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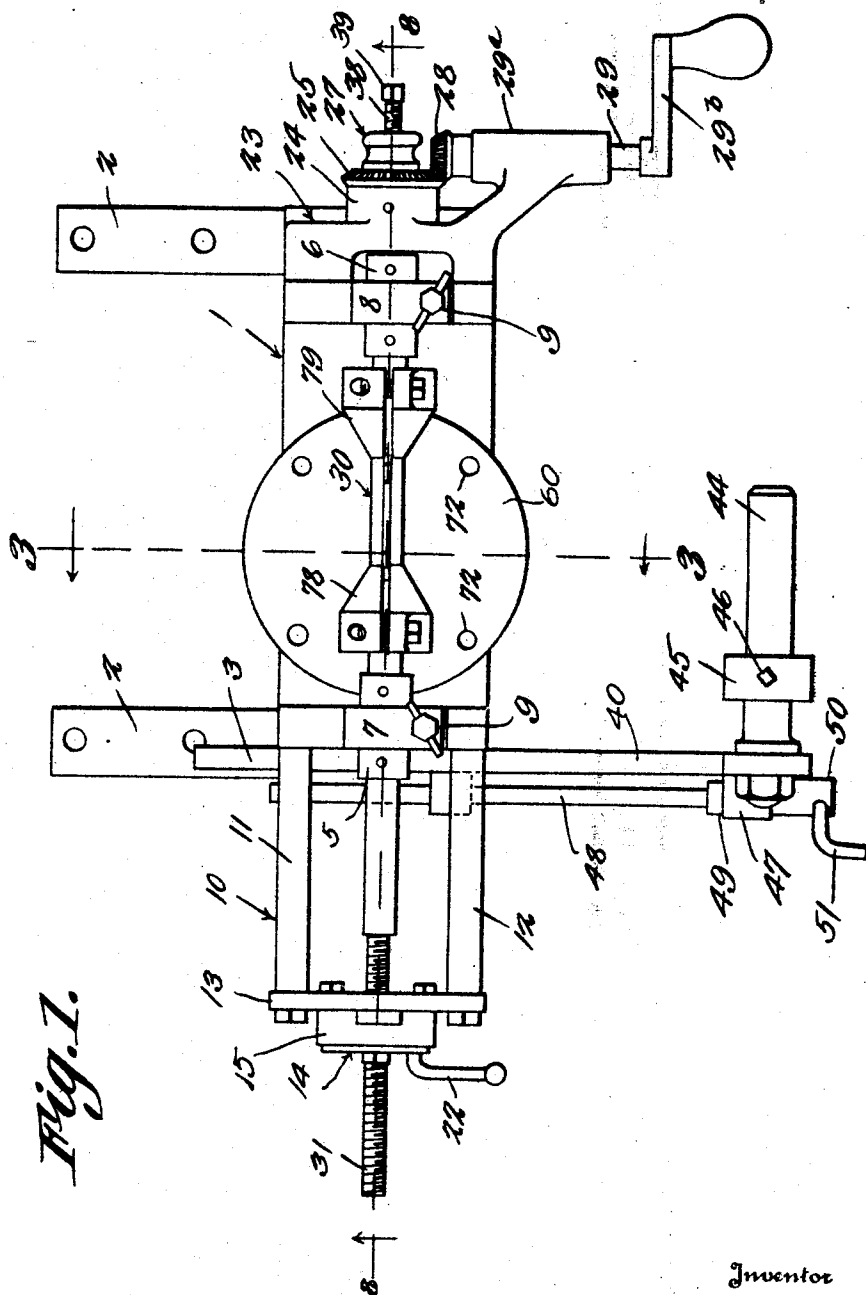
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J. BURGH

