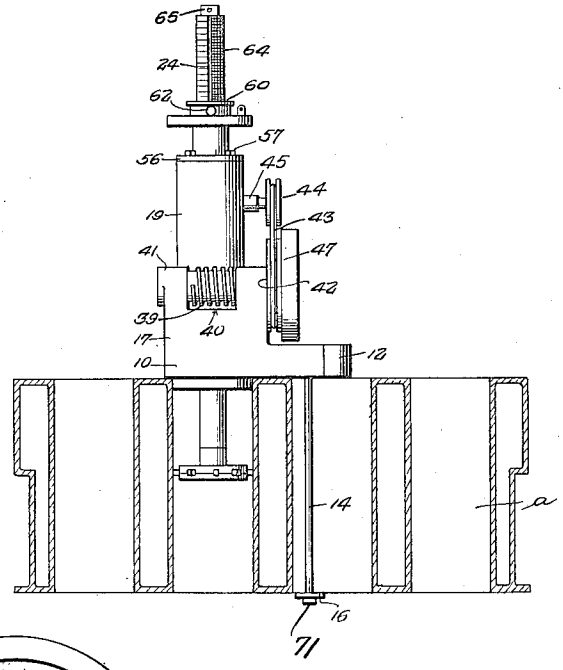
July 24, 1923. 1,463,089

D. L. MARTYN

REBORING MACHINE

Filed Sept. 28, 1921 3 Sheets-Sheet 1

Fig. 1.



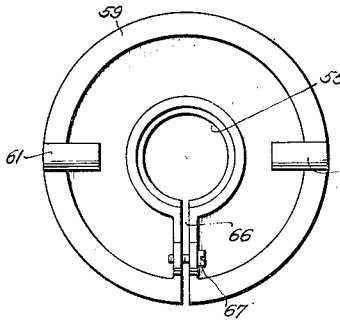


Fig. 5

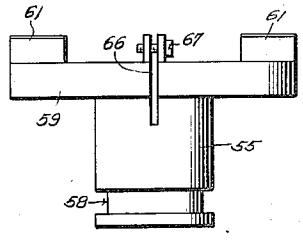


Fig. 6.

Fig. 7.

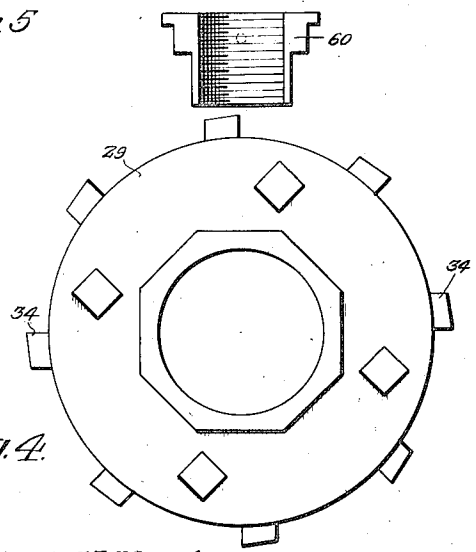


Fig. 4.

David L. Martyn, INVENTOR.

BY

Geo. L. Kimmel ATTORNEY.

