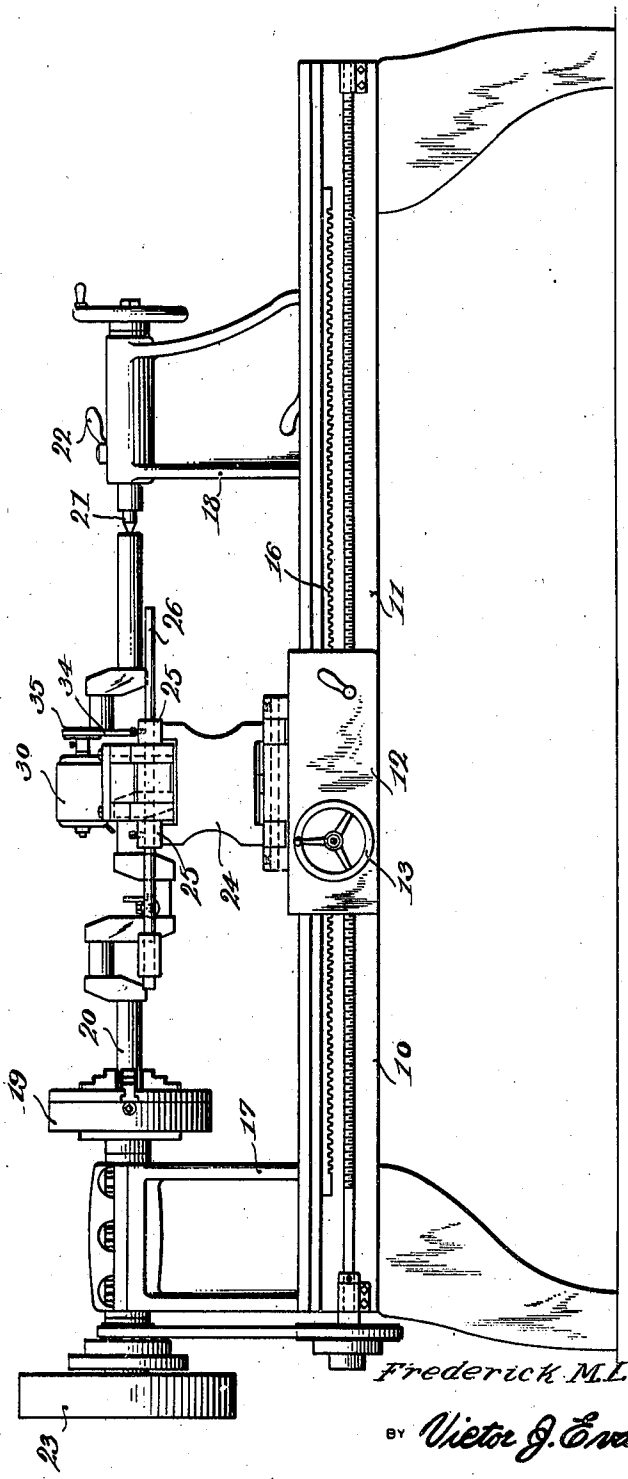
Feb. 1, 1944. F. M. LEUSCH 2,340,602

CRANKSHAFT GRINDING MACHINE

Filed Aug. 4, 1941 4 Sheets-Sheet 1

Fig. 1.



