(No Model.) 2 Sheets—Sheet 1.

W. E. COOK.

GRINDING MACHINE.

No. 534,200. Patented Feb. 12, 1895.

Fig. 1.

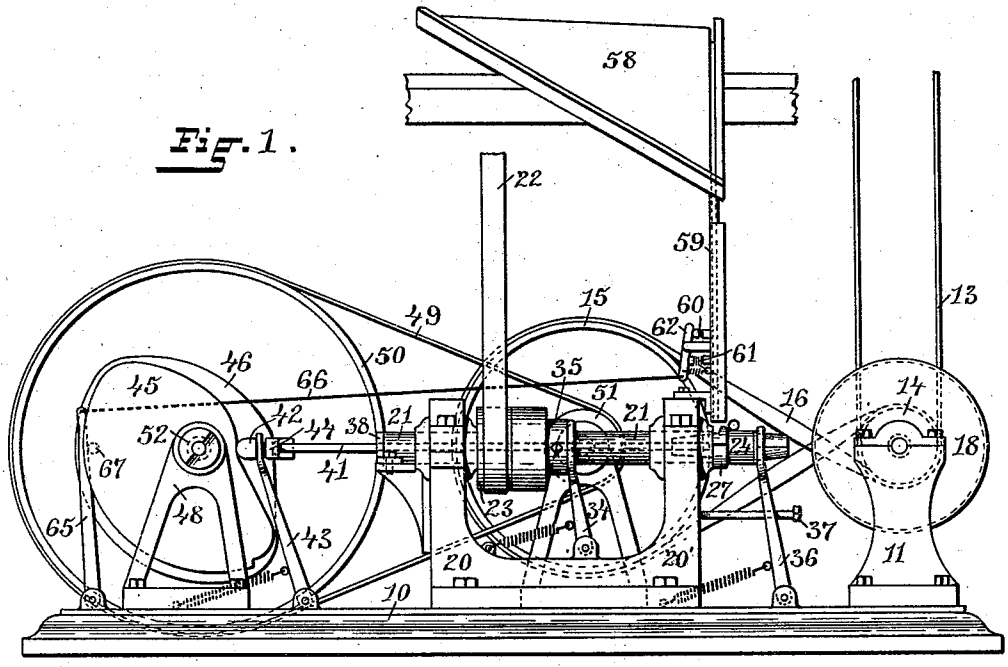
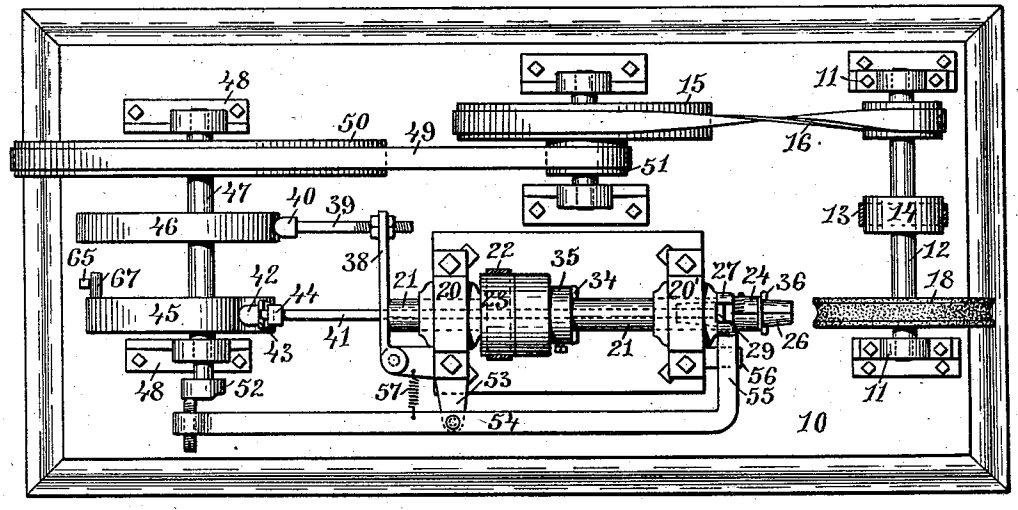


Fig. 2.



WITNESSES:

Henry J. Miller

Chas. H. Luther Jr.

INVENTOR:

Walter E. Cook

by Joseph A. Miller & Co.

Attys.

(No Model.) 2 Sheets—Sheet 2.

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GRINDING MACHINE.

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Fig. 3.