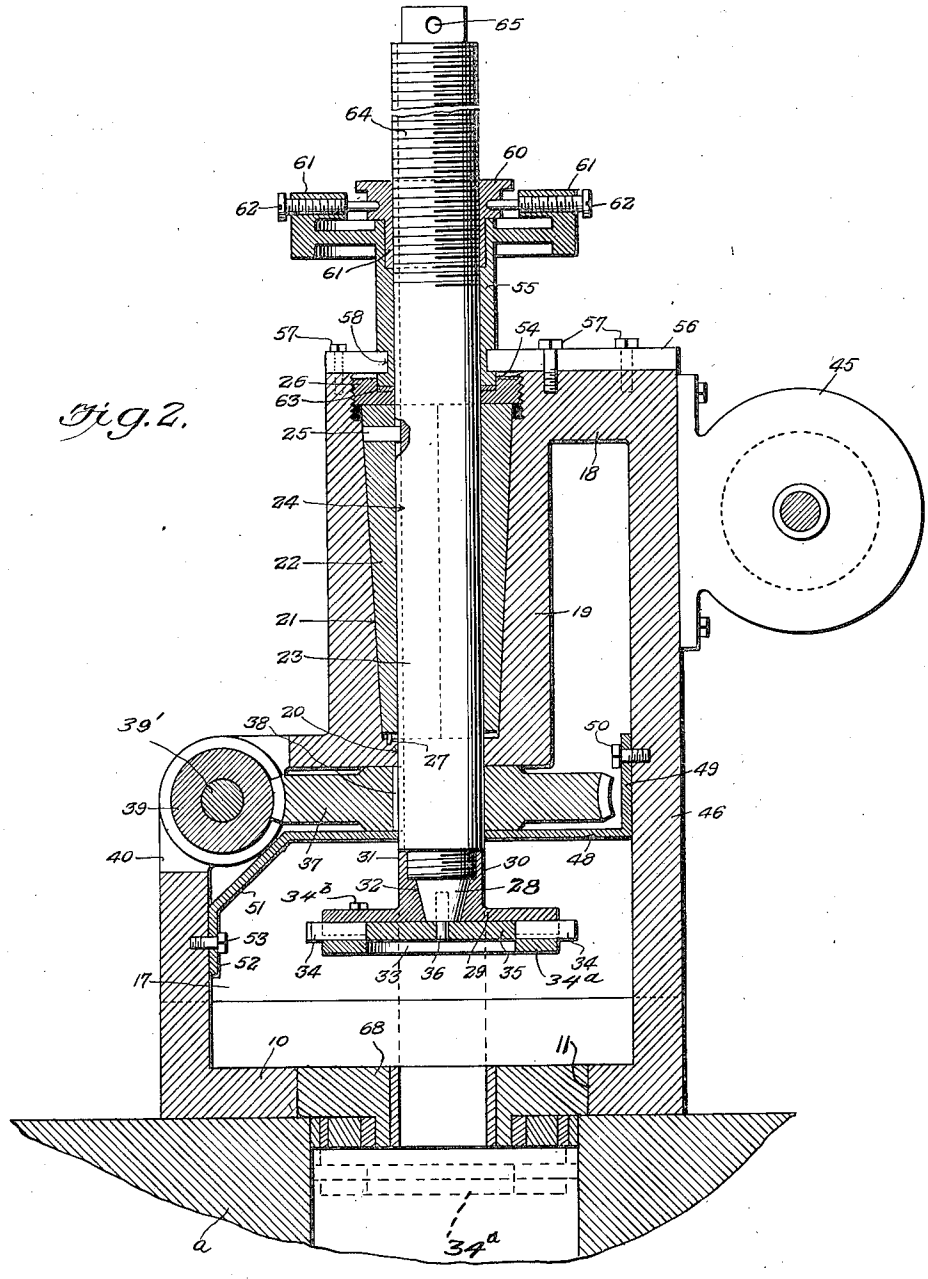
July 24, 1923. 1,463,089

D. L. MARTYN

REBORING MACHINE

Filed Sept. 28 . 1921 3 Sheets-Sheet 2

Fig. 2.



David L. Martyn INVENTOR.

BY

Geo. P. Kimmel ATTORNEY.

