June 8, 1943. W. C. HANRAHAN 2,321,081

SHAFT GRINDER

Filed Nov. 10, 1941 2 Sheets-Sheet 1

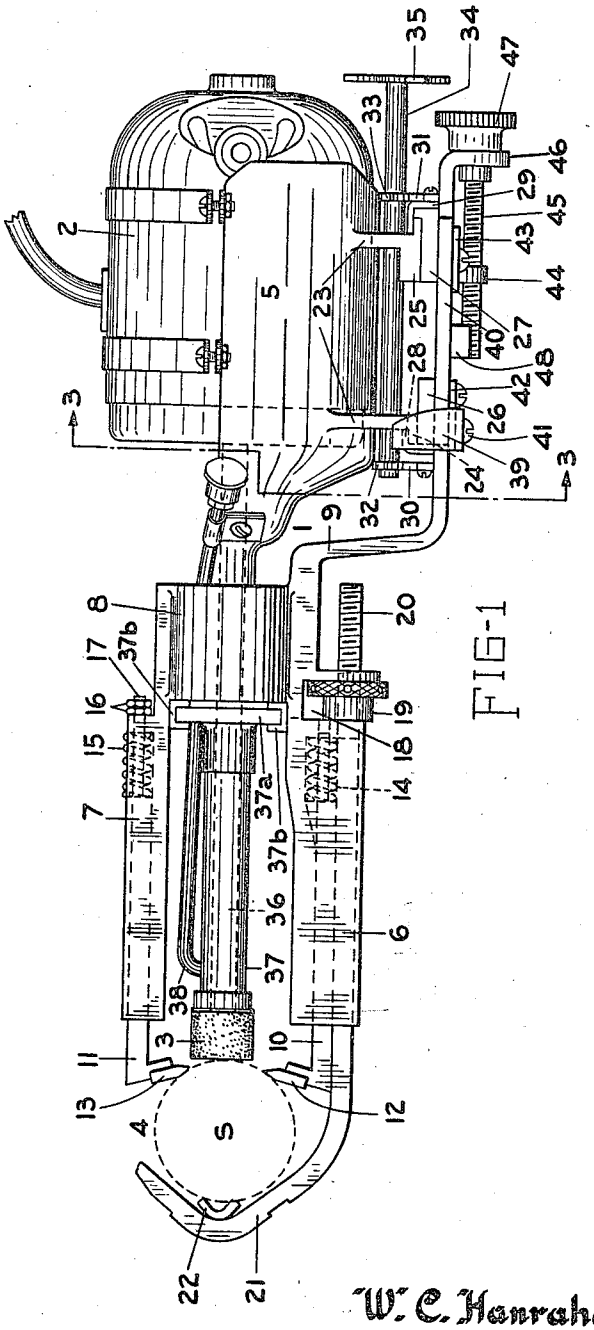


FIG-1

W. C. Hanrahan INVENTOR

BY Merrill M. Blackburn

ATTORNEY

June 8, 1943. W. C. HANRAHAN 2,321,081

SHAFT GRINDER

Filed Nov. 10, 1941 2 Sheets-Sheet 2

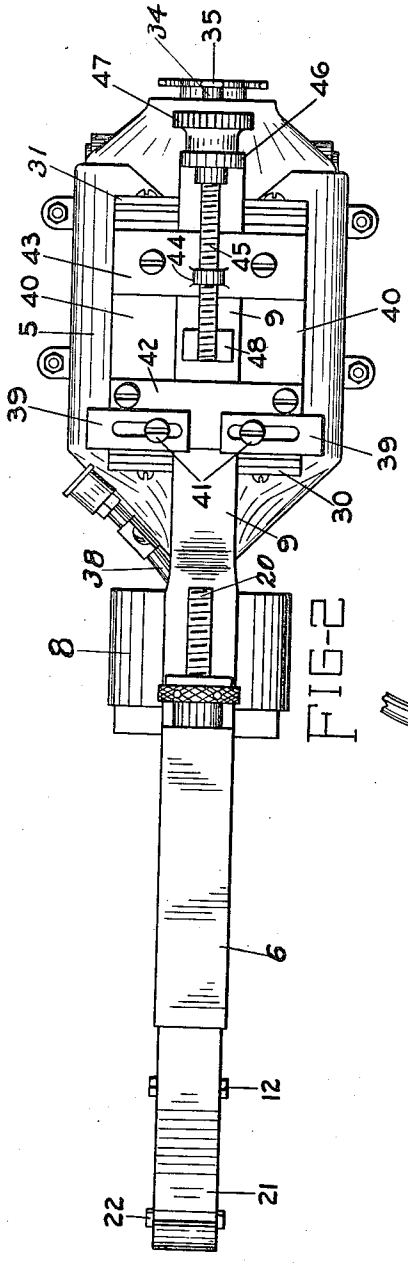


FIG-2

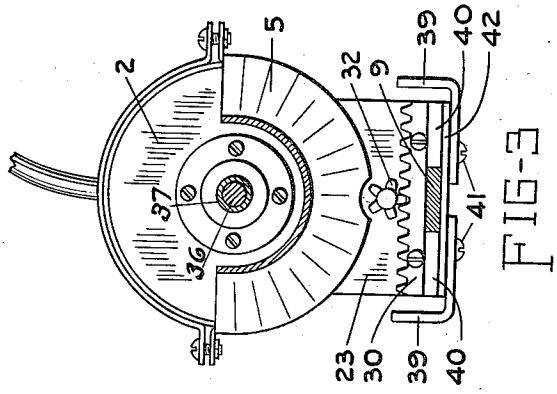


FIG-3

W. C. Hanrahan INVENTOR

BY Merrill M. Blackburn

ATTORNEY

Patented June 8, 1943 2,321,081

UNITED STATES PATENT OFFICE

2,321,081

SHAFT GRINDER

Wilfred C. Hanrahan, Iowa City, Iowa

Application November 10, 1941, Serial No. 418,485

5 Claims. (Cl. 51—241)

The present invention pertains to a mechanism for use in the grinding of shafts, whether this be the original grinding of the shaft or the regrinding thereof, necessitated by wear of the shaft.

Among the objects of this invention are the provision of an improved apparatus of the class referred to; the provision of an apparatus of the character indicated for the grinding of crank shafts provided with bearing portions and shoulders at the ends of the bearing portions; the provision of an apparatus for the purpose indicated equipped with means for definitely positioning this apparatus in such relation to the shoulders at the end of the bearing portions that the apparatus will not be capable of sidewise shifting along the crank shaft; the provision, in a mechanism of the character indicated, of means for shifting the motor and the grinding stone carried thereby, laterally, to cause the grinding of the shaft completely up to the shoulders, the machine being provided with adjustable stops to positively limit the lateral shifting of the grinding stone; the provision, in a machine of the character indicated, of a longitudinally adjustable forward stop which, during use, is normally held in fixed position with relation