Jan. 17, 1950 E. McMASTER 2,494,569

CRANKSHAFT BALANCER

Filed Nov. 19, 1947 2 Sheets-Sheet 1

Fig. 1.

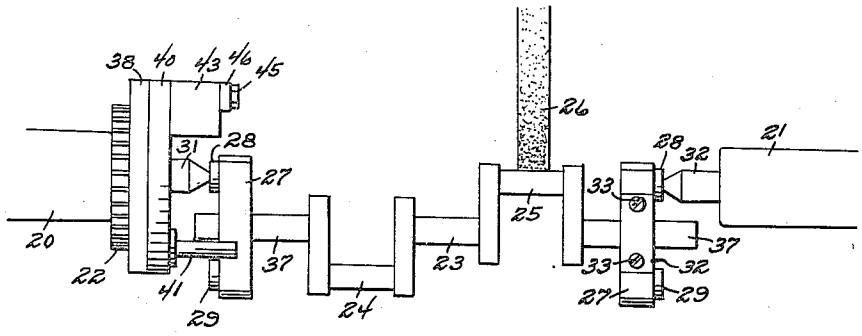


Fig. 2.

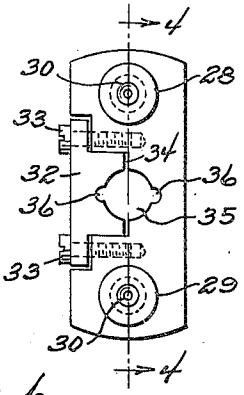


Fig. 3.

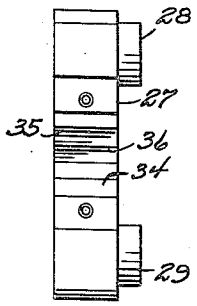


Fig. 4.

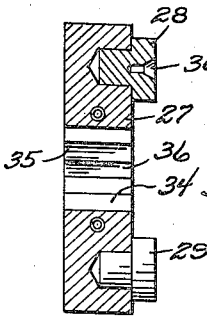


Fig. 5.

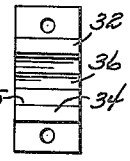


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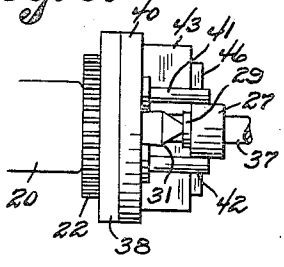


Fig. 7.

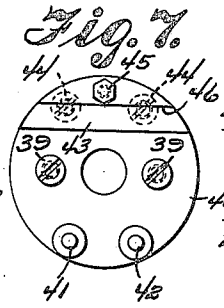


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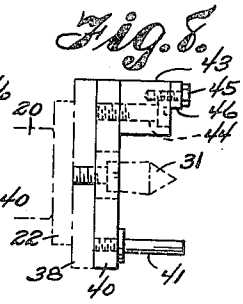
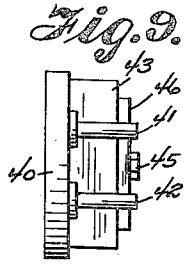


Fig. 9.



INVENTOR.
Edward McMaster
BY
Victor J. Evans & Co.
ATTORNEYS

Jan. 17, 1950 E. McMASTER 2,494,569

CRANKSHAFT BALANCER

Filed Nov. 19, 1947 2 Sheets-Sheet 2

Fig. 10.

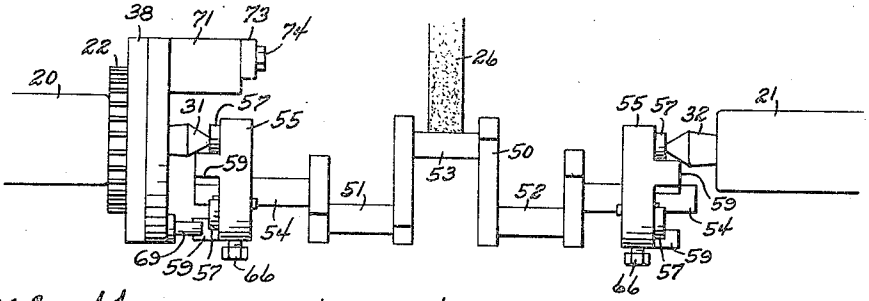


Fig. 11.