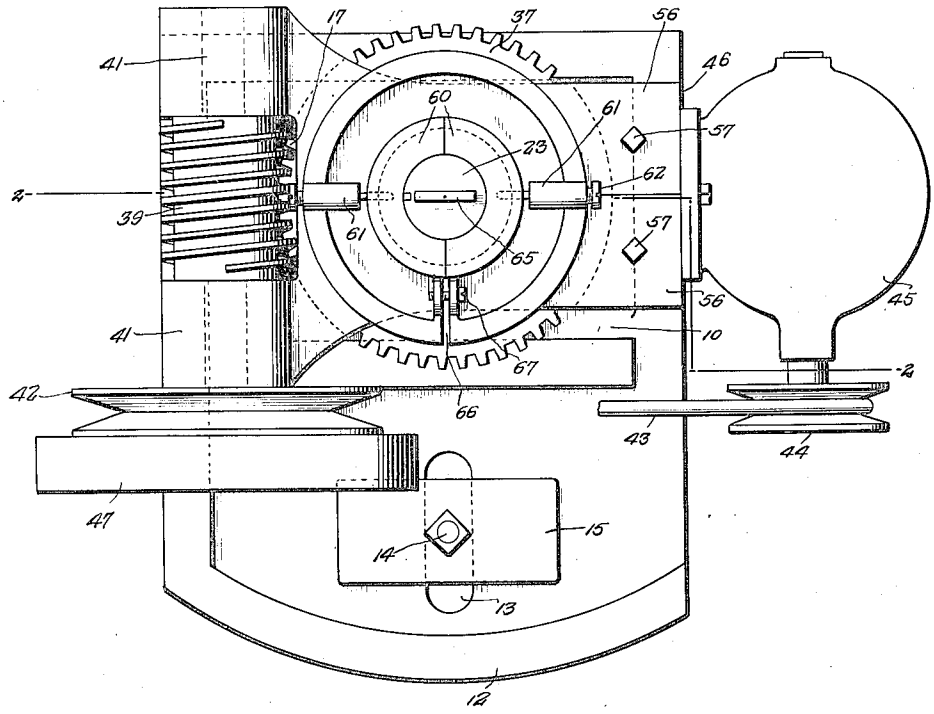
July 24, 1923. 1,463,089

D. L. MARTYN

REBORING MACHINE

Filed Sept. 28, 1921 3 Sheets-Sheet 3

Fig. 3.



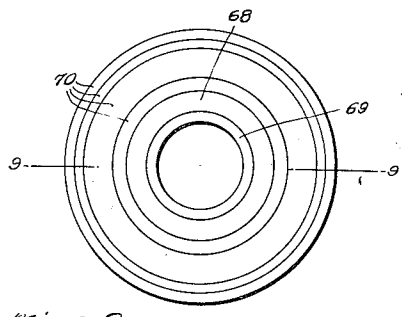


Fig. 8.

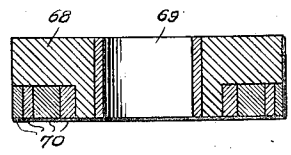


Fig. 9.

David L. Martyn, INVENTOR.

BY

Geo. P. Kimmel ATTORNEY.

Patented July 24, 1923. 1,463,089

UNITED STATES PATENT OFFICE.

DAVID L. MARTYN, OF VANCOUVER, WASHINGTON.

REBORING MACHINE.

Application filed September 28, 1921. Serial No. 503,860.

To all whom it may concern:

Be it known that I, DAVID L. MARTYN, a citizen of England, residing at Vancouver, in the county of Clarke and State of Washington, have invented certain new and useful Improvements in Reboring Machines, of which the following is a specification.

This invention appertains to certain improvements in boring machines or tools, and more particularly to a type of the same adapted for the boring and re-boring of a cylinder or cylinders of internal combustion engines and the like.

The principal object of the invention is to provide for a machine or tool of the class mentioned, and one particularly designed for the re-boring of scored or worn engine cylinders and which is provided with an adjustable means for adapting the same for the boring or re-boring of cylinders of various diameters and to any desired or predetermined diameter and depth.

Another object of the invention is to provide for a machine or tool of the type set forth, and one wherein the cylinders of an engine having a removable head block such as the valve-in-head types of such engines, may be re-bored without necessitating the removal of the engine from its normal operative position, and with equal facility to the re-boring of the cylinders of an engine removed from normal operative position.

A further object of the invention is to provide for a boring machine as characterized, and one embodying extremely simplified features of construction, arrangement and operation of parts, such as provide for a machine of comparatively light weight so as to be readily portable from one point of operation to another, of low cost to manufacture, and of extreme ease and of high efficiency in operation.

With the foregoing and other objects in view, the invention resides in the certain novel and useful features of construction, arrangement and operation of parts as will be hereinafter more fully described, set forth in the appended claims, and illustrated in the accompanying drawings, in which:—

Figure 1 is a vertical longitudinal section of an engine cylinder block and showing the preferred embodiment of the machine or tool in elevation and in position for the boring operation on one of the cylinder bores thereof,

Figure 2 is a vertical section through the machine or tool, the same being taken on the line 2—2 of Figure 3,

Figure 3 is a top plan view of the same,

Figure 4 is a top plan view of the cutter head or element,

Figure 5 is a top plan view of the hand wheel for effecting the desired feed of the boring bar of the machine,

Figure 6 is a side elevation thereof,

Figure 7 is an inner side elevation of one part of the split nut used on the hand wheel for effecting the feed of the boring bar in one manner of its use, and to permit of the quick adjustment or removal of the boring bar in its other manner of use,

Figure 8 is a bottom plan of a disc device adapted for use in accurately centering the machine or tool into operative position, and

Figure 9 is a section taken on the line 9—9 of Figure 8.