REAMING MACHINE

Filed July 18, 1922

4 Sheets-Sheet 1



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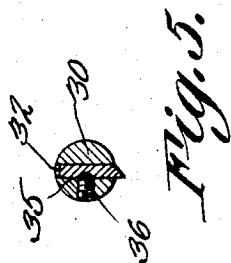
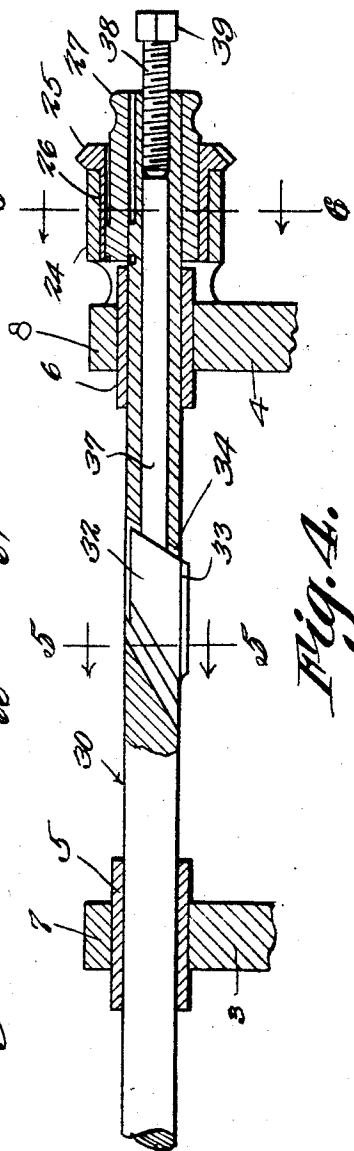
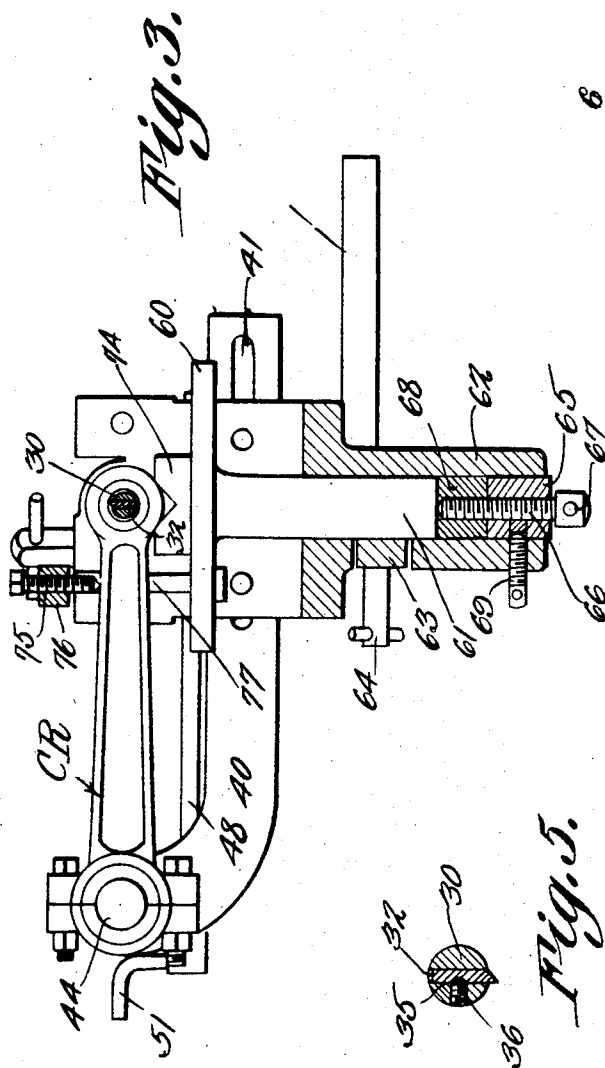
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4 Sheets-Sheet 3



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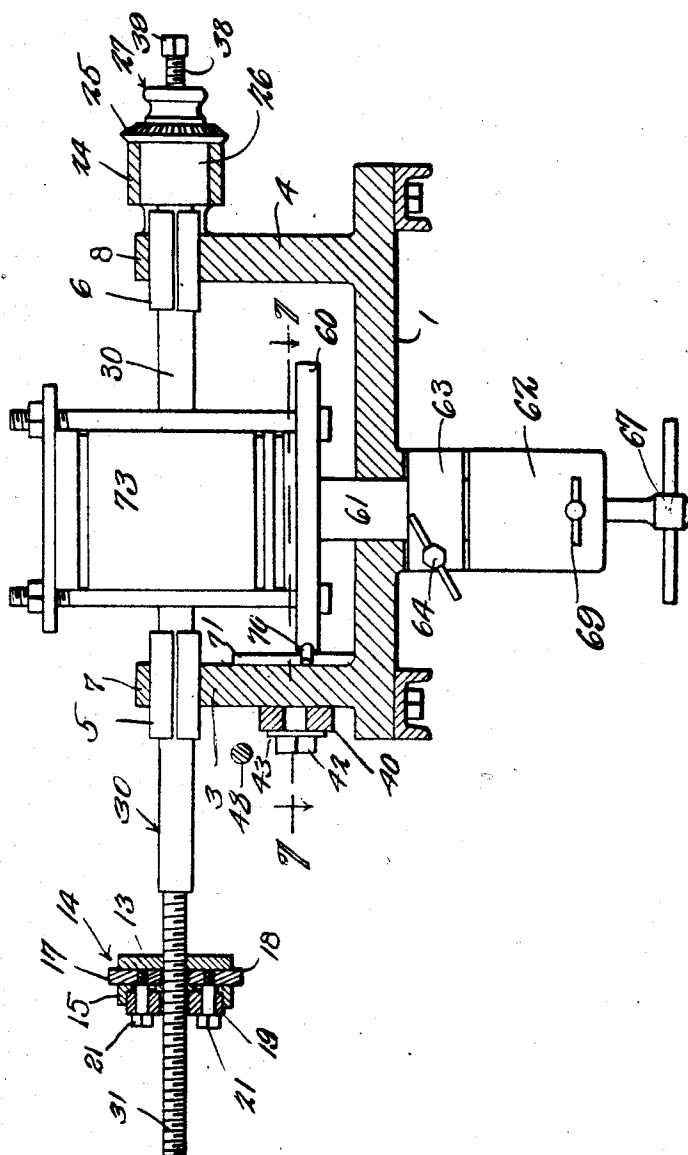
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Fig. 8.



