H. NESS.

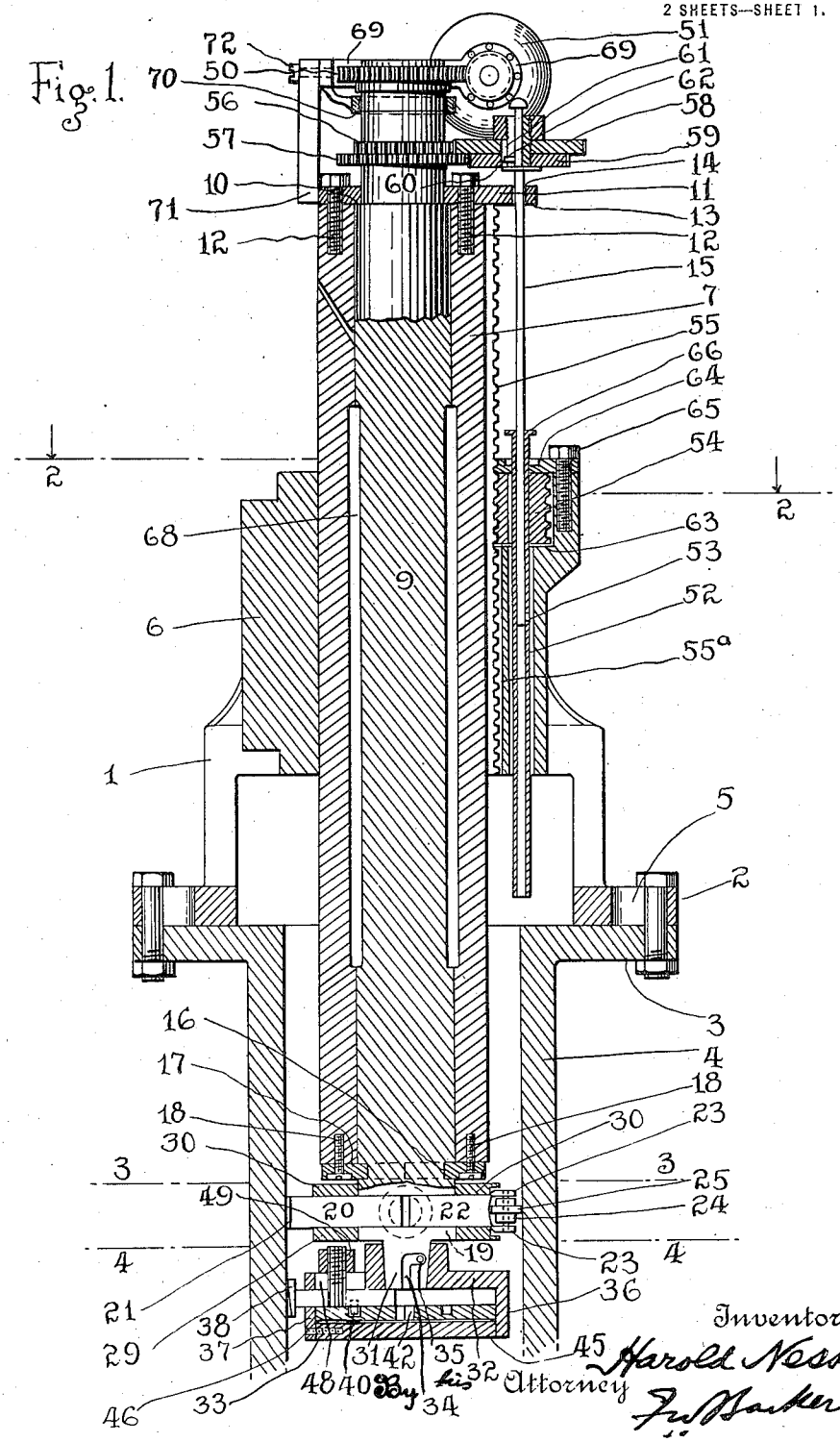
REBORING TOOL.

APPLICATION FILED JUNE 23, 1921.

1,436,669. Patented Nov. 28, 1922.

2 SHEETS—SHEET 1.

Fig. 1.



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2 SHEETS—SHEET 2.

Fig. 2.

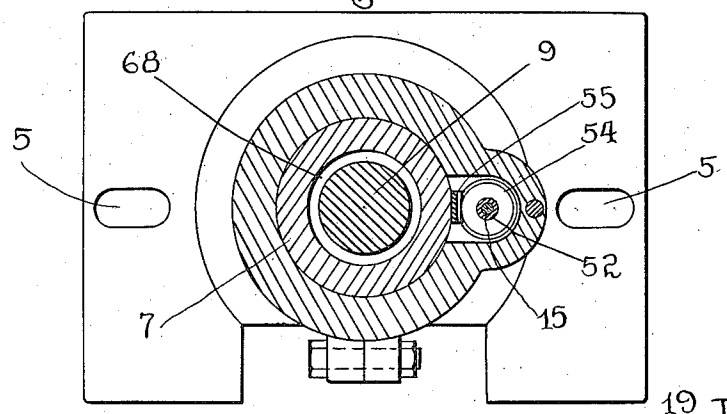


Fig. 3.