Referring to the drawing, wherein similar characters of reference designate corresponding parts in the several views thereof, the frame of the machine or tool as shown comprises a metal casting, having a flat base portion or wall 10 provided with a circular opening 11 arranged to align with the bore of an engine cylinder to be bored, and an extended portion 12, of an area to overlie, or partially so, an adjacent engine cylinder, which portion 12 is provided with a slot-way 13 downwardly of which is passed a bolt or the like 14 having its upper end secured in a clamp member or plate 15, resting on the upper face of the portion 12 and cross-ways of the slot-way 13, and its lower end depending through the bore of the cylinder and secured in engagement with a clamp bar 16 disposed cross-ways of the lower end of the engine cylinder block, the latter construction and arrangement constituting the means for securing the machine or tool rigidly in position during the boring operation. It is to be here noted that the circular opening 11 of the bottom wall or base portion 10 of the frame is of a greater diameter than that of the usual bores or diameters of the cylinders of internal combustion engines, so that the machine or tool is readily adapted for the reboring of the cylinders of various makes and sizes of engines.

That part of the frame, which extends from the bottom wall 10, provides a cutter compartment 17, which communicates with the opening 11. The top wall of the frame is indicated by the reference character 18

and has formed integral therewith a cylindrical housing 19, which is disposed centrally of the compartment 17, and is formed with a vertically disposed bore 20, arranged in alignment with respect to the center of the opening 11. The bore 20, is formed of a tapered intermediate portion 21, and a pair of cylindrical end portions of different diameters. The cylindrical end portion at the top of the intermediate portion 21, is of greater diameter than the said intermediate portion 21, and has its wall threaded. The diameter of the other cylindrical end portion of the bore, is less than the smallest diameter of the intermediate portion 21 of the bore and at the point of joinder between the intermediate portion and end portion of smaller diameter of the bore a shoulder is provided. Positioned within the intermediate portion 21, of the bore, is arranged a split bearing sleeve which is tapered to conform to the taper of the intermediate portion 21, of the bore 20. Extending through the cylindrical housing 19 and also through the bearing sleeve, is a boring bar 23, of the desired length, and it is formed with a peripheral key-way 24. running its full length. The bearing sleeve 22, is rotatable with the boring bar 23, through the medium of a key 25, carried by one part of the bearing 22, and projecting into the key-way 24. By reason of the taper of the bore formed in the housing 19, and the bearing 22, the boring bar 23, is centered in the frame and maintained true and accurately aligned at all times as the wear on the bearing 22 is compensated by the bearing formation. The bearing 22, is held in place through the medium of an apertured circular disk 26, which is peripherally threaded and engages with the threads of the walls of that portion of the bore 20, of larger diameter. Projecting slightly upwardly from the shoulder formed between the lower end of the intermediate portion 20, and the end portion of smaller diameter of the bore, is a short projection or stud 27, which is employed to prevent the bearing crowding at its lower end against the shoulder thereby eliminating friction at such point.

The lower end of the boring bar 23 is projected for a distance into the cutter compartment 17, formed in the lower part of the same, and the free end of the same is machined to form a tapered portion 28 to act as a bearing for a circular cutter plate or head 29, which is formed to provide a hub portion 30 having a threaded bore portion 31 arranged in threaded engagement with the lower end of the boring bar 23, and inwardly of the tapered end 28 thereof, and an inner tapered bore portion 32 adapted to center on the said tapered end 28 of the boring bar 23, which arrangement assures of the cutter head or plate 29 running true and accurate at all times throughout the operation of the machine or tool.

The cutter head or plate 29 is of circular formation, as hereinbefore stated, and has its outer or lower face formed to provide a concentrically disposed circular depression or annular recess 33, and opening radially outward of the circular wall thereon is a series of equi-distantly spaced channels adapted for the reception of cutters 34, which are accurately and equally positioned therein and project therefrom outwardly of the peripheral edge of the cutter head or plate 29, and are held in such position by means of circular discs or plates 35 seated concentrically within the depression or annular recess 33 for such purpose, the said discs or plates 35 being made in different sizes or diameters, and are accurately centered in position by having central openings formed in the same for engagement on a centering pin or stud 36 carried in the tapered end portion of the boring bar 23, the pin 36 being preferably made of tool steel to assure of a minimum amount of wear on the same in the interchanging of one disc or plate 35 for another thereon. The diameter of the openings in the discs or plates 35, is such with respect to the diameter of the pin 36, that the walls of such openings will frictionally engage with the pin 36 to hold the disc or plates in position.