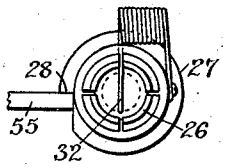
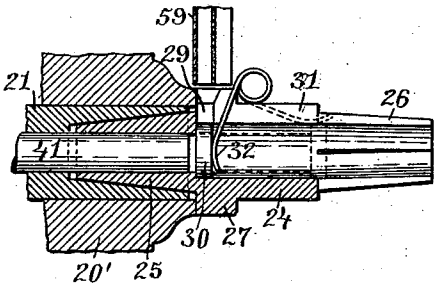


Fig. 4.



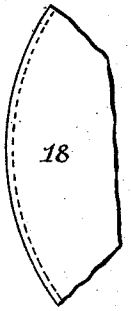


Fig. 5.

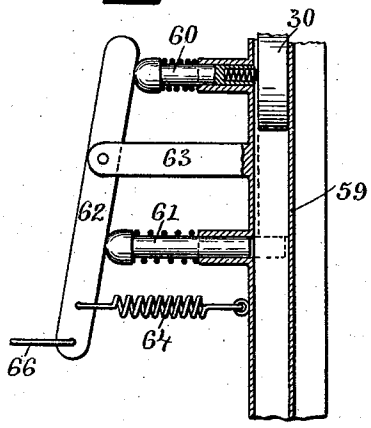


Fig. 6.

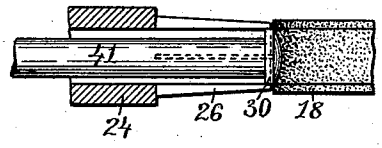
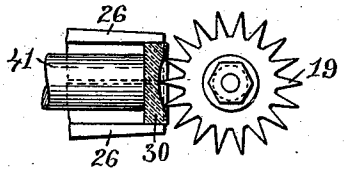


Fig. 7.



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Attys

UNITED STATES PATENT OFFICE.

WALTER E. COOK, OF PROVIDENCE, RHODE ISLAND.

GRINDING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 534,200, dated February 12, 1895.

Application filed May 31, 1892. Serial No. 434,903. (No model.)

To all whom it may concern:

Be it known that I, WALTER E. COOK, of the city of Providence, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Grinding-Machines; and I hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification.

This invention has reference to improvements in automatic devices for grinding the surfaces of disks.

The object of this invention is to produce a machine which will grasp a disk, automatically fed to the proper position, and, while rapidly rotating such disk, will present a surface thereof to the action of a grinding, or cutting, device rotating in a direction at right angles with the rotation of the disk.

The invention consists in the peculiar construction of the rotatable clutch, the automatic feed-plunger working therein, and the combination therewith of a hopper feeding-device and a grinding mechanism located in front of the chuck.

The invention further consists in the combination with the feeding and grinding devices of suitable driving-mechanism, as will hereinafter be more clearly specified and pointed out in the claims.

Figure 1 represents a front elevation of the improved grinding-machine, Fig. 2 representing a plan view of the same. Fig. 3 represents an end view of the chuck and a portion of the brake for holding the same in a position to receive a blank disk. Fig. 4 represents a longitudinal sectional view of the chuck, a disk being shown therein and a portion of the plunger for advancing the disk. Fig. 5 represents a view, partly in section, of a portion of the feed-chute and the regulating mechanism by which the feeding is controlled. Fig. 6 represents a horizontal cross-section of the chuck and a portion of the convex grinding-wheel, the disk being shown as held against the grinding-wheel by the plunger. Fig. 7 represents a vertical sectional view of the end portion of the chuck and a disk held therein by the plunger against the action of a concaving device.

Similar numbers of reference designate corresponding parts throughout.

In the drawings 10 indicates a base on which the mechanism is mounted. At one end of this base are secured the standards 11 in the upper portions of which the shaft 12 is journaled, motion being imparted to the shaft by the belt 13 passing over the pulley 14 and conveyed therefrom to the intermediate pulley 15 by the belt 16 passing over the pulley 17. Also secured on this shaft 12 is a grinding device, or wheel, 18 which may be an emery-wheel, a milling-disk 19, or any other suitable cutting or grinding mechanism adapted to operate by rotation.

Secured to the central portion of the base 10 is a substantial frame having vertical standards 20 and 20′, and journaled in the upper portions of these standards, in a line with the center of the grinding device 18 or 19, is a longitudinally-movable tubular shaft 21 the bore of which is gradually enlarged at the forward end to form a tapering socket. This shaft 21 is rotatable by means of the belt 22 passing over the fast-pulley 23 secured thereto.