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CRANKSHAFT GRINDING MACHINE

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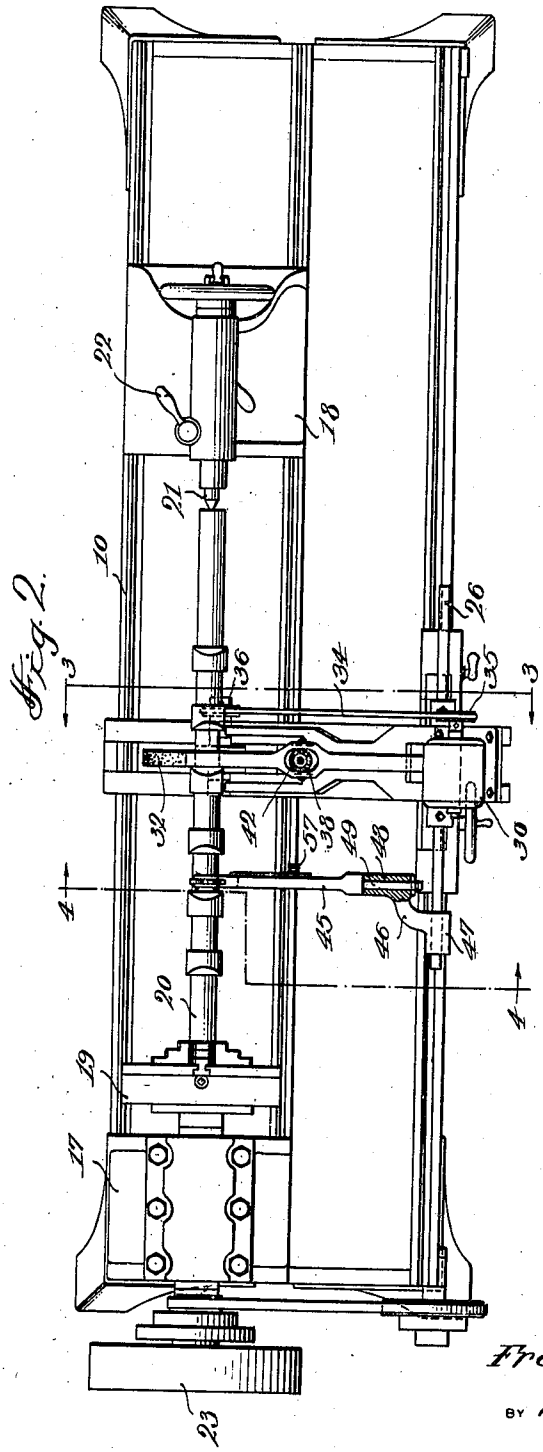


Fig. 2.

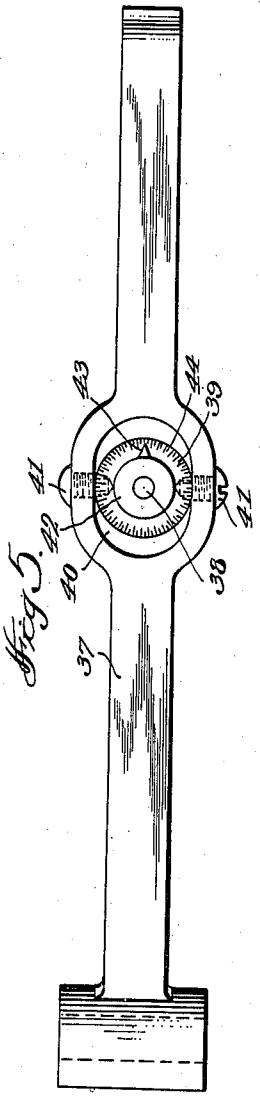


Fig. 5.