The cutters 34 are secured in the channels formed in the lower face of the cutter-head or plate 29, by a clamping ring 34[a], which is positioned against the cutters 34, as shown in Figure 2, and which is connected to the head 29, by the clamping screws 34[b]. It is to be here noted of the cutters 34, that the same are preferably made of high speed steel, and that the same have their cutting edges disposed in the same plane on or immediately below the center line of the head or plate 29, which arrangement avoids the chattering thereof during the boring operation, and also, that the inner ends of the same abut the flat peripheral edge faces of the centering discs or plates 35, when properly positioned.

The boring bar 23 is rotated through the medium of a worm wheel 37, keyed directly thereon, as at 38, and at a point directly below the ower end of the body portion 19 of the frame, and arranged in mesh with a worm gear 39 which is operable in a slotted opening 40 formed in the upper corner portion at one side of the lower portion or cutter compartment 17 of the frame. The worm gear 39 has its shaft 39′ journaled in bearings 41 arranged at the opposite ends of the slotted opening 40, and is driven by means of a pulley 42, which is keyed on the projected end of the shaft 39′, which, in turn, is driven, by means of a drive belt 43,

from any suitable source of power separate from the machine, or from an electric motor or the like 45, in which latter case, the belt 43 connects with a pulley 44 mounted on the shaft thereof. The motor 45 is secured in position on the vertical wall 46 of the upper portion 18 of the frame, substantially as is shown in the drawings. It is to be noted that the projected end of the worm gear shaft 39' is also provided with a fly wheel 47, and that the same is preferably cast in one piece with the pulley 42 thereon. The worm gearing drive of the machine is preferably separated from the cutting compartment 17, by means of a partition plate 48, which is formed to provide an angularly bent flanged portion 49 secured to the wall 46 by means of bolts or screws 50, an angularly bent portion 51 extending diagonally beneath the worm gear 39, and an angularly bent flanged portion 52 which is secured, by means of bolts or screws 53, to the wall of the compartment 17 opposite to the wall 46.

The circular bushing or plate 26 is formed to provide a circular depression or recess 54 in its upper face and concentrically thereof, and surrounding the boring bar 23, and is arranged to loosely receive the lower end of a hub 55, which is held in position by means of a pair of plates 56 bolted, as at 57, to the top end of the cylindrical portion 19 of the frame, the opposed edges of the plates 56 being provided with registered semi-circular openings surrounding the hub 55, and engaging in an annular groove or channel 58 formed in the peripheral face thereof, substantially as is shown in Figure 2. The upper end of the hub 55 is formed with a hand wheel 59, and an annular recess concentric to the bore thereof into which is fitted a split bushing or nut 60, arranged in threaded engagement with the boring bar 23, the latter extending upwardly through the bore of the upper portion of the frame, through the bore of the hub 55 and of the bushing or nut 60. Disposed within the depression or circular recess 54 of the bushing or plate 26, beneath the lower end of the hub 55, is a compressible washer or the like 63, and when the screws 57 are slightly loosened, the same is unaffected, so that the hub 55 is free to revolve within the bushing 26 upon the rotation of the boring bar 23, but, when the screws 57 are tightened, the hub 55 is forced downwardly upon the washer 63, which is placed under compression, and is held against rotation, together with the hand wheel 59 and the split bushing or nut 60, so that a positive feed of the boring bar 23 is possible by reason of its threaded portion 64 being engaged by the complemental threads of the bushing or nut 60. With the bolts or screws 57 loosened and the hub, hand wheel and split bearing rotating with the boring bar 23, by grasping the hand wheel 59 with the hand, the latter may be fed to the work as desired, and intermittently by the alternate grasping and releasing of the hand wheel. With the parts assembled as above indicated, the boring bar 23 is supported in position throughout its operation, by the hub 55 and the plates 56. By releasing the screws 62 from their engagement with the parts of the split bushing or nut 60, the same may be drawn from the recess in the upper end of the hub 55, and the boring bar 23 raised out of its engagement with the work at any time during the boring operation, or at the completion thereof. The upper end of the boring bar 23 may be provided with an eye 65 for the connecting thereto of a hoisting device, cable or the like (not shown), whereby to facilitate the free raising and lowering of the same from and to operative position. As shown in Figures 5 and 6, the hand wheel 59 and the hub portion 55 thereof may be split, as at 66, to facilitate the proper assembling of the boring bar 23 and the split bushing or nut 60 into operative position, the split portion of the hand wheel 59 being held together by means of a screw 67.