to the grinding stone; the provision of a machine of the character indicated in which the forward abutment stop and the grinding stone are adjustable with relation to each other but are normally fixed a definite distance from each other during the grinding operation but are adjustable at will to compensate for change in size of the shaft being ground; the provision, in a machine of the character indicated, of yieldable, spring-pressed abutments which will constantly hold a shaft being ground against a fixed forward abutment and as far away from the grinding stone as is possible, considering the adjustment of the machine; and such further objects, advantages, and capabilities as will hereafter appear and as are inherent in the structure disclosed herein. My invention further resides in the combination, construction, and arrangement of parts illustrated in the accompanying drawings and, while I have shown therein what is now regarded as the preferred embodiment of this invention, I desire the same to be understood as illustrative only and not to be interpreted in a limiting sense.

In the drawings annexed hereto and forming a part hereof,

Fig. 1 represents a side elevation of a structure embodying my present invention;

Fig. 2 represents a bottom plan view of this structure; and

Fig. 3 represents a section substantially along the plane indicated by the line 3—3, Fig. 1.

Reference will now be made in greater detail to the annexed drawings for a more complete description of this invention. Broadly, this invention comprises a support 1, a motor 2, a grinding wheel 3, and shaft clamping means 4. The support 1 comprises a cradle 5 for the reception and support of the motor 2, a pair of arms 6 and 7 for the support of rearward abutments, and a body 8 connecting the arms 6 and 7 and supporting them upon the bar 9 which forms the backbone of the whole assembly.