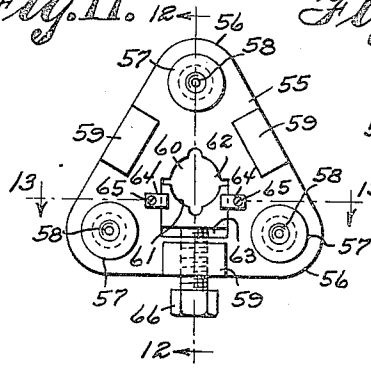


Fig. 12.

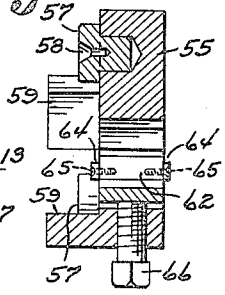


Fig. 14.

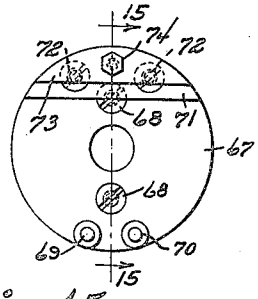


Fig. 13.

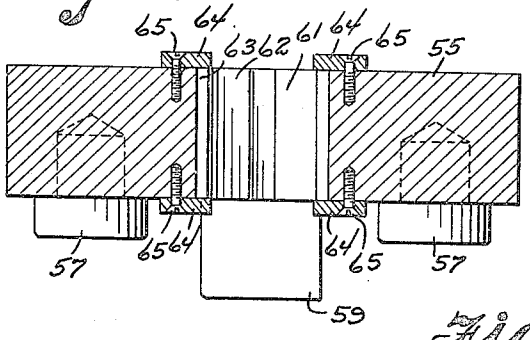


Fig. 15.

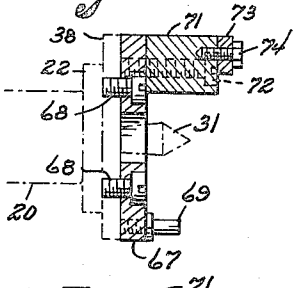


Fig. 16.

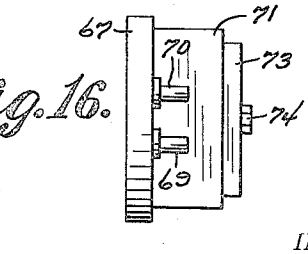
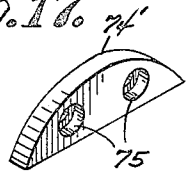


Fig. 17.



INVENTOR.

Edward McMaster

BY Victor J. Evans & Co.

ATTORNEYS

Patented Jan. 17, 1950

2,494,569

UNITED STATES PATENT OFFICE

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CRANKSHAFT BALANCER

Edward McMaster, Sandwich, Ill.

Application November 19, 1947, Serial No. 787,012

3 Claims. (Cl. 51—237)

1

My present invention relates to an improved crankshaft balancer of the type especially adapted for use when grinding or otherwise reinforcing the worn crank pins of a crank shaft.

Normally in trueing or grinding a connecting rod bearing on a crankshaft, the crankshaft and holders therefor are badly unbalanced with the result that a perfect grinding cannot be had.

The device of my invention will overcome this difficulty, and permit a perfect grinding operation.

In the accompanying drawings, I have illustrated one complete example of the physical embodiment of my invention, according to the best mode I have thus far devised, but it will be understood that various changes and alterations may be made in the exemplified structure within the scope of the appended claims.