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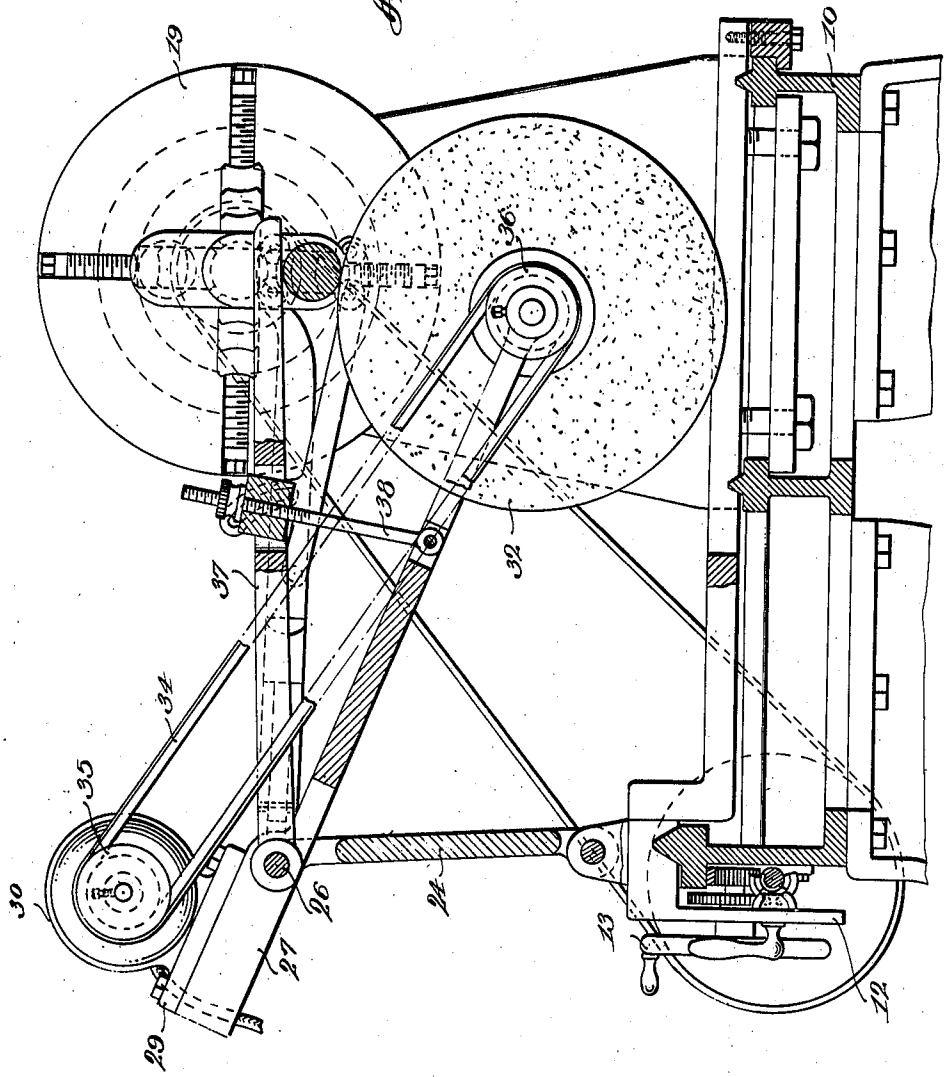
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CRANKSHAFT GRINDING MACHINE

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Fig. 3.