In the use of the machine or tool, the same is to be accurately positioned on an engine cylinder block *a* as follows:—The centering disc or circular plate 68 is placed in position at the upper end of the bore of the cylinder to be rebored, after the same has been provided with the proper sized ring 70 to snugly fit the bore of the cylinder and the machine is then lifted into position with the opening 11 of the bore face thereof fitted over the disc or plate 68, when the machine is ready to be secured by the bolt 14 being passed through the adjacent cylinder bore and its nut 71 tightened against the clamp bar 16. This disc or plate 68 is now removed from the cylinder bore and is passed upwardly of the boring bar 23, when the cutter head 29 will be secured on the lower free end of the same beneath the plate or disc 68, after which the machine is ready for the boring operation. The centering disc or plate 68 is of a size and diameter to snugly fit the opening 11 of the base of the frame of the machine, and has its lower face formed to provide an annular groove or rabbet opening outwardly of the peripheral edge thereof, and which is adapted to receive one or more centering rings 70, which are adapted to be fitted into the groove or channel and one within the other as the case may be, until the proper sized ring 70 is in position to snugly fit the bore of the cylinder to be bored, and thus center the disc or plate 68 and the boring bar of the machine with respect thereto. After the machine is clamped in position, and the cutter head 29 is placed on the lower end of the boring bar 23, power

is applied to the worm gearing for the rotation of the latter, when the hand wheel 59 will be grasped by the operator and held until the boring bar 23 has been fed downward to the point of starting of the cut, when the screws 57 can be tightened for the automatic feed of the bar 23 throughout the desired depth of bore, or, if desired, the entire feed can be effected by hand as hereinbefore explained.

Having described and illustrated herein a preferred embodiment of the machine or tool in specific terms and details of construction, arrangement and operation of parts thereof, it is well understood that various changes in and modifications of the same may be resorted to without departing from the spirit of the invention, or scope of the claims appended hereto.

Having thus fully described the invention, what is claimed is:—

1. A re-boring machine comprising a frame including a vertical housing, a vertically disposed bearing mounted within the latter, a bearing engaging member engaging the upper end of the bearing, a compressible element mounted in said member, a boring bar extending through said bearing and housing, a grooved, bar-feeding device mounted on said element and provided with means for connection with the bar for feeding the latter, and adjustable means connected with the frame and housing and extending into the groove of the feeding device for coupling rotatably the latter with the frame and further adapted for compressing at will said element to cause a non-rotative engagement of the feeding device with the frame and a corresponding feed of the bar.

2. A re-boring machine comprising a frame including a vertical housing, a vertically disposed bearing mounted within the latter, a bearing engaging member engaging the upper end of the bearing, a compressible element mounted in said member, a boring bar extending through said bearing and housing, a grooved, bar-feeding device mounted on said element and provided with means for connection with the bar for feeding the latter, adjustable means connected with the frame and housing and extending into the groove of the feeding device for coupling rotatably the latter with the frame and further adapted for compressing at will said element to cause a non-rotative engagement of the feeding device with the frame and a corresponding feed of the bar, said feeding device arranged on the upper end of the bar, a driven element for the bar carried immediately below the housing, and a driving element supported by the frame and operatively connected with said driven element.

3. A re-boring machine comprising a frame including a vertical housing, a vertically disposed bearing mounted within the housing, a bearing engaging member threadably engaging with the housing and arranged within the latter at the upper end thereof, a compressible element mounted within said member, a rotatable boring bar extended through said bearing and housing and further connected with the bearing for carrying the latter therewith, a grooved, bar-feeding device mounted on said element and provided with means for connection with the bar for feeding the latter, and adjustable means connected with the frame and housing and extending into the groove of the feeding device for rotatably connecting the latter with the frame and further for compressing at will said element to cause non-rotative engagement of the feeding device with the frame and a corresponding feed of the bar.