In the drawings:

Figure 1 is a side elevational view of a crankshaft in a grinding tool support;

Figure 2 is an elevational view of one bearing block;

Figure 3 is a side elevational view of the block with the securing or clamp block removed;

Figure 4 is a sectional view at line 4—4 of Figure 2;

Figure 5 is a view of the clamp block;

Figure 6 is a bottom plan view of the device showing both drive pins engaged;

Figure 7 is a front elevational view of the balance device;

Figure 8 is an elevational view of the balance device with the cooperating head plate shown in dotted lines;

Figure 9 is a bottom view of the device similar to Figure 6 with parts removed;

Figure 10 is an elevational view of a modified bearing block for the crankshaft in a guiding tool support;

Figure 11 is an elevational view of the modified block, per se;

Figure 12 is a sectional view on the line 12—12 of Figure 11;

Figure 13 is an enlarged sectional view on the line 13—13 of Figure 11;

Figure 14 is an elevational view similar to Figure 7 of a modified form of balance device;

Figure 15 is a sectional view on the line 15—15 of Figure 14;

Figure 16 is a bottom view of Figure 14 and

Figure 17 is a perspective view of a modified form of balance weight.

Referring now to the drawings, and more especially to Figures 1 to 9, inclusive, wherein I have

2

illustrated one form of the embodiment of my invention, wherein I employ the conventional head stock 20 and tail stock 21 of a grinding machine, the head having a gear 22 driven by suitable means to rotate the crankshaft 23 so that the offset cranks 24 and 25 respectively may be separately rotated against the grinding wheel 26.

Bearing blocks 27 have bearing cups or center blocks 28 and 29 having the central conical shaped sockets 30 for receipt of the center pins 31 and 32 respectively of the head and tail stock of the grinding machine. Removable clamp block sections are secured by bolts 33 in the recesses 34 in one side of the blocks 27 intermediate of the cups 28 and 29 respectively. The block and clamp section assembly respectively having openings 35 formed by diametrically opposed recesses 36 to clamp onto the ends 37 of the shaft 23. Secured to the head plate 38, by means of screws 39, is a circular centerbored plate 40, which is of the same configuration as the head plate 38.

The screws 39 are spaced along a transverse center of the plate 40, and on one side of this center, adjacent the periphery of the plate 40, there are removably mounted, the diametrically opposed drive pins 41 and 42 respectively. These pins engage on opposite sites of the bearing block 27 to rotate the shaft 23.

To offset the tendency of the pins 41 and 42 to throw the plate 40 off balance, a weight 43 is secured to the plate 40 on the opposite side of the center, adjacent the periphery of the plate 40 by bolts 44, to balance the pins and the crankshaft and holders therefor. In both instances, the heads of the screws 39 and the heads of the bolts 44 are countersunk within the face of the plate 40 and the weight 43.

Secured to the face of the weight 43, by a bolt 45, is a balancing weight 46 which is used to balance the crankshaft and its assembly so that when rotating the shaft, a perfect grinding is obtained. This weight being used when a lot of stock must be removed from the crankshaft. The weight can be disconnected after the excess stock has been removed, still leaving the crank and holders perfectly balanced. Therefore, before grinding the crankshaft 23, the assembly, including the shaft and the bearing blocks, is adjusted so that the cups 28 or 29 will be used, which most nearly conforms to the axis of rotation through the crankshaft 23.

With the assembly mounted as in Figure 1, and the head stocks 20 rotating, the pins 41 and 42 will engage the block 27 and cause the shaft 23

to rotate against the wheel 26 in perfect balance, thereby obtaining a perfectly rounded surface at the cranks 24 and 25 respectively. As previously stated, the weight 46 is used to obtain the perfect balance of the shaft.

In Figures 10 to 17, inclusive, there is shown a modified form of my invention in use with a crankshaft 50 which is dissimilar in shape to the crankshaft 23.