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CRANKSHAFT GRINDING MACHINE

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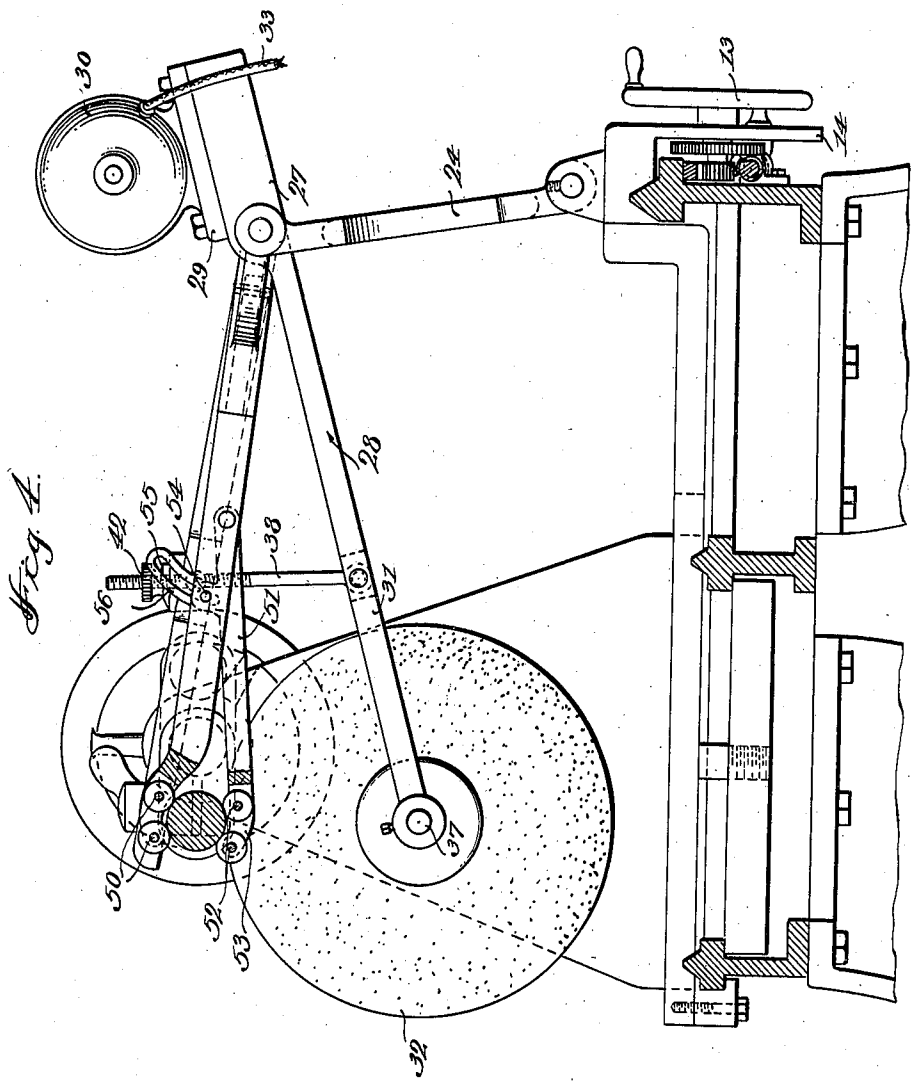


Fig. 4.

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Patented Feb. 1, 1944

2,340,602

UNITED STATES PATENT OFFICE

2,340,602

CRANKSHAFT GRINDING MACHINE

Frederick M. Leusch, Lemmon, S. Dak.

Application August 4, 1941, Serial No. 405,419

10 Claims. (Cl. 51—72)

My invention relates to new and useful improvements in apparatus for grinding crankshafts.

An important object of my invention is the provision of an apparatus for grinding the main and crank pin bearings of crankshafts that may be mounted on a machine in the nature of a conventional lathe, that is uniquely constructed to suspend the grinding wheel below the crankshaft and that is operative to hold the periphery of the wheel in proper association with the surface to be ground whereby to efficiently and automatically regrind the said surface into a true circular cross section.

Another object of my invention is the provision of an apparatus of the above mentioned character that is actuated by the crankshaft to cause the grinding wheel to follow the circular path traversed by the crank pin being ground during rotation of the crankshaft whereby to assure a properly controlled operation at all times.

Still another object of my invention is the provision of an apparatus of the above mentioned character wherein the grinding assembly is slidably mounted on the bed of a supporting lathe structure to permit the operator to regrind all of the main and crank pin bearings without removing the crankshaft from its original setting in the chuck portions of the lathe.

Other objects and advantages of my invention will be apparent during the course of the following description.

In the drawings, forming a part of this specification, and wherein like numerals are employed to designate like parts throughout the same,

Figure 1 is a front elevation of an apparatus embodying my invention and showing the same associated with a lathe of generally conventional construction,

Figure 2 is a top plan view of the same,

Figure 3 is an enlarged transverse vertical sectional view taken on the line 3—3 of Figure 2,

Figure 4 is an enlarged transverse vertical sectional view taken on the line 4—4 of Figure 2, and

Figure 5 is a top plan view of the holding arm and indicator means embodying a part of my invention.