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UNITED STATES PATENT OFFICE.

JOHN BURGH, OF DENVER, COLORADO.

REAMING MACHINE.

Application filed July 18, 1922. Serial No. 575,796.

To all whom it may concern:

Be it known that I, JOHN BURGH, a citizen of the United States, residing at Denver, in the county of Denver and State of Colorado, have invented a new and useful Reaming Machine, of which the following is a specification.

This invention relates to reaming machines and more particularly to machines for reaming pistons and connecting rods for internal combustion engines.

The object of the invention is to provide a machine of this character constructed so as to obtain perfect alinement or paralleling of the axial centers of cylindrical bores or shafts, more especially connecting rod bearings with the wrist or piston pin of internal combustion engines.

Another object is to provide a reaming machine constructed so as to maintain accurate dimensions and the axis of the bearings absolutely perpendicular to the longitudinal axis of the connecting rod.

Another object is to provide an improved cutter bar for use in a machine of this character, together with improved means for operating it.

Another object is to provide improved means for centering up the work to be reamed and adjustable means to accommodate rods of different lengths.

With the foregoing and other objects in view which will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed, it being understood that changes in the precise embodiment of the invention herein disposed may be made within the scope of what is claimed without departing from the spirit of the invention.

In the accompanying drawings:—

Figure 1 represents a plan view of a reaming machine constructed in accordance with this invention.

Fig. 2 is an end elevation thereof.

Fig. 3 is a transverse vertical section taken on the line 3—3 of Fig. 1.

Fig. 4 is a detail longitudinal section

showing the mounting of the cutter bar and the location of the tool therein.

Fig. 5 is a detail transverse section taken on the line 5—5 of Fig. 4.

Fig. 6 is a detail transverse section taken on the line 6—6 of Fig. 4.

Fig. 7 is a detail horizontal section with the work supporting table shown in plan, and

Fig. 8 is a longitudinal section with parts in elevation showing a piston mounted on the machine ready to be reamed.

In the embodiment illustrated, a base plate 1 is shown having laterally extended apertured attaching arms 2 for mounting it on a suitable support. Rising from opposite ends of the plate 1 are two standards 3 and 4 in which bronze bushings or journals 5 and 6 are mounted and removably held by clamps 7 and 8 secured in position by set screws 9.

Projecting laterally from the outer face of the standard 3 is a frame 10 which comprises parallel side bars 11 and 12 connected at one end with the standard 3 and connected at their other ends by a cross bar or plate 13 which carries on its outer face a lever actuated feed screw engaging member 14.

This member 14 comprises an annular member 15 mounted on a plate 16 carried by the cross bar 13, said plate 16 being peripherally apertured at diametrically opposite points, to form seats for sliding plates 17 and 18 which are designed to be projected and retracted radially by means soon to be described to bring them into and out of engagement with a feed screw of the cutter carrying shaft 30, hereinafter to be described.

Mounted to oscillate in the annular casing 15 is a disk 19 having arcuate cam slots 20 therein through which extend headed studs 21 carried by the radially movable plates 17 and 18 so that when said disk 19 is turned in one direction or the other, these plates 17 and 18 will be projected or retracted. An operating finger or handle 22 is carried by the disk 19 in con-

venient position for actuating the disk to project and retract the plates 17 and 18 to cause them to engage or release the threaded extension 31 of the cutter carrying shaft 30. The inner ends of the plates 17 and 18 are threaded and curved to conform to the extension 31 of the cutter shaft so that when these plates are engaged with said extension, the turning of the shaft 30 will operate to feed it longitudinally through the bearings or bushings 5 and 6.