The tubular chuck 24 has a tapering shank 25 adapted to fit in the tapering socket formed in the forward end of the shaft 21 and is furnished with the segmental spring-arms 26 which are slightly contracted at the ends. Around the chuck is formed the shoulder 27 by which the backward movement of the chuck is limited, as this shoulder comes in contact with the face of the bearing in which the shaft 21 is journaled. A portion of the collar is cut away to form the stop 28, and a slot 29 is cut through the material of the shoulder and the chuck through which the blank disk 30 may enter, while extending at right angles with the entrance slot is a longitudinal-slot 31 through which the spring-arm 32 extends to support the disk in position when first dropped into the chuck. The outer portion of the spring-arm is coiled and is secured to the surface of the chuck.

The backward movement of the tubular-shaft 21 is accomplished by means of the spring-operated arm 34, the U-shaped upper portion of which partially embraces the shaft and bears against the collar 35, the limit of

backward motion being regulated by the location on the shaft of the pulley 23 which serves as a stop bearing against the standard 20. The rearward movement of the chuck 24 is also assisted by the spring-operated arm 36 bearing against the same at the base of the arms 26. This arm 36 is provided with a stop-screw 37 which limits the forward accidental movement of the chuck by striking the standard 11 to prevent the end of the chuck from coming in contact with the grinding-wheel.

The forward movement of the shaft 21 is accomplished by means of the arm 38 pivoted to a stud on the bracket 20 and bearing against the rear end of said shaft. The arm 38 is furnished with an extension 39, adjustable in its length, on the end of which is secured a bearing-head 40.

The plunger 41 extends through a perforation in the arm 38 and extends partially through the bore of the shaft 21 in which it is free to move longitudinally. At its rear end it is provided with a bearing-head 42 and its rearward movement is accomplished by means of the spring-operated arm 43, the U-shaped upper end of which partially embraces the portion of the plunger between the bearing-head 42 and the stop 44.

The cams 45 and 46 are mounted on the shaft 47 which is journaled in the upper portions of the brackets 48 and is driven by a belt 49 passing over the large pulley 50 mounted on said shaft and over the small pulley 51 mounted on the shaft by which the pulley 15 is carried. By this means the speed of the shaft 47 is reduced. At the end of the shaft, opposite to that on which the pulley 50 is carried, I secure a small face-cam 52. The cam 46 bears against the bearing-head 40 and is shaped to bear against it in a manner to cause a gradual advance of the tubular-shaft 21 and the chuck 24 until the forward end of the same very nearly touches the grinding-wheel, and to then allow of a quick return of the shaft and chuck by means of the spring-operated arms 34 and 36.

The cam 45 is shaped to bear against the head 42 on the plunger to advance the plunger more rapidly at the start than the advance of the shaft 21, in order to force the blank 30 into a position between the ends of the segmental-arms 26 of the chuck. The plunger now advances in unison with the shaft and chuck until the disk is brought against the grinding-device and ground and this position is held until the quick backward movement of the chuck and shaft has commenced, thereby pushing the finished disk out of the chuck,—the return of the plunger being then effected by means of the spring-operated arm 43.

Extending from the bracket 20 is a stud 53 to which is pivoted the arm 54 the forward end of which is bent inwardly to form the brake 55 resting on the stud 56 which extends from the bracket 20′ and is adapted to engage the stop 28 of the chuck to hold the same in a position to allow a disk to be fed into the slot 29, the shank 25 of the chuck 24 being disengaged from the socket of the shaft 21 by the slight further backward movement of the shaft, allowing the chuck to be thus held against rotation while on the advancement of the shaft the shape of the cam 52 allows the rear end of this arm 54 to be drawn in by the coiled-spring 57 and the brake 55 to be withdrawn from engagement with the stop of the chuck.

The hopper 58 is secured above the machine and is of any suitable size and shape to hold a number of blanks and to direct their movement toward the chute 59 by which they are conveyed to a point just above the slot 29 in the chuck. The movement of the blanks down this chute is regulated by the device, more clearly shown in Fig. 5, consisting of the spring thrust-plungers 60 and 61 longitudinally movable in casings secured to the chute and operated by the lever 62 which is pivoted on the arm 63 extending from the chute, the lever being drawn inward at the lower end by the coiled-spring 64 against the tension of which the lever is operated by the throwing backward of the pivoted-arm 65 to the upper end of which the lower end of the lever 62 is connected by the wire 66. This arm 65 is thrown backward at each revolution of the cam 45 by the stud 67 extending from the face of the cam. The plunger 60 is furnished at its inner end with a small coiled-spring partially contained within a socket in the plunger and adapted to bear against the faces of the disk-blanks as they pass down the chute and sustaining them successively in the position shown in Fig. 5 until the plunger 61 is pushed inward sufficiently to support the same. By this means the feeding is regular and positive.