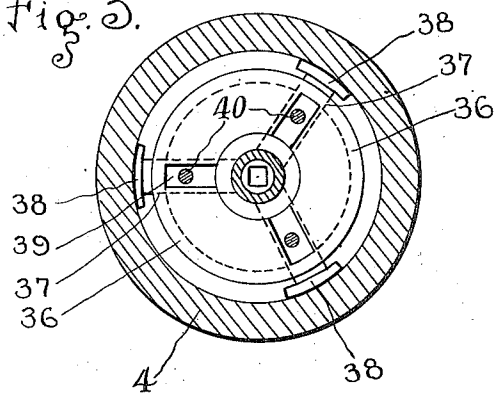


Fig. 4.

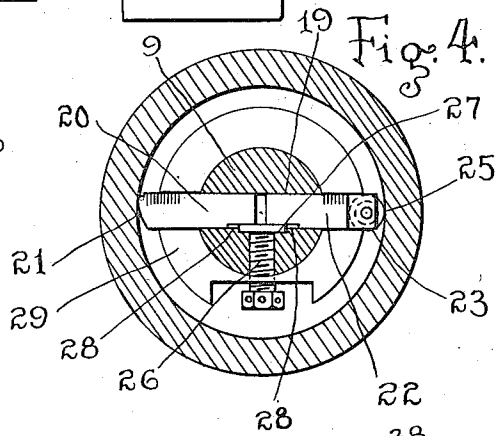


Fig. 5.

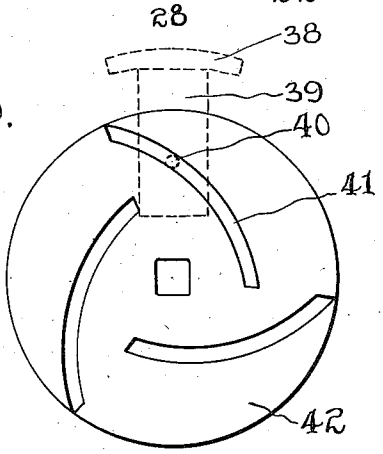
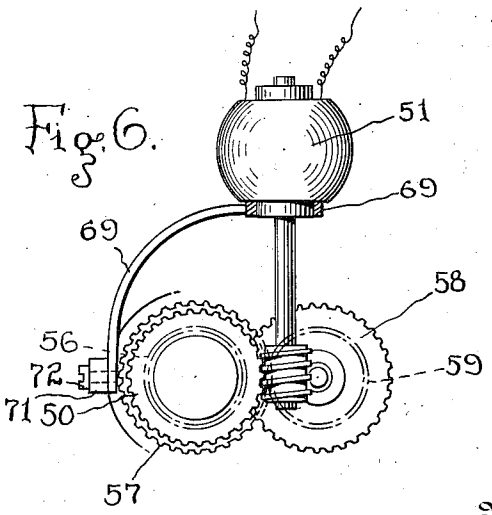


Fig. 6.



Inventor

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Patented Nov. 28, 1922. 1,436,669

UNITED STATES PATENT OFFICE.

HAROLD NESS, OF JERSEY CITY, NEW JERSEY, ASSIGNOR, BY MESNE ASSIGNMENTS, OF ONE-HALF TO LOUIS F. NORTIER, OF NEW YORK, N. Y.

REBORING TOOL.

Application filed June 23, 1921. Serial No. 479,819.

To all whom it may concern:

Be it known that I, HAROLD NESS, a citizen of the United States, and resident of Jersey City, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in Reboring Tools, of which the following is a specification.

This invention relates to re-boring tools for cylinders, and my improvements are directed to apparatus of this character which is capable of employment in re-boring the cylinders of engines, pumps, etc., without necessitating the demounting or taking down of the cylinders.

Furthermore my re-boring device is so constituted that its frame may be rigidly mounted and secured upon a cylinder to be treated, and the boring or cutting tool adjusted with such precision that its operation will be in true concentric relation to the cylinder axis.

Still further my improved re-boring apparatus includes a cutting member which is provided with rolling end thrust means, guided by the interior surface of the cylinder, that holds the cutting edge of the tool positively to its work, ensuring the accuracy of the operation, and preventing the tool from skipping over abnormally hard spots in the material of the cylinder.

Still further my invention comprehends the employment of automatic feed means, actuated by the cutter driving means, to render the re-boring operation continuously progressive.

Other features and advantages of my said invention will hereinafter appear.