Carried by the outer face of the standard 4 is a bracket or casting 23 which has a bearing 24 formed therein alining with the bushing 6. A beveled gear 25 has a sleeve 26 extending rearwardly therefrom and rotatably mounted in the bearing 24. A driving sleeve 27 is mounted in the sleeve 26 of the beveled gear, being connected therewith for rotation by keying it to said sleeve. This driving sleeve 27 is connected with the cutter bar or shaft 30, also by means of a key, so that when the beveled gear 25 is rotated, the driving sleeve 27 will be turned therewith and will communicate motion to the cutter shaft 30.

A beveled pinion 28 meshed with the gear 25 and is carried by a shaft 29 mounted for rotation in a bearing 29^a on the casting or bracket 23, and which may be rotated by any suitable means, a handle 29^b being here shown for this purpose.

The cutter shaft 30 which is keyed to the driving sleeve 27, extends through the bushings 5 and 6 and has adjustably mounted therein, a cutting blade 32. This blade 32 is constructed as shown in Fig. 4, with a heel 33 designed to extend through a slot 34 in the bar 30, and which limits the movement of the cutter in one direction. This cutter 32 tapers toward its front end and is longitudinally grooved as shown at 35 to receive a set screw 36 which holds it in adjusted position and yet permits it to be moved longitudinally. (See Fig. 5.)

A plunger 37 is mounted in one end of the shaft 30 and is designed to engage the rear end of the blade 32 for projecting it radially to vary the cutting depth. This plunger 37 is operable in the bar 30 by means of a screw 38 threaded in the outer end of said shaft and movable by means of a head 39 which affords a suitable finger grip.

A work holder for supporting the connecting rod or other article to be reamed is here shown in the form of an arm 40 longitudinally slotted at 41 for the reception of a connecting bolt 42 here shown with a washer 43 located thereunder between the head thereof and the arm, and which permits the arm 40 to be moved longitudinally on the standard 3 which carries said bolt for adjusting the outer end of the bar toward or away from the cutter shaft 30. The free

end of the arm 40 is preferably upturned and has extending laterally inward therefrom an arbor 44 which is designed to receive one end of the connecting rod CR shown in Fig. 3. A collar 45 is adjustably mounted on the arbor 44 and is held in adjusted position thereon by a set screw 46. This collar is designed as an abutment for the head of the connecting rod when applied, so that when said collar is set in the proper position, the connecting rod may be applied and removed from the arbor 44, and yet insure its being positioned properly for recutting when necessary.

A sleeve 47 extends laterally from the outer face of the upturned end of the arm 40 with the bore thereof extending parallel with the body of the arm and in which is designed to be mounted for rotation, a feed screw 48. This screw 48 has a collar 49 at the inner end of the threaded portion thereof and at its terminal is equipped with a head 50. The sleeve 47 is located between the collar 49 and the head 50 of the feed screw 48 for holding said screw against longitudinal movement relatively to the arm and yet permit it to be rotated. A hand grip 51 extends laterally from the head 50 and is designed to be grasped for rotating the screw 48 for a purpose presently to be described.

A nut 52 is carried by a bolt 53 which extends through the slot 41 in the arm 40 and is mounted on the standard 4. The threaded portion of the feed screw 48 engages this nut 52 so that when the screw is rotated, it will operate to slide the arm 40 back and forth, according to the direction in which the screw is turned for adjusting the arbor 44 toward or away from the cutter shaft 30 to adapt the machine to be used in connection with connecting rods of varying lengths. The arbor 44 is thus always held parallel with the shaft 30 thereby properly positioning the end of the connecting rod to be reamed.

A work supporting table 60 is mounted for vertical adjustment in the bed plate 1 being provided on its lower face with a centrally disposed pedestal 61 which operates in a sleeve 62 depending from the lower face of the bed plate and which is equipped at its upper end with a clamp 63 which is held engaged with the pedestal 61 by means of a set screw 64 which when in position, will securely clamp the pedestal in the sleeve 62, and thereby assist in holding the table in adjusted position.

Mounted in the lower end of the sleeve 62 is an adjusting block 65 through which operates a threaded rod 66 having a head 67 for rotating it. This rod 66 bears at its inner end against the lower end of the pedestal 61 and is designed for raising the table 60 when desired, or for permitting it to be

lowered, it being obvious that when the rod 66 is screwed out, the table will be permitted to drop, since the pedestal 61 will be unsupported by said screw. This screw or rod 66 preferably carries at its inner end an abutment block 68 which bears against the lower end of the pedestal, as is shown clearly in Fig. 3. A set screw 69 extends laterally through the sleeve 62 and the block 65, and is designed to engage the rod 66 and hold it in adjusted position.