In the accompanying drawings, wherein for the purpose of illustration, is shown a preferred embodiment of my invention, the numeral 10 designates a lathe bed of essentially conventional construction. As best illustrated in Figure 2, the bed is of rectangular formation in plan and is provided at the front thereof with a guide bar 11 on which the slide 12 is mounted for movement longitudinally of the lathe. The movements of the slide are controlled by a hand wheel 13 extending forwardly of the depending apron 14 thereof, the shank portion of which wheel extends through the apron 14 to position the gear 15 carried thereby in meshed association with the rack 16 mounted on the guide bar 11 of the lathe bed. The operation of the slide is conventional, rotation of the hand wheel causing the gear to traverse the rack and thereby effect movement of the slide along the guide bar in a direction depending upon the direction of rotation of the wheel. A head stock 17 is fixedly mounted at one end of the lathe bed and a tail stock 18 is mounted at the opposite end of the lathe bed for sliding movement relative to the head stock. The head stock is illustrated as being provided with a four-jaw lathe chuck 19 which receives and centers one end of a crankshaft 20 to be reground. The tail stock is provided with the conventional hand operated centering shank 21 and latching device 22 for holding the opposite end of the crankshaft during the regrinding operation. After the crankshaft has been mounted in the lathe between the head and tail stocks in the above described manner, it may be rotated at a selected speed by any suitable drive means. I have, however, here illustrated the shaft of the head stock as being provided with a belt pulley 23 on which an endless belt from an electric motor, or the like, (not shown) may be trained.

The regrinding apparatus embodying the present invention is mounted on the above described lathe structure and comprises a frame 24 the lower end of which is pivoted to the slide 12 for free swinging movement about a horizontal axis. The opposite end of the frame is formed with spaced upstanding bearings 25 which receive the elongated rod 26. As best illustrated in Figure 1, the opposite ends of the rod extend substantially beyond the supporting bearings and the portion thereof extending between the bearings pivotally supports the forked end 27 of a rocker arm 28. The fork portions of the rocker arm extend outwardly from the rod and are provided with a transverse platform 29 on which an electric motor 30 is mounted. The inner end 31 of the rocker arm is bifurcated and a grinding wheel 32 is mounted for rotation between the spaced prongs thus provided.

The electric motor mounted on the outer end of the rocker arm is provided with a power line 33 which may be connected to any source of current supply and an endless belt 34 is trained about

the pulleys 35 and 36 carried by the armature shaft of the motor and the spindle or axle 37 of the grinding wheel, respectively. Thus, energization of the motor will effect rotation of the grinding wheel through the medium of the endless belt 34.

The outer forks of the rocker arm are arranged adjacent to the bearings 25 and the outer end of a supporting arm 37 is journalled on the portion of the rod 26 extending therebetween. The supporting arm extends inwardly from the pivot in diverging relation with the rocker arm to position the free end thereof in superjacent relation to the crankshaft mounted in the lathe. The arm will therefore position the grinding wheel directly below the crankshaft bearing to be ground and the outer end thereof will extend across and be supported by the bearing.

By reason of the fact that both the supporting and rocker arms are pivoted for independent swinging movement about the rod 26 it is necessary to provide some means for connecting these arms if the periphery of the grinding wheel is to be moved into operative association with the crankshaft bearing to be ground. I have, therefore, provided an eye bolt 38 the head portion of which is pivotally attached at the bifurcated inner end 31 of the rocker arm and in spaced relation with the grinding wheel 32. The threaded shank of the bolt extends upwardly from the rocker arm and through a gauge block 39 disposed in an elongated slot 40 provided in the supporting arm directly thereabove. The gauge block is supported for free swinging movement in the slot by means of the diametrically opposed pivots 41 and the pivotal mounting of the block permits the same to readily accommodate itself to angular movement of the rocker and supporting arms relative to each other. An internally screw threaded nut 42 is carried by the portion of the shank extending above the guide block and the end thereof seating against the block is formed with a pointer 43 which cooperates with the circularly arranged scale marks 44 inscribed in the upper surface of the block. The pointer cooperates with the scale 44 to permit the operator to obtain an accurate setting of the grinding wheel when regrinding a plurality of crankshaft bearings to a selected size in a manner which will be readily apparent as the description of the device progresses.