Supported and slidable in the arms 6 and 7 are a pair of abutment carrying arms 10 and 11, provided at their forward ends with removable and replaceable plates 12 and 13 which bear against the shaft being ground, designated in this instance by the letter S. Back of these members 10 and 11 are springs 14 and 15, housed in the supporting arms 6 and 7 and forcing the abutments 12 and 13 forwardly into engagement with the shaft being ground. The forward movement of the plate or abutment 13 may be limited by the nuts 16 on the screw-threaded end of the member 17 forming a continuation of the bar 11. These nuts bear against a shoulder of the arm 7, as is clear from Fig. 1, and definitely prevent forward movement of the arm 11 beyond a certain predetermined point. The lower arm 6 is notched, as indicated at 18, for the reception of the adjusting nut 19 having screw-threaded connection with the threaded end 20 of the forward abutment jaw 21. This forward jaw has a V-shaped abutment member 22 corresponding to the members 12 and 13, and it is against this that the shaft S is forced by the springs 14 and 15 pressing forwardly on the bars 10 and 11. The distance between the abutment member 22 and the grinding wheel 3 may be adjusted by properly positioning the nut 19 on the shaft 20. Naturally, this will be positioned in accordance with the greatest diameter of the shaft S at the point where the grinding is to take place. The springs 14 and 15, through the bars 10 and 11 and the plates 12 and 13, hold the shaft forwardly against the abutment member 22, normally tending to press it away from the grinding wheel 3. Therefore, if there are any high spots to be ground from the shaft, the forward abutment jaw 21 will be adjusted by means of the nut 19 in accordance with the diameter of the shaft, and only the high spots on the shaft will

be hit by the grinding wheel 3 as the shaft is rotated slowly to bring all parts of the shaft into proximity to the grinding wheel. Since there is a definite distance between the abutment 22 and the stone 3 and the shaft is pushed against the abutment 22, it is clear that the wheel 3 can touch only the projecting high spots. As the high spots are ground away and the nut 19 is adjusted to bring the forward abutment closer to the stone, more and more of the shaft will be hit by the stone as the grinding progresses, until finally the bearing surface is again cylindrical.

It should be noted in passing that the abutments 12, 13, and 22 are normally of the same length, and this length is just sufficient to fit between the shoulders at the ends of the bearing part of a crank shaft. Abutments of different lengths may be provided to correspond to the different lengths of the bearing portions of such cranks. The parts 12, 13, and 22 are secured in place by means of screws passing therethrough to hold them to their respective supports.

The cradle 5 has legs 23 for supporting it upon the support 1. These legs are provided with feet 24 and 25 which are located in guideways formed by the plates 26 and 27 and the angular members 28 and 29. To these angular members 28 and 29 and the plates 26 and 27 are secured racks 30 and 31 which cooperate with pinions 32 and 33 secured to the shaft 34 which is provided at its rear end with a hand wheel 35. A spacer bar separates the angular member 28 and the rack 30. The legs 23 are in the form of cross-members which extend across under the cradle and are secured thereto, these members being provided with openings for the reception of the shaft 34 which therefore has bearings in which it may rotate. The pinions 32 and 33 upon the shaft 34 mesh with the racks 30 and 31 and travel along the same as the hand wheel 35 is rotated. This results in lateral adjustment of the cradle 5 and the motor 2 carried thereby, and also adjusts the shaft 36 which is either the motor shaft or an extension thereof, preferably the latter, although, functionally, it may be regarded as the motor shaft. This shaft is housed in a tubular member 37 passing through a slide 37*a* operating in slideways 37*b*, and lubricant may be forced into the space between the shaft and its housing through the lubricating tube 38, of any suitable size and type. The grinding stone 3 is secured to the forward end of the shaft 36 and therefore rotates about the axis of this shaft. It will therefore be seen that the structure just described provides means for adjusting the grinding stone laterally to grind the full length of the bearing portion of the shaft S.

In order to prevent the grinding stone from grinding the shoulders at the ends of the bearing portion, adjustable stops 39 are provided which are secured to the bars 40 by means of screws 41. These stops are adjusted to such positions that the forward leg 23 will abut against the stops 39 at the same time that the stone 3 reaches a shoulder of the shaft S. Naturally, if the bearing portion is longer or shorter, it would be necessary to adjust the stops 39 accordingly so as to permit the stone to traverse the full length of the bearing portion but not travel so far as to grind off the inside faces of the shoulders.

The bar 9 extends rearwardly between the bars 40 and is held in place against the plates 26 and 27 by the cross-plates 42 and 43. It is clear that the plate 43 is held rigidly in place with relation to the plates 40 by the screws passing therethrough and into said plates 40. The cross-plate 43 is provided with an internally screw-threaded loop 44 for reception of the screw 45 which passes through the downwardly extending portion 46 at the rear end of the bar 9. It is clear that this extension prevents the screw 45 from moving forwardly or rearwardly with relation to the bar 9 and that, therefore, the cross-bar 43, together with the cradle 5 and motor 2, must move forwardly or rearwardly relatively to the bar 9 when the screw 45 is turned. The screw 45 is provided with a head 47 by means of which it may be turned. A friction block 48, perhaps made of rubber, prevents inadvertent rotation of the screw 45 and, therefore, holds the machine in longitudinal adjustment.

