This invention relates to grinding machines and more particularly to a swing frame grinding machine for use in snagging and similar grinding operations.

Heretofore various swing frame grinding machines have been developed in which the grinding wheel is driven either by a motor mounted on the swing frame which is connected by driving belts with a grinding wheel, or driven from an overhead shaft which is in turn connected by belts to the grinding wheel. These previous constructions have had several objectionable features. They have been of bulky design on the grinding wheel end so that the operator’s vision of the work is obstructed. A main frame has been provided to support the motor and the grinding wheel which in turn are connected by belts, forming a construction in which the belts are exposed or partially covered by a belt guard to form a very cumbersome frame for the operator to work with in that it includes the width of the frame and, of course, the width of the belt drive and its protection guard.

It is the principal object of this invention to overcome this difficulty and to provide a compact construction in which the grinding wheel bearing and guard are of very narrow construction to increase the operator’s visibility of the work and in which the main frame of the machine is constructed and arranged to serve as the main supporting frame to support a motor at one end thereof and the grinding wheel at the other and also serve to surround the driving belt to act as a belt guard.

It is another object of this invention to provide a suitable support for a swinging frame grinding machine which is arranged so that the machine may be put in balance and which is arranged so that the machine may be readily locked with the grinding wheel axis in a substantially horizontal plane, or may be unlocked so that the operator may swing the axis of the grinding wheel laterally in a vertical plane to pass it over irregular curved surfaces as desired.

It is a further object of this invention to provide a readily accessible mounting for the grinding wheel in which a cover plate for the wheel guard is readily removable to give access to the grinding wheel mount for changing of grinding wheels.

It is still another object of this invention to provide a pivotally mounted motor which may be readily adjusted to tension the driving belt by means of a pawl and ratchet controlled gear mechanism.

One embodiment of this invention has been illustrated in the attached drawing, in which like reference numerals indicate like parts:

Fig. 1 is a side elevation of a grinding machine embodying this invention;

Fig. 2 is a plan view of the machine;

Fig. 3 is an enlarged sectional view, taken approximately on the line 3—3 of Fig. 2;

Fig. 4 is a sectional view, taken approximately on the line 4—4 of Fig. 1; and

Fig. 5 is an enlarged fragmentary plan view of the mechanism to lock the latch out of engagement to permit a lateral rocking of the machine frame, taken approximately on the line 5—5 of Fig. 1.

In accordance with this invention, a swing frame grinding machine is provided having a main frame which serves, in a dual capacity, as a main supporting frame to support a grinding wheel at one end thereof and a pivotally mounted driving motor at the other end, and also as a belt guard to surround the driving belt which connects the motor pulley with the grinding wheel. The driving motor is mounted on a pivotal support which is arranged so that it may be readily adjusted to tension the driving belts. A suitable supporting and locking device is provided which permits the frame to be locked to the supporting member so that the axis of the wheel is in a substantially horizontal plane for grinding plane surfaces, or readily unlocked so that the frame may rock laterally if it is desired to grind an irregular or curved surface. The grinding wheel is mounted on a rotatable supporting member which is supported on a spindle fixed relative to the frame of the machine. The wheel is surrounded by a wheel guard having a readily removable cover which permits rapid changing of the wheel.

As illustrated in the drawing, a swing frame grinding machine embodying this invention has been illustrated in which a main supporting frame 11 of a substantially U-shaped cross section surrounds the belt and supports the various parts of the machine. One end of the frame 11 is provided with projecting flanges 12 and 13 which are bolted or riveted to a wheel guard 14 to form a support for a grinding wheel 15. The other end of the frame serves as a support for a bracket 18 having a downwardly projecting portion 19 and a pivot 20 which support a motor mounting 21 to serve as a support for the motor 22. The lower open side of the U-shaped frame is preferably closed by a cover plate 16 which is fastened to the frame by screws to completely enclose the driving belts.

