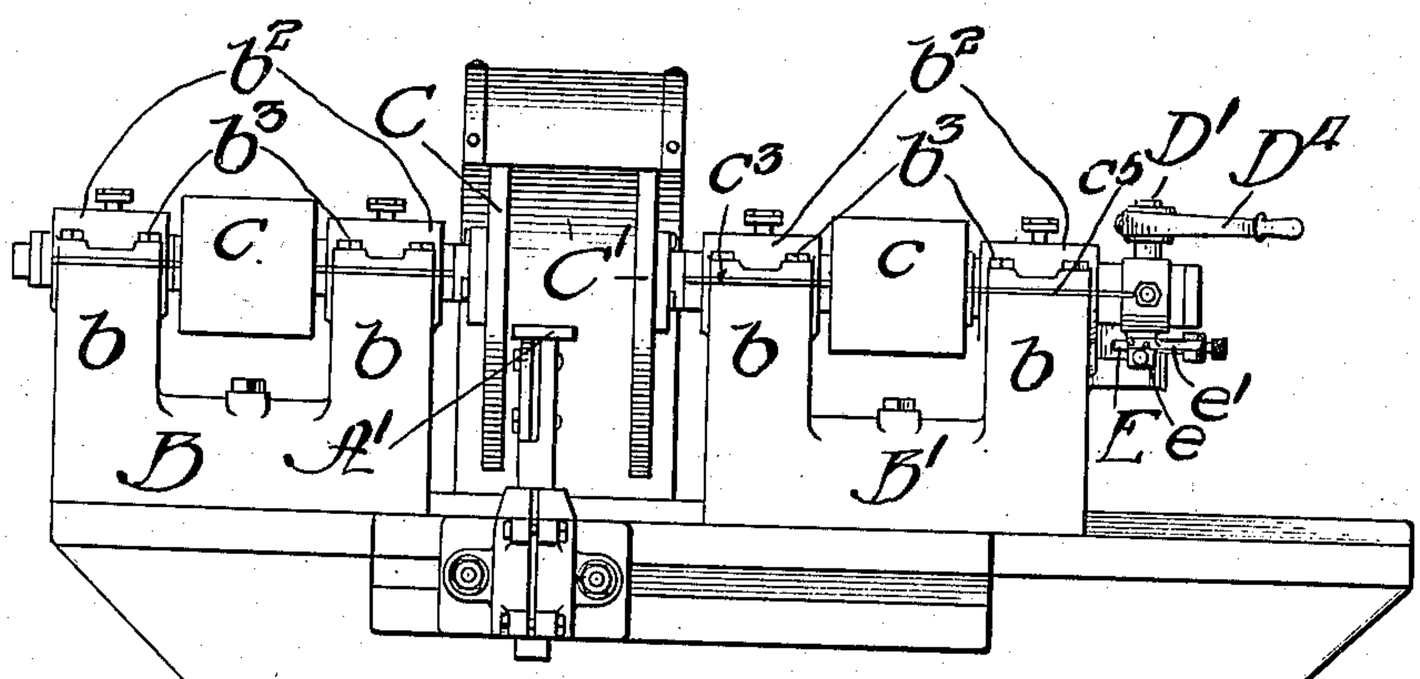

Fig. 1.