4. A re-boring machine comprising a frame including a vertical housing, a vertically disposed bearing mounted within the housing, a bearing engaging member threadably engaging with the housing and arranged within the latter at the upper end thereof, a compressible element mounted within said member, a rotatable boring bar extended through said bearing and housing and further connected with the bearing for carrying the latter therewith, a grooved, bar-feeding device mounted on said element and provided with means for connection with the bar for feeding the latter, adjustable means connected with the frame and housing and extending into the groove of the feeding device for connecting rotatably the latter with the frame and further for compressing said element to cause a non-rotative engagement of the feeding device with the frame and a corresponding feed of the bar, a driven element for said bar carried immediately below the housing and a driving element supported by the frame and operatively connected to said driven element.

5. A re-boring machine comprising a frame including a vertical housing formed with a bore having a tapered portion, a tapered bearing mounted in said bore, a bearing engaging member threadably engaging with the housing and arranged within the latter at the upper end thereof, a compressible element mounted in said member, a rotatable boring bar extended through said bearing and housing and having means for bodily carrying said bearing therewith, a grooved, bar-feeding device having its lower end extending in the top of the housing and seated on said element and provided with means for connection with the bar to feed the latter, and adjustable means connected with the frame and housing and extending into the groove of the feeding device for

rotatably connecting the latter to the frame and for compressing at will said compressible element to cause a non-rotative engagement of the feeding device with the frame and a corresponding feed of the bar.

6. A re-boring machine comprising a frame including a vertical housing formed with a bore having a tapered portion, a tapered bearing mounted in said bore, a bearing engaging member threadably engaging with the housing and arranged within the latter at the upper end thereof, a compressible element mounted in said member, a rotatable boring bar extended through said bearing and housing and having means for bodily carrying said bearing therewith, a grooved, bar-feeding device having its lower end extending in the top of the housing and seated on said element and provided with means for connection with the bar to feed the latter, adjustable means connected with the frame and housing and extending into the groove of the feeding device for rotatably connecting the latter to the frame and for compressing said compressible element to cause a non-rotative engagement of the feeding device with the frame and a corresponding feed of the bar, a driven element for said bar carried immediately below the housing, and a driving element supported by the frame and operatively connected to said driven element.

7. A re-boring machine comprising a frame including a vertically disposed cylindrical housing having a vertical bore formed with a tapered intermediate portion and cylindrical end portions of different diameters, that end portion of greater diameter being of greater diameter than the larger diameter of the intermediate portion and arranged at the top of the latter and having its wall threaded, the other cylindrical end portion being of less diameter than the smaller diameter of the intermediate portion and arranged at the lower end of the latter, a tapered bearing mounted within said intermediate portion of the bore, a threaded boring bar extending through said housing and slidably connected to said bearing, a recessed disk engaging said threaded wall for holding said bearing from upward movement, a compressible element mounted within said disk, a grooved, bar-feeding device seating on said element and provided with means for connection with the bar for feeding the latter, and an adjustable means connected with the frame and housing and extending into the groove of the feeding device for connecting rotatably the latter to the frame and for compressing at will said element to cause a non-rotative engagement of the feeding device with the frame and a corresponding feed of the bar.

8. A re-boring machine comprising a frame including a vertically disposed cylindrical housing having a vertical bore formed with a tapered intermediate portion and cylindrical end portions of different diameters, that end portion of greater diameter being of greater diameter than the larger diameter of the intermediate portion and arranged at the top of the latter and having its wall threaded, the other cylindrical end portion being of less diameter than the smaller diameter of the intermediate portion and arranged at the lower end of the latter, a tapered bearing mounted within said intermediate portion of the bore, a threaded boring bar extended through said housing and slidably connected to said bearing, a recessed disk engaging said threaded wall for holding said bearing from upward movement, a compressible element mounted within said disk, a grooved bearing feeding device seating on said element and provided with means for connection with the bar for feeding the latter, an adjustable means connected with the frame and housing and extending into the groove of the feeding device for rotatably connecting the latter to the frame and for compressing at will said element to cause a non-rotative engagement of the feeding device with the frame and a corresponding feed of the bar, a driven element carried on the bar immediately below the housing, and a driving element supported by the frame and operatively connected to said driven element.

9. A machine for the purpose set forth comprising a boring bar provided at one end with a cutter-head, a circular disk adapted to be mounted on said bar above said head and having its lower portion formed with an annular rabbet opening outwardly with respect to the peripheral edge of the disk, and a plurality of interchangeable annular members of different diameters adapted to be removably mounted in the rabbet of the disk to provide for the centering of said head.

In testimony whereof, I affix my signature hereto.

DAVID L. MARTYN.