The frame may be supported from any suitable flexible overhead supporting means, such as a chain or the like (not shown), which is fastened to an eye 25 on the upper end of a supporting bracket 26. The lower end of the supporting bracket is provided with an aperture which engages the cylindrical surface of a supporting bar 27 and is provided with a clamping screw 28 so that it may be rigidly locked to the member 27.
when adjusted to the desired position. By adjusting the supporting member 26 relative to the supporting bar 27, the machine may be put in balance longitudinally of the machine so that the operator may manipulate the machine with a minimum amount of physical exertion.

In certain types of grinding, such as grinding a plane or irregular surfaces, where a longitudinal traverse movement of the machine is necessary, it is desirable that the frame 11 be locked to the supporting member 26 to prevent a lateral tilting or rocking of the wheel axis. To accomplish this, any suitable locking device may be provided to hold the bar 27 against rotation relative to the frame. As illustrated, the supporting bar 27 is provided with reduced end portions 30 and 31 which are rotatably supported in the brackets 32 and 18 respectively on the frame 11. A locking pin 33 is slidable mounted within a hole 34 in the bracket 32. The pin 33 has a reduced end portion 35 which is surrounded by a spring 36 interposed between the enlarged portion of pin 33 and a portion of the bracket 32. The spring 36 exerts a pressure tending to force the pin 33 into engagement with an aperture 37 in a projecting flange 38 on the supporting bar 27. When the pin or plunger 33 engages the aperture 37, the frame 11 of the machine is locked against a lateral or transverse rocking movement relative to the supporting member 26.

In the snagging of castings and other similar grinding operations in which a swing frame grinder is employed, it is frequently desirable that the frame of the machine be arranged so that the axis of the grinding wheel may be rocked. The swing frame may be rocked, the tube being preferably flexible or pass the operative face of the grinding wheel across an irregular or curved surface on the work piece. To permit a lateral rocking movement of the frame, a suitable mechanism is provided so that the locking pin 33 may be readily withdrawn from engagement with the aperture 37 and locked out of engagement, so that the operator by movement of an operating handle 40 may rock the axis of the grinding wheel laterally in a vertical plane or pass the grinding wheel across an irregular or curved face to be ground. As illustrated in the drawing, this may comprise a lever 41 which is pivotally supported on a stud 42 on a projection 43 of the bracket 32. The reduced portion 35 of the pin 33 is connected to the lever 41 by a pin 44 so that movement of the lever 41 towards the left, as viewed in Fig. 1, will retract the pin 33 from the aperture 37 and permit a rocking movement of the frame.

For convenience of operation, the pin is arranged so that it may be locked in position out of engagement with the aperture 37, a suitable operating knob 45 is provided on the end of a rod 46 which is slidable supported in a bracket 47 on the wheel guard 14. The rod 46 is connected to the lever 41 by a link 48 so that when the operator pulls the knob 45 toward the left, as viewed in Figs. 1 and 2, the lever 41 retracts the pin 33 from engagement with the aperture 37.

A pin 49 is provided on the rod 46 so that when the plunger 33 is in a locked position, the pin engages the bottom of a slot 50 in the bracket 47. When the operator moves the knob 45 into the position 45a, as shown in dotted lines in Fig. 5, the knob 45 and rod 46 may be turned so that the pin 49 swings into a position 49a in engagement with the end face 51 on the bracket 47. In this position, the pin 49 holds the pin 33 out of engagement with the aperture 37 and the operator may then swing the frame laterally in a vertical plane to pass the grinding wheel over an irregular or curved face.

The motor 52 is provided with a suitable stepped driving pulley 53 which is arranged so that the operator may readily change the pulley, end for end, to bring either the step 60 or the step 61 into proper position for engagement with the driving belt 62. Any suitable form of driving belt may be utilized, such as multiple V-type driving belts 62 which are arranged to form driving connections between the motor pulley 59 and the pulley groove 63 on the wheel mount.