Obviously, the crank pin bearings of the crankshaft will traverse a circular orbit about the main bearings thereof when the crankshaft is rotated in the lathe. As is well known, the crank pin bearings become flattened or ovalized by the action of the connecting rods attached thereto and, when regrinding these bearings to a true circular cross section, it is necessary that some means be provided for holding the grinding wheel in equi-spaced operative association therewith at all times during the rotation thereof. To accomplish this purpose, I provide a guide arm 45 which connects the swinging frame 24 with the crank pin bearing of the crankshaft adjacent to the bearing being reground.

The guide arm includes a bracket 46 having right angular disposed laterally offset sleeves 47 and 48, the sleeve 47 slidably receiving the portion of the rod 26 extending from the frame and the sleeve 48 pivotally receiving the shank 49 extending from the outer end of the guide arm. The sleeve 47 of the bracket may be shifted along the rod 26 and out of engagement therewith whereby to permit the bracket to be applied to either end of the rod in accordance with the exigencies of the particular situation. The forked inner end of the guide arm overhangs the crankshaft and rollers 50 are mounted in the fork and in such relation therewith that the peripheries thereof contact the bearing at opposite sides of its vertical center line and hold the arm in slight vertically spaced relation with the bearing. A companion supporting arm 51 has the outer end thereof pivotally attached to the arm 45 intermediate its end and the inner end thereof laterally offset to position the rollers 52 mounted between the forked portions 53 thereof directly below the rollers 50 and at opposite sides of the vertical center line of the crank pin bearing. The companion supporting arm 51 is angularly adjustable relative to the arm 45 and is held in fixed adjusted relation therewith by means of a threaded shank 54 which extends from the arm 45 and through an elongated arcuate slot 55 in the lug 56 extending from the companion arm and along the adjacent vertical side of the arm 45. A threaded nut 57 mounted on the shank may be moved into tight pressed engagement with the lug 56 to hold the same in a selected adjusted position and to hold the vertically spaced pairs of rollers 50 and 52 in engagement with the opposite sides of the bearing.

In operation, the hand wheel 13 is actuated to position the slide 12 in confronting relation with the bearing to be reground. The frame 24 is normally swung in a direction away from the crankshaft and in order to move the grinding wheel 32 into operative relation with the crankshaft it is therefore necessary to rock the frame inwardly until the grinding wheel is located immediately below the particular bearing to be reground. As the frame is swung inwardly to position the grinding wheel below the crankshaft, the arm 37 is held in an elevated position so that the free end thereof will pass above the bearing and the guide arm 45 is also held in an elevated position so that the pairs of rollers 50 and 52 will pass at opposite sides of the adjacent bearing. As soon as the respective parts of the apparatus have been made to assume the above position, the companion guide arm 51 is swung upwardly until both sets of rollers are moved into pressed engagement with the crank pin bearing with which they are associated. The nut 57 is next tightened in the manner described to hold the rollers in engagement with the crank pin bearing. The nut 42 carried by the supporting arm 37 is then tightened to swing the grinding wheel upwardly until the periphery thereof engages the high spot of the bearing being reground.

During the regrinding operation I prefer that the crankshaft be rotated at a relatively slow rate of speed (approximately 6 revolutions per minute) and that the grinding wheel be rotated at a relatively high rate of speed (approximately 2,000 revolutions per minute). As the crankshaft rotates the guide arm will rock the frame 24 about a horizontal axis to permit the grinding wheel carried thereby to follow the horizontal movements of the bearing and the supporting arm 37 will hold the periphery of the grinding wheel in the selected adjusted position relative to the bearing. When the high spot has been ground from the bearing the nut 42 may be tightened slightly to move the grinding wheel in the direction of the crankshaft so that continued rotation of the crankshaft will permit the grinding surface of the wheel to contact therewith at

all times during its rotation. By thus holding the grinding wheel in fixed association with the bearing it may be ground into a true circular cross section.