A

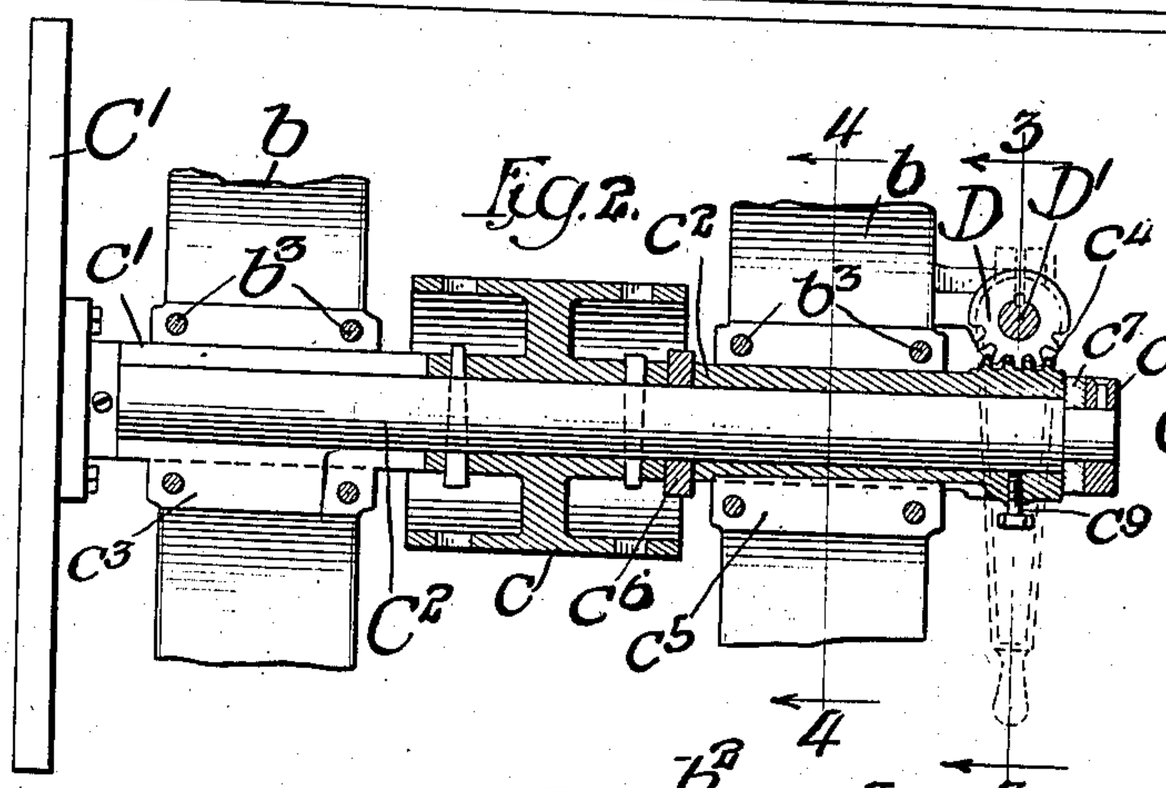

Fig. 2.

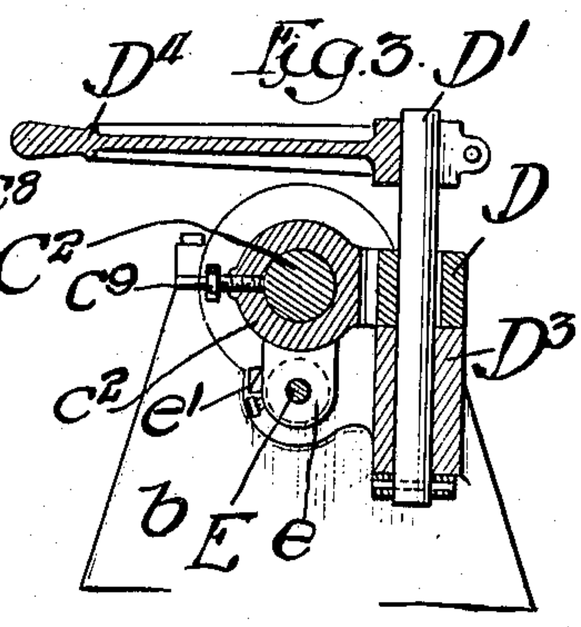

Fig. 3.

Witnesses:
F. H. Alfuds
G. R. Wilkins

Fig. 4.

Inventor:
John Miller Jr.
by Poole & Brown
Attys.

UNITED STATES PATENT OFFICE.

JOHN MILLER, JR., OF BELOIT, WISCONSIN, ASSIGNOR TO CHARLES H. BESLY, OF CHICAGO, ILLINOIS.

SLIDING SPINDLE FOR GRINDING-DISKS.

No. 911,896. Specification of Letters Patent. Patented Feb. 9, 1909.

Application filed July 16, 1907. Serial No. 383,956.

To all whom it may concern:

Be it known that I, JOHN MILLER, Jr., a citizen of the United States, and a resident of Beloit, in the county of Rock and State of Wisconsin, have invented certain new and useful Improvements in Sliding Spindles for Grinding-Disks; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to improvements in grinding or polishing machines, and more particularly to flat surface grinding machines, or what are generally known as disk grinders.

The invention relates more especially to means in a grinding machine by which a grinding disk may be moved bodily toward and from the work in the direction of the axis of rotation of the disk.

The invention consists in the matter hereinafter set forth and more particularly pointed out in the appended claims.