A lug 70 projects radially from the perimeter of the table 60, and is designed to engage a stop 71 carried by the inner face of the standard 3 for limiting the rotation of the table. The table top is provided with a plurality of apertures 72 which are designed to receive pins or bolts for securing work to be held by the table which as shown in Fig. 8, is in the form of a piston, 73 having the usual openings in its opposed side walls for the reception of the connecting rod pins, and through which the cutter shaft 30 is designed to be passed when these openings are to be reamed.

To hold the free end of the connecting rod CR in proper position on the shaft 30, a U-block 74 is mounted on the table 60 and is designed to receive the end of the connecting rod to be reamed, as is shown clearly in Fig. 3, said rod being held engaged with said block by means of a set screw 75 which passes through a cross bar 76 carried by pins or bolts 77 which extend through two of the apertures in the table 60.

In the use of this reamer, when it is desired to ream a connecting rod to insure the alinement or true boring of the bearings in the connecting rod, the rod is engaged with the spindle 44 and clampingly held secured thereto as shown in Fig. 3. The end to be reamed is then positioned on the block 74 as shown in Fig. 3, and the cutter bar 30 passed therethrough, the rod being properly centered by means of two cone-shaped heads 78 and 79 removably and adjustably mounted on the bar 30. After the rod has been properly centered, by means of these cone-shaped heads, and clamped in operative position, the cutter bar 30 is removed by first loosening the set screws 9 and then drawing out the bar, together with the driving sleeve 27 which will permit the removal of the cone-shaped heads, 78 and 79. After removing these heads, the bar is replaced with the cutter 32 located in position for reaming out the connecting rod. This bar 30 is then rotated by means of the handle 29^b which through the meshing pinion and gear 28 and 25 respectively and the driving sleeve 27 rotate the bar 30 and a cutter 32 carried thereby, reaming out the interior of the connecting rod journal. When it is de-

sired to ascertain whether this rod has been cut out sufficiently, the cutter bar 30 is again removed and the rod swung upwardly to examine the opening. If further reaming is required, it is again lowered onto the U-block and clamped the cutter bar again inserted and another reaming operation is effected.

The cone-shaped heads 78 and 79 are shown split and are held in clamped engagement with the bar 30 by means of screws which extend through registering threaded apertures in the split portions of said heads as is shown clearly in Fig. 1.

It is of course understood that when it is desired to feed the cutter bar longitudinally, the bar engaging plates 17 and 18 are moved inwardly into gripping engagement with the threaded extension 31 of the cutter bar, whereby the turning of the bar operates to feed it longitudinally. When the bar is to be removed these plates 17 and 18 are expanded by turning the cam disk 19 which operates through the headed studs 21 in connection with the cam slots 20 to move the plates 17 and 18 outward, releasing the extension 31 and permitting the bar 30 to be rotated without longitudinal movement or to be withdrawn at the will of the user.

When a piston 73 is to be reamed, it is placed on the table 60 as shown in Fig. 8, and clamped thereto in the same manner that the head of the connecting rod is mounted and the cutter bar 30 passed through the opening in the opposed walls thereof and rotated for reaming out said openings.

I claim:—

1. In a machine of the class described, a supporting frame, a cutter bar mounted for longitudinal movement therein, actuating means for said bar, a longitudinally slotted work supporting arm, headed screws extending from said frame through the slot in said arm to provide for its longitudinal adjustment, cooperating means carried by said arm and frame for adjusting the arm, and a right angularly extending shaft carried by the arm to support the work.

2. In a machine of the class described, a supporting frame, a cutter bar mounted for longitudinal movement therein, actuating means for said bar, a longitudinally slotted work supporting arm, headed screws extending from said frame through the slot in said arm to provide for its longitudinal adjustment, cooperating means carried by said arm and frame for adjusting the arm, a right angularly extending shaft carried by the arm to support the work, and a collar mounted on said shaft to form an abutment for the work to be held thereby.

3. In a machine of the class described,

a supporting frame, a cutter bar mounted for longitudinal movement, actuating means for said bar, a longitudinally slotted work supporting arm, headed screws extending
5 from said frame through the slot in said arm to provide for its longitudinal adjustment, cooperating means carried by said arm and frame for adjusting the arm, a right angularly extending shaft carried by the
10 arm to support the work, a threaded sleeve carried by said frame, and a screw swiveled on said arm and having threaded engagement with said sleeve whereby the turning of the screw will operate to adjust said arm to properly position the work carried there- 15 by.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature.

JOHN BURGH.