As soon as one bearing of the crankshaft has been reground the guide arm may be released from the bearing to which it is attached and the nut 42 may be retracted slightly to permit the grinding wheel to drop away from the reground bearing. The frame 24 may then be rocked outwardly to position the grinding wheel and guide arm in laterally spaced relation with the crankshaft. Rotation of the hand wheel 13 will move the guide 12 longitudinally of the frame until the grinding wheel is in alignment with the next bearing to be reground. The frame is then rocked forwardly and the guide arm and grinding wheel applied to the crankshaft in the manner hereinabove described. By noting the final setting of the nut 42, as indicated by the position of the pointer 43 on the scale 44, the operator may grind the second bearing the exact size of the first bearing. It is obvious that by carefully noting the settings of the nut 42 at the end of the first grinding operation all of the bearings subsequently reground may be finished to an identical size.

When the end crank pin bearing at the right hand side of the crankshaft, as illustrated in Figure 1, is being reground the guide arm is applied to the end of the rod 26 extending to the left of the frame; and, conversely, when the crank pin bearing at the opposite end of the crankshaft is being reground the guide arm is applied to the end of the rod extending to the right of the frame. It is thus possible for the guide arm to be applied to a crank pin bearing adjacent to the bearing being reground regardless of the relative position of such bearing.

It is to be understood that the form of my invention, herewith shown and described, is to be taken as a preferred example of the same, and that various changes in the size, shape and arrangement of parts may be resorted to without departing from the spirit of my invention, or scope of the appended claims.

Having thus described my invention, I claim:

1. An attachment for lathes comprising a swinging frame, means for slidably mounting the frame on a lathe, a rocker arm pivoted to the said frame and having its free end arranged below a crankshaft secured in the lathe, a grinding wheel mounted for rotation at the free end of the rocker arm, a pivoted supporting arm extending from the frame to overlie the crankshaft immediately above the grinding wheel, an adjustable means connecting the supporting arm with the rocker arm for adjusting the said grinding wheel relative to the crankshaft, a guide arm mounted on the frame for sliding movement relative to the rocker arm and for pivotal movement into and out of engagement with the crankshaft, and means for detachably securing the guide arm to the said crankshaft.

2. An attachment for lathes comprising a swinging frame, means for slidably mounting the frame on a lathe, a rocker arm pivoted to the said frame and having its free end arranged below a crankshaft secured in the lathe, a grinding wheel mounted for rotation at the free end of the rocker arm, a pivoted supporting arm extending from the frame to overlie the crankshaft immediately above the grinding wheel, an adjustable means connecting the supporting arm with the rocker arm for adjusting the said grinding wheel relative to the crankshaft, a guide arm mounted on the frame for sliding movement relative to the rocker arm and for pivotal movement into and out of engagement with the crankshaft, and means for detachably securing the guide arm to the said crankshaft.

3. An attachment for lathes comprising a swinging frame, means for slidably mounting the frame on a lathe, a rocker arm pivoted to the said frame and having its free end arranged below a crankshaft secured in the lathe, a grinding wheel mounted for rotation at the free end of the rocker arm, a pivoted supporting arm extending from the frame to overlie the crankshaft immediately above the grinding wheel, an adjustable means connecting the supporting arm with the rocker arm for adjusting the said grinding wheel relative to the crankshaft, an indicator means cooperative with the adjustable means for registering the relative adjusted positions of the said supporting and rocker arms, and means for detachably connecting the swinging end of the frame with one of the crank bearings of the crank shaft at one side of the bearing being ground.