My invention may be better understood by reference to the accompanying drawings, in which,—

Figure 1 is a view in side elevation showing my improvement embodied in a grinding machine. Fig. 2 is a horizontal, axial section taken in the plane of the disk-supporting spindle of the machine. Fig. 3 is a vertical section, taken on the line 3—3 of Fig. 2. Fig. 4 is a vertical section, taken on line 4—4 of Fig. 2.

As shown in the drawings, A indicates the pedestal of a grinding machine provided with head-stocks B B^1 in which are journaled spindles or rotary arbors carrying at their inner or adjacent ends grinding disks C and C^1. The said disks C and C^1 are provided on their inner or adjacent faces with grinding surfaces and means are provided, here shown as comprising a vertically and horizontally adjustable work-table A^1, for supporting a piece of work between the said disks in such manner that two opposite faces thereof may be ground at the same time. One of said head stocks B^1 is horizontally movable in a direction parallel to the axis of its spindle in order to vary the distance between the faces of said grinding disks to accommodate pieces of work to be ground of different sizes. The general construction and arrangement of said movable head-stock is similar to that of the ordinary tail-stock of a lathe, it being arranged to slide longitudinally along the bed-plate of the grinding machine. Each of said head-stocks comprises two upright members *b b*, the upper ends of which are formed to provide journal boxes for the said disk-carrying spindle. The said journal boxes are horizontally divided, the upper parts or bearing caps b^2 being secured to the lower parts by stud-bolts b^3. Between the two journal boxes of each head-stock are mounted driving pulleys *c c* which are fixed to the two disk spindles or shafts.

The movable head-stock B^1 is provided with a longitudinally sliding spindle C^2 which is designed to be moved endwise in its bearings in order to carry the grinding disk C^1 towards the work or to withdraw it from the same. The means for giving sliding movement of the spindle C^2 in its bearings comprises features of construction as follows: c^1 c^2 indicate two bushings or sleeves surrounding the end portions of the spindle C^2. Said sleeves are arranged to slide longitudinally in the said journal boxes and are immovable endwise on the spindle so that the latter moves endwise with the sleeves, and the latter are non-rotative; the spindle being adapted to turn freely therein. In the construction illustrated, the said sleeve c^1 is longitudinally split or divided by a horizontal plane into semi-cylindric upper and lower portions which are separated a small distance along their forward meeting edges to form a longitudinal slot in which is arranged a spline c^3, said spline extending radially outwardly and being clamped between the upper and lower parts of the journal box, whereby said sleeve is prevented from rotating. The sleeve c^2 is made of one piece of metal and is not split, and said sleeve is provided on its forward side with a longitudinally extending groove in which is arranged a spline c^5, said spline extending radially outwardly and being secured in the same manner as the spline c^3, whereby the sleeve c^2 is prevented from rotating. c^9 indicates a grease cup by means of which the spindle C^2 is lubricated. On its outer end, or end remote from the grinding disk C^1, the sleeve c^2 is enlarged in diameter and said enlarged portion is provided on one side with an integral longitudinally extending

rib on which are formed rack-teeth c^4 which mesh with a gear wheel D arranged to turn on an axis transverse to the spindle C^2 and by means of which longitudinal movement is given to the said sleeve. Said sleeve c^2 is held from endwise movement on the spindle C^2 by means of thrust collars c^6 and c^7 which surround the spindle in contact with the inner and outer ends of said sleeve. The thrust collar c^6 is interposed between the inner end face of the sleeve c^2 and the hub of the pulley c and the thrust collar c^7 is interposed between the outer end face of the said sleeve and a collar c^8 which is secured by a set-screw to the end of the spindle C^2. Said collar c^8 can be adjusted longitudinally on the spindle in order to compensate for wear of the parts. The pinion D is secured on a shaft D^1 which is journaled in a stationary bearing member D^3 formed integral with the head-stock B^1. Said shaft is shown as arranged vertically and as provided at its upper end with a crank-arm or hand-lever D^4 by means of which the shaft and pinion may be rotated for the purpose of giving movement to the said spindle C^2. On the sleeve c^2 is a depending lug e in which is mounted a micrometer screw E arranged to come into contact with a stationary part of the head-stock B^1. Said screw constitutes an adjustable stop for accurately stopping the forward movement of the spindle C^2 at any predetermined point whereby any desired amount of material may be ground off from a piece of work placed between the two disks C and C^1. For this purpose said micrometer screw is conveniently provided with a scale-plate e^1 fixed to said lug e.