In the use of this machine, the shaft S is so mounted that it can be turned about its axis of rotation, and then the screw 45 is turned sufficiently to separate the jaw 21 from the abutment member 13 far enough to admit the shaft S between the abutment member 13 and the end of the hook 21. Then the screw 45 is adjusted until the grinding stone 3 just touches the shaft S at its point of greatest diameter. Now the motor is started and the shaft S is turned about its axis to permit the stone to touch and grind off any projecting parts of the shaft. In order to make this grinding complete throughout the length of the bearing portion, it is necessary to turn the hand wheel 35 so that the pinions 32 and 33, cooperating with the racks 30 and 31, will carry the motor and grinding stone back and forth crosswise of the length of the bar 9. If, by this time, the stone 3 does not touch all parts of the surface of the bearing part of the shaft, the screw 45 is turned again slightly to bring the stone 3 into contact with the shaft. Thus, another cut is made on the shaft to reduce still more any projecting parts of the bearing surface. During this operation, it is preferable to let the motor hang down below the shaft S so that the weight thereof will assist the springs 14 and 15 in holding the shaft against the abutment 22, or the abutment 22 against the shaft. However, this is not essential since the springs are stiff enough to insure a fair contact between the shaft and the abutment. When the grinding has been completed, the screw 45 is turned in the opposite direction to separate the abutment 13 and the end portion of jaw 21 so as to permit removal of the grinding machine from the shaft.

It will of course be understood that the specific description of structure set forth herein may be departed from without departing from the spirit of this invention as set forth in the appended claims.

Having now described my invention, I claim

1. In a grinder for shafts having bearing spaces and shoulders at the ends of said spaces; an abutment jaw against which a shaft may be held, a plurality of movable jaws to be spring-held against said shaft, longitudinal supports for said jaws extending substantially perpendicular to the axis of said shaft, a support for the jaw supports, means for positively adjusting the distance of the support from the abutment jaw, and resilient means for resiliently holding the movable jaws toward the abutment jaw.

2. In a grinder for shafts having bearing spaces and shoulders at the ends of said spaces; an abutment jaw against which a shaft may be held, a plurality of movable jaws to be spring-held

against said shaft, longitudinal supports for said jaws extending substantially perpendicular to the axis of said shaft, a support for the jaw supports, means for positively adjusting the distance of the support from the abutment jaw, resilient means for resiliently holding the movable jaws toward the abutment jaw, a motor and its shaft adjustably carried by said support, and a grinding element carried by the motor shaft in proximity to the plurality of jaws to engage and grind a shaft held by the jaws.

3. In a grinder for shafts having bearing spaces and shoulders at the ends of said spaces; an abutment jaw against which a shaft may be held, a plurality of movable jaws to be spring-held against said shaft, longitudinal supports for said jaws extending substantially perpendicular to the axis of said shaft, a support for the jaw supports, means for positively adjusting the distance of the support from the abutment jaw, resilient means for resiliently holding the movable jaws toward the abutment jaw, a motor and its shaft adjustably carried by said support, a grinding element carried by the motor shaft in proximity to the plurality of jaws to engage and grind a shaft held by the jaws, and removable and replaceable stop members on the plurality of jaws to fit between said shoulders and hold the grinder substantially immovable longitudinally of the shaft being ground.

4. In a grinder for shafts having bearing spaces and shoulders at the ends of said spaces; an abutment jaw against which a shaft may be held, a plurality of movable jaws to be spring-held against said shaft, longitudinal supports for said jaws extending substantially perpendicular to the axis of said shaft, a support for the jaw supports, means for positively adjusting the distance of the support from the abutment jaw, resilient means for resiliently holding the movable jaws toward the abutment jaw, a motor and its shaft adjustably carried by said support, a grinding element carried by the motor shaft in proximity to the plurality of jaws to engage and grind a shaft held by the jaws, and a removable and replaceable stop member on at least one of the plurality of jaws to engage the shaft being ground and limit the amount of movement of the grinder longitudinally of said shaft.

5. In a grinder for shafts having bearing spaces and shoulders at the ends of said spaces; an abutment jaw against which a shaft may be held, a plurality of movable jaws to be spring-held against said shaft, longitudinal supports for said jaws extending substantially perpendicular to the axis of said shaft, a support for the jaw supports, means for positively adjusting the distance of the support from the abutment jaw, resilient means for resiliently holding the movable jaws toward the abutment jaw, a motor and its shaft adjustably carried by said support, a grinding element carried by the motor shaft in proximity to the plurality of jaws to engage and grind a shaft held by the jaws, and adjusting means connected to the motor and the last mentioned support whereby the motor and its shaft may be positively moved toward or away from the abutment jaw.

WILFRED C. HANRAHAN.