The crank 50 has the cranks 51 and 52 respectively lying in the same plane with an offset crank 53, and the ends 54 of the crank 50 are mounted as later described.

The modified form of bearing block 55 is in the form of an equilateral triangle having rounded apexes 56 and, mounted at each apex, is a bearing cup or center block 57, having the conical shaped center sockets 58 for receipt of the center pins 31 and 32 of the head and tail stock of the grinding machine.

Formed on the face of the block 55 in upstanding relation thereto, centrally of the cups 57, are the projections 59, the use of which will be later described.

At the center of the block 55, there is provided a semi-circular recess 60, confronting a similar recess 61 in a clamp block 62, and these recesses form the opening 62 which engage the ends of the crank 50.

The block 62 is slidably mounted in the cutout 63, in the block 55. Guide plates 64 secured by screws 65 to both faces of the block 55 on opposite sides of the cutout 63 in overlapping relation to the clamp block 62 retain this block in the cutout 63. A bolt 66 entering the edge of the block 55, at right angles thereto, enters the cutout 63 to engage the clamp block 62, whereby the block is forced into clamping position on the end 54 of the crank 50.

The center bored plate 67 is similar in shape to plate 40, but the screws 68 securing this plate to the head plate 36 are on the vertical center line of the plate. The drive pins 69 and 70 therefor are removably mounted on the plate 67 on opposite sides of the center line adjacent the lower peripheral edge of the plate. These pins engage the projections 59 on opposite sides thereof to rotate the shaft, as previously described. A weight 71 is secured to the plate 67 in similar manner as is the weight 43, and the screws 72 are on opposite sides of the center, as defined by the screws 68. A balancing weight 73, similar to the weight 46, is secured to the weight 71 by a bolt 74 for the same purpose, as the weight 46.

Should a larger crank be used, and a heavier balancing weight be desired, the weight 74 shown in Figure 7 having openings 75 for two bolts to fasten it to the weights 46 or 71 is used, the opening 75 aligning with the bolts used to secure the latter weights to their respective plates.

The operation of this form of the invention is similar to the operation of the form shown in Figures 1 to 9, inclusive.

There is thus provided a device for automatically balancing a crankshaft during the grinding thereof, eliminating the use of counterweights on the crankshaft or holder blocks, eliminating having to shift weights during the grinding of the crankshaft, and eliminating having to shift or move the crank or holders therefor.

It is believed that the foregoing description will clearly point out to those skilled in the art, the construction and manner of use of the device, and it is to be understood that changes in the minor details of construction, arrangement and combination of parts may be resorted to, provided they fall within the spirit of the invention and the scope of the appended claims.

Having thus fully described my invention, what I claim as new and desire to secure by Letters Patent is:

1. The combination with a lathe having a head stock and a tail stock each of which is provided with a center pin to receive a crankshaft to be ground, of a pair of bearing blocks each of which is provided with a central opening therein to receive an end of the crankshaft, removably mounted bearing cups at the ends of said blocks to eccentrically receive said center pins, a balance plate secured to the head stock, a pair of relatively spaced eccentric drive pins on said plate adapted to have operational engagement with said blocks for the rotation thereof a weight on said plate in opposed relation to said pins to counterbalance the pins and the blocks and a detachable weight on the first weight to counterbalance the crankshaft.

2. The invention as in claim 1 wherein said bearing blocks are rectangular in shape having a centrally located recess in one side thereof to receive a clamp section whereby said blocks are fixed to said crankshaft and the drive pins are adapted to engage the opposite sides of said block.

3. The invention as in claim 1 wherein said bearing blocks are triangular in shape having an adjustable clamp block therein to engage said crankshaft to retain said block on said crankshaft and projections are provided on one face of said block centrally of each side thereof to engage the drive pins on said plate.

EDWARD McMASTER.

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