The grinding wheel is preferably supported, in a suitable manner, so that it may be readily removed after it has worn away and replaced by a new wheel without undue loss of time. As illustrated in the drawing, a wheel supporting member 64 is rotatably mounted on a stud 65 which is formed integral with a flange 66. The flange 66 is riveted to the wheel guard 14 so that the stud 65 forms a fixed supporting member for the grinding wheel bearings. A pair of roller bearings 67 and 68 are mounted on the stud 65 and are supported by a spacing collar 69 which surrounds the stud. The stud 65 engages the inner race rings of the roller bearing members. The outer race rings of the roller bearings fit within a cylindrical aperture 70 in the wheel supporting member 64 and are held in place by an annular ring 71 which is in turn secured by cap screws 72 to the supporting member 64. The wheel supporting member is provided with a cylindrical portion 75 which serves as a supporting surface for the grinding wheel. A flange 76 is preferably formed integrally with the supporting member 64 and may be formed as a separate flange which is riveted or bolted to the supporting member and serves to position the grinding wheel on the portion 75.

A second flange 77 engages the opposite side of the wheel and is held in place to clamp the wheel securely to the supporting member 64 by a plurality of bolts 78.

In order that the operator may readily change the wheel, the wheel guard is preferably made in two parts, the main guard 14 which is riveted or fixed to the main frame 11, and a cover 80 which has a projecting annular rim 81 and an internal cylindrical surface 82 fitting an external cylindrical surface 83 on the wheel guard 14. A bushing 85 is mounted in the center of the cover 80 and is provided with a hole arranged to slideably support a portion 86 of the cover 80 so as to serve as a support for the outer end of the stud 65. The cover 80 may be secured in place by any suitable means, but for convenience of assembly, this is preferably accomplished by means of a tapered pin 87 which passes through a slot 88 in the portion 86 of the stud. A washer 89 is interposed between the bushing 85 and the pin 87. When the pin 87 is driven into place, it forces the bushing 85 and cover 80 towards the left, as viewed in Fig. 3. This locking movement forces the bushing 85 into engagement with a dust collar 90, which is mounted on the portion 86 of the stud 65. It will be readily appreciated from this disclosure that the end thrust of the tapered pin 87 will lock the inner races of the bearings 67 and 68 to the stud 65 and hold them against rotation.

To replace the grinding wheel when it becomes worn, the operator removes the tapered pin 87, then removes the cover 80 by sliding it endwise from the stud and wheel guard. The flange 77 may then be readily removed by removing the
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bols 78, after which the worn-out wheel may be removed and replaced by a new wheel.

4. The driving belts 62 may be properly tensioned for driving the grinding wheel 61 with either the step 60 or 61 of the motor pulley in driving position, a suitable mechanism is provided for swinging the motor support 21. As illustrated in the drawing, a gear segment 91, which is preferably formed as an integral part of the motor support 21, meshes with a pinion 92 on a shaft 93. The shaft 93 is rotatably supported in the bracket 18, so that rotation of the shaft 93 is transmitted to rock the motor support 21 in either direction depending upon the direction of rotation. The end of the shaft is provided with a square shaped projection 94 so that it may be readily turned by use of an ordinary wrench.

A suitable mechanism is provided for locking the shaft 93 against rotation in one direction so as to prevent any undesired tensioning of the driving belt. A ratchet wheel 95 is mounted on or formed integral with the shaft 93. A pawl 96 is slidable mounted in the bracket 18 and is held in-yielding engagement with the ratchet wheel 95 by a spring 97. A knob 98 is mounted at the inner end of the pawl so that the operator may readily retract the pawl when it is desired to slack the driving belt for changing the motor pulley.

The operation of the machine will be readily apparent from the foregoing disclosure.

Which is essentially described as invention what we claim as new and desire to secure by Letters Patent is:

1. A swing frame grinding machine comprising a main frame having a wheel guard secured thereto, a nonrotatable wheel spindle permanently fastened at one end to said guard, a bearing upon said spindle, a wheel hub rotatably supported by said bearing and provided with a wheel support at one end and a driving pulley at the other end, an adjustable flange upon said wheel hub arranged to secure the grinding wheel upon its hub, a detachable cover plate fitting over the end of said spindle and forming one side of the wheel guard, and means connected to the wheel spindle arranged to lock both the cover plate and wheel hub in the correct relative position for a grinding operation.