The surface of the chuck-shank 25, or the inner surface of the shaft-socket, may be roughened, if desired, to insure a better grip, but I find in practice that the friction between ordinarily smooth surfaces will be sufficient to engage these parts in order to rotate the chuck at a speed equal to that of the shaft.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. In a grinding device, the combination with a rotatable, longitudinally-movable shaft operated in one direction by a spring, a tubular chuck carried thereby, and a plunger reciprocal in the chuck, of means for advancing the shaft and plunger dissimultaneously.

2. The combination with a tubular rotatable chuck having a laterally-disposed entrance, and a plunger, reciprocal in the chuck, around which the chuck is rotatable, of a grinding device rotatable in the vertical plane of the chuck.

3. In a grinding device, the combination with a rotatable tubular chuck provided with an entrance slot and releasing means for ro-

tating the same, of means for stopping the rotation of the chuck at the point of release from the rotating mechanism, as described.

4. The combination, in a grinding device, with a rotatable longitudinally-movable tubular-shaft provided with a flaring socket in the forward end, a plunger independently movable therein, and means for rotating and moving the same, of a tubular-chuck having a tapering shank to fit said socket and provided with an entrance slot and a longitudinal slot extending therefrom, a spring-arm working through the longitudinal slot, and means for stopping the rotation of the chuck when released from engagement with the shaft-socket, as described.

5. In a grinding device having a rotating grinding-mechanism, the combination with a rotatable longitudinally-movable chuck having an entrance slot, a plunger working therein, and means for advancing and returning the chuck and plunger, of an automatic feeding-device supported above the chuck, and means for stopping the rotation of the chuck to bring the entrance slot immediately below such feeding device.

6. In a grinding-machine, in combination, a rotatable grinding-device, a longitudinally-movable tubular-chuck rotatable in a direction at right angles with that of the grinding device, and a plunger movable within said chuck, a spring-operated arm adapted to exert a backward pull on said plunger, and a rotatable cam adapted to bear against the rear end of the plunger to move the same forward at certain points and to allow the plunger to be drawn backward at others, as described.

7. The combination with the rotatable longitudinally-movable tubular-shaft 21 suitably journaled in the standards 20 and 20′ and provided with a tapering socket at the forward end, a tubular chuck having an entrance slot and provided with a tapering shank to fit said socket, an arm 38 pivoted to a stud on the bracket 20 and bearing against the rear end of the shaft 21, an extension 39 on said arm, and a plunger 41, extending through a perforation in the arm 38, independently movable within said shaft and chuck, of the cams 45 and 46 carried on the shaft 47, suitably journaled and driven, adapted to bear against the rear ends of the arm 39 and plunger, the spring-operated arm 43 to draw the plunger backward, and the spring-operated arm 34 to exert a backward pressure on the shaft 21, as described.

8. The combination in a grinding device with the rotatable longitudinally-movable shaft 21 provided with a tapering-socket at its forward end, a tubular chuck 24 having the tapering-shank 25 and shoulder 27 a portion of which is cut away to form the stop 28, and means for rotating the shaft independently of the chuck, of the arm 54 pivoted to the stud 53 of the bracket 20 and having the inwardly-bent end 55 adapted to engage with the stop 28, the coiled-spring 57 for drawing this bent end out of engagement therewith, and the rotatable cam 52 bearing against a set screw in the rear end of said arm, as described.

9. In a grinding mechanism having a rotatable grinding-device, a longitudinally-movable tubular shaft rotatable in a direction at an angle with said grinding-device, a tubular-chuck carried by said shaft and provided with an entrance or feed slot, and a plunger movable in said shaft, the combination with the rotatable cam 45 adapted to operate said plunger in the forward direction, a stud 67 on said cam, and a pivoted-arm 65 adapted to be thrown thereby, of a feed-chute 59, the spring-plungers 60 and 61 working in cases on said chute, the pivoted lever 62 adapted to operate said plungers alternately, a coiled-spring 64 for drawing the lower end of the lever toward the chute, and the wire 66 connecting the lower end of the lever 62 with the upper end of the arm 65, as and for the purpose described.

In witness whereof I have hereunto set my hand.

WALTER E. COOK.

Witnesses:
HENRY J. MILLER,
JOSEPH A. MILLER, Jr.