In the operation of a grinding machine equipped with a sliding disk-carrying spindle, such as has been above described, it is intended that the movable head-stock B^1 shall be placed in a position permitting the two disks to be separated a desired distance. The object to be ground is placed and allowed to rest upon the table A^1, and the two disks are then moved towards each other by sliding the spindle C^2 inward until the desired amount of material has been ground off, the object being ground, which rests loosely on the table, adjusting itself laterally as the movable disk is advanced so that the material is removed to an equal extent from both sides of the same.

The rack and pinion actuating connection between the sliding spindle and the stationary bearing member has the advantage of giving motion to the spindle at uniform speed relatively to the turning movement of the hand-lever, in all positions of the latter while, at the same time, it is of simple construction and is durable because its wearing parts are not liable to receive between them dust or grit arising from the grinding operation.

The features constituting my invention are more particularly applicable to the form of machine illustrated which includes two grinding disks, turning about a common axis of rotation, and one which is movable toward and from the other in the direction of said axis, so that said disks are adapted to operate at the same time on opposite faces of an object which is held between the disks, and which is free to adjust itself laterally so that both disks will act equally, or with equal pressure, thereon. A machine embracing this feature has great advantages for use in finishing two flat faces on opposite sides of an object.

Manifestly, the features of construction illustrated and described in the means for mounting the grinding disk shaft in the machine frame, and for giving endwise movement to said shaft, may be used in connection either with a single disk grinder or with a double disk grinder, such as is shown in the accompanying drawings.

I claim as my invention:—

1. A grinding machine comprising a machine frame, a non-rotative endwise movable sleeve provided with a longitudinal groove, a bearing on the frame for said sleeve provided with a spline which engages the groove in said sleeve to hold the latter from rotation, a grinding-disk spindle which turns in and has endwise movement with said sleeve, said sleeve projecting at one end outside of said bearing, and means for giving endwise movement to the sleeve embracing longitudinally arranged rack teeth on the part of said sleeve which projects outside of the bearing, and a gear wheel mounted on the machine frame to turn on an axis at right angles to that of the disk spindle and engaging said rack teeth on the said sleeve.

2. A grinding machine comprising a machine frame, a non-rotative endwise movable sleeve provided with a longitudinal groove, a bearing box for said sleeve consisting of two longitudinally separated parts, and a spline which is clamped between the parts of said bearing box and enters said groove to hold the sleeve from rotation.

3. A grinding machine comprising a machine frame, a non-rotative, endwise movable sleeve provided with a longitudinal groove, a two-part bearing box for said sleeve, a spline clamped between the meeting edges of the bearing box and extending inwardly into said groove in the sleeve, and a grinding disk spindle which turns in said sleeve and has endwise movement with the same, said spindle being provided with bearing shoulders for contact with the ends of said sleeve to hold the spindle from endwise movement in the sleeve.

4. A grinding machine comprising a machine frame, a non-rotative, endwise movable sleeve provided with a longitudinal groove,

a bearing box for said sleeve consisting of two longitudinally separated parts, a spline which is clamped between the parts of said bearing box and enters said groove in said sleeve, said sleeve extending at one end outside of the bearing box and being provided with an integral laterally projecting, longitudinal rib having gear teeth formed thereon, and a gear wheel mounted on the machine frame and engaging said gear teeth.

5. A grinding machine comprising a machine frame, a non-rotative endwise movable sleeve provided with a longitudinal groove, a two-part bearing box for said sleeve, a spline clamped between the parts of the bearing box and extending inwardly into said groove, a grinding-disk spindle which turns in said sleeve and has endwise movement with the same, said spindle being provided with bearing shoulders for contact with the ends of said sleeve to hold the spindle from endwise movement in the sleeve, said sleeve extending at one end outside of said journal box, and being provided on its extended end with gear teeth, and a gear wheel mounted on the machine frame and engaging said gear teeth.

6. A grinding machine comprising a machine frame provided with a head-stock having two journal boxes in alinement with each other, non-rotative sleeves mounted to slide endwise in said journal boxes and having splined connection with the same, a grinding disk spindle extending through and turning in both of said sleeves and a driving pulley affixed to said spindle between said sleeves, said spindle being provided with shoulders engaging the ends of both of said sleeves to hold the said spindle from endwise movement relatively to the sleeves.

In testimony, that I claim the foregoing as my invention I affix my signature in the presence of two witnesses, this 2nd day of July, A. D. 1907.

JOHN MILLER, Jr.

Witnesses:
A. F. Spaulding,
Edward P. Welles.