2. A swing frame grinding machine comprising a frame, a grinding wheel rotatably mounted at one end, a driving motor mounted at the other end, a pulley on the driving motor, a wheel hub supporting the grinding wheel having a pulley thereon, a belt connecting said pulleys, an adjustable mount for the driving motor comprising a pivotally mounted support for said motor, a gear segment on said support, a pinion engaged with the gear segment, and a drive belt on the machine frame, means to rotate said pinion to move the motor support and thereby tension the driving belt, a ratchet wheel mounted for rotation with said pinion, and a pawl adapted to engage said ratchet wheel and maintain the motor support in adjusted position.

3. A grinding machine comprising a frame, a wheel guard which has a side plate and a peripheral wall integral therewith, a removable cover plate, a spindle, one end of which is rigidly fixed to said side plate, the other end being removably supported on the cover plate, a wheel support rotatably mounted on the spindle, which has a clamping flange engageable with one side of the wheel, a removable flange arranged to clamp the grinding wheel on said support, means for rotating the wheel support, and means to lock said support in a relative position on the spindle and to hold the cover plate in supporting relation to the spindle, said parts being so arranged that the wheel may be removed axially thereof.

4. A grinding machine comprising a frame, a wheel guard which has a side plate and a peripheral wall integral therewith, a removable cover plate, a spindle one end of which is rigidly fixed to the side plate, the other end being removably mounted on the cover plate, a wheel support rotatably mounted on the spindle, which has a clamping flange engageable with one side of the wheel, a removable flange arranged to clamp the grinding wheel on said support, means for rotating the wheel support, and means including a taper pin passing through the spindle arranged to lock said support in a relative position on the spindle and to secure the cover plate in supporting relation to the spindle.

5. A grinding machine comprising a frame, a wheel guard fixed to said frame, having a side plate and a peripheral wall integral therewith, a removable cover plate, a non-rotatable wheel spindle, rigidly fastened to the side plate at one end and removably mounted within the cover plate at the other end, a bearing member rotatably mounted on the spindle, a wheel support fixed on said bearing member, said support having a pulley groove, a fixed flange and an adjustable flange arranged to clamp the grinding wheel thereon, and a removable locking member arranged to lock said support in a relative position and to removably fix the cover plate in supporting relation to the spindle.

6. A swing frame grinding machine comprising a frame, a grinding wheel rotatably mounted at one end of said frame, a wheel guard therefor, a motor, a driving belt connecting said motor and wheel, a support for said frame which is rotatably connected thereto between the motor and the wheel guard, a positive locking device to lock said support to the frame in a fixed position or to permit a lateral rocking of the frame relative to the support, a manually operable means mounted on said wheel guard and connected to actuate said locking device, and means to adjust the support longitudinally of the frame to balance the same without interference with the operation of said locking device.

7. A swing frame grinding machine comprising a frame, a grinding wheel rotatably mounted at one end of said frame, a motor on the other end of the frame, driving connections between said motor and the grinding wheel, a supporting bar, means to rotate said frame on the bar, means adjustable along the bar to support the frame in a balanced condition, and a locking device arranged to lock the bar and frame against relative rotation in a desired position.

8. A device of the type covered by claim 7 in which a control member is mounted on the wheel guard and connected with the locking device for control thereof by the operator during the grinding operation and means is provided for holding the locking device in or out of engagement with the support when desired.

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CERTIFICATE OF CORRECTION.


HOWARD W. DUNBAR, ET AL.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, line 36, strike out the words "straws, the tube being preferably flexible or" and insert instead laterally or transversely in a vertical plane to; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 13th day of November, A. D. 1934.

Leslie Frazer

(Seal) Acting Commissioner of Patents.