4. An attachment for lathes comprising a swinging frame, means for slidably mounting the frame on a lathe, a rocker arm pivoted to the said frame and having its free end arranged below a crankshaft secured in the lathe, a grinding wheel mounted for rotation at the free end of the rocker arm, a pivoted supporting arm extending from the frame to overlie the crankshaft immediately above the grinding wheel, an adjustable means connecting the supporting arm with the rocker arm for adjusting the said grinding wheel relative to the crankshaft, and means for detachably connecting the swinging end of the frame with one of the crank bearings of the crankshaft at one side of the bearing being ground.

5. An attachment for lathes comprising a swinging frame, means for slidably mounting the frame on a lathe, a pair of relatively adjustable arms independently pivoted to the swinging end of the frame, one of said arms extending below a crankshaft mounted in the lathe and the other of the arms extending above the crankshaft, a grinding wheel mounted for rotation on the said first arm and being supported below the crankshaft by the second arm, a guide arm mounted on the frame for sliding movement relative to the first mentioned arms and for pivotal movement into and out of engagement with the crankshaft, and means for detachably securing the guide arm to the said crankshaft.

6. An attachment for lathes comprising a swinging frame, means for slidably mounting the frame on a lathe, a pair of relatively adjustable arms independently pivoted to the swinging end of the frame, one of said arms extending below a crankshaft mounted in the lathe and the other of the arms extending above the crankshaft, a grinding wheel mounted for rotation on the said first arm and being supported below the crankshaft by the second arm, a guide arm mounted on the frame for sliding movement relative to the first mentioned arms and for pivotal movement into and out of engagement with the crankshaft, and means for detachably securing the guide arm to the said crankshaft.

7. A grinding attachment comprising a frame pivoted for rocking movement about an axis parallel to the axis of rotation of the work to be ground, outwardly divergent arms independently

pivoted to the swinging end of the frame, one of the arms extending above and being supported by the work and the other of the arms extending below the said work, a grinding wheel carried by the last-mentioned arm, means for adjusting the arms relative to each other whereby to swing the wheel upwardly into engagement with the work, and means controlled by the movements of the work for holding the periphery of the wheel in a selected relation to the work regardless of the path traversed thereby.

8. A grinding attachment comprising a frame pivoted for rocking movement about an axis parallel to the axis of rotation of the work to be ground, outwardly divergent arms independently pivoted to the swinging end of the frame, one of the arms extending above and being supported by the work and the other of the arms extending below the said work, a grinding wheel carried by the last-mentioned arm, drive means for the wheel, means for adjusting the arms relative to each other whereby to swing the wheel upwardly into engagement with the work, and means controlled by the movements of the work for holding the periphery of the wheel in a selected relation to the work regardless of the path traversed thereby.

9. The combination with a lathe having means for supporting a crankshaft, an intermediately pivoted frame mounted on the lathe and slidable thereon, a grinding wheel mounted for rotation at one end of the frame, a motor mounted on the opposite end of the frame for rotating the grinding wheel, a pivoted supporting arm extending from the frame to overlie the crankshaft immediately above the grinding wheel, a link pivotally carried by the supporting arm and engaging the crankshaft from below, and a link connection between the intermediately pivoted frame and the pivotally supported arm, whereby the grinding disc can be drawn upwardly into engagement with the crank pin.

10. The combination with a lathe having means for supporting a crankshaft, an intermediately pivoted frame mounted on the lathe and slidable thereon, a grinding wheel mounted for rotation at one end of the frame, a motor mounted on the opposite end of the frame for rotating the grinding wheel, a pivoted supporting arm extending from the frame to overlie the crankshaft and provided with rollers engaging the crank pin, a link pivotally carried by the supporting arm and having rollers engaging the crank pin on its underside, means for adjusting the link in respect to the arm, and means connected to the intermediately pivoted frame and the pivoted arm, whereby the frame is moved to cause the grinding disc to engage the crank pin.

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