In the drawings:—

Figure 1 is a vertical, sectional view of my improved re-boring tool, as mounted upon a cylinder.

Fig. 2 is a cross-sectional view, on the line 2—2 of Fig. 1.

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

Fig. 4 is a section on the line 4—4 of Fig. 1.

Fig. 5 is a plan view of the cam bearing disk for the centering device, and

Fig. 6 is a plan view showing the variable speed gearing and the motor to operate the tool.

In carrying out my invention I employ a yoke like frame 1, having a base flange portion 2, adapted to be seated upon the flange 3 of a cylinder 4 from which the head has been removed, said flange 2 having bolt receiving slots 5 whereby it may be securely bolted to the flanges 3 of different sized cylinders.

The frame 1 has an upwardly extended annular enlargement 6, of substantial proportions, and a vertical, hollow cylinder 7 is slidable within said enlargement, but being keyed thereto, to prevent its rotation.

Said cylinder 7 is of considerable length, to be capable of extending below the frame 1 for operation throughout the length of a cylinder. A shaft 9, revoluble in cylinder 7, is shouldered at 10 to comprise an upper thrust bearing against a plate 11, that is apertured to permit the extension therethrough of said shaft. Plate 11 is secured to the upper end of cylinder 7 as by screws 12, and said plate has a lateral extension, 13, with an aperture 14, for the reception of a drive rod 15, which will be more particularly referred to hereinafter.

The shaft 9 is provided with an annular groove 16 toward its lower end, said groove serving for the reception of the inner portion of a ring 17 (which may be in two halves for convenience of assembly), and said ring being secured to the lower end of cylinder 7 as by screws 18. The engagement of ring 17 in groove 16 constitutes an end or thrust bearing for shaft 9, (which is the cutter bearing member of the device) in both directions, and co-acts with bearing 10 in absorbing the reactive thrust of the tool.

The shaft 9, below groove 16, has a transverse aperture 19 to receive the cutting or boring device. This device is in two parts, and consists of a cutter bar 20, whose edge portion 21 extends out to operate upon the inner surface of a cylinder, as 4, and an opposed bar 22, whose outer end is provided with lugs or bearings 23, in which is journalled a roller 24, with a central, annular enlargement 25, whose function is to bear against the cylinder surface, in opposed relation to the cutter, in order that the edge of said cutter may be held, axially of the cutting device, continually in effective operative relation upon the cylinder surface. Also, as will be obvious, the roller element, by exerting pressure against the cylinder surface portion with which it contacts, in a progressive operation of the tool, has the effect of burnishing the cut surface.

The two part cutting device is secured to the shaft 9 by means of a set screw 26, threaded through shaft 9, right angularly to the axis of aperture 19, said screw having a terminal plate 27 that clamps against flattened portions 28 respectively on the bars 20, 22. A hardened ring 29, is fitted snugly and securely upon shaft 9, as by swaging, and has apertures 30, 30, aligned with aperture 19, to extend the cross-sectional bearing area for elements 20, 22, to stiffen and render the latter more rigid in operation.

The lower terminal portion 31 of shaft 9, is of inverted frusto-conical form, and is adapted to have fitted thereto a circular, plate-like member 32, by means of a central, thimble-like portion 33 thereof, said portion 31 having a bayonet slot 34, with which a pin 35 on thimble 33 engages, to comprise locking means. Also said plate 32 is provided with a depending, concentric flange 36, that is pierced with radial slots 37.

Tool centering shoes 38, of which three are herein shown, each carried by a bar 39 slidable in a slot 37, extend out beyond flange 36, to co-act with the inner surface of the cylinder to be re-bored, to adjust the tool in its centered relation therewith. For this purpose the shoe bars 39 each carry a stud 40, said studs respectively engaging in cam slots 41 provided in a circular plate 42 that is revolubly fitted within flange 36, whereby, upon rotation of plate 42, the bars 39 are caused to move either in or out, in synchronism, according to the direction of rotation of plate 42. A central, squared key-way 43 in plate 42 serves for the reception of a key, to actuate said plate.

A cover plate 45 also fits within flange 36 to retain plate 42 in place, and is itself removably secured as by a set screw 46.

The shoe bars 39 may each be locked in their set positions of radial adjustment by means of screw studs 47, that project upwardly from the bars, through radial slots 48 in plate 32, and are secured with nuts 49 that bind them to said plate 32.

The shaft 9 may be suitably rotated within cylinder 7 for the operation of the cutting device. In the present example I have shown a worm wheel 50 carried by the upper end of said shaft, for engagement by driving means such as a motor 51.

As the shaft 9 rotates for the performance of the cutting operation, it together with the cylinder 7, is accorded a regulated feed movement by the following instrumentalities.

The feed rod 15 is in telescopic relation with a tube 52, being keyed thereto at 53, and said tube, which has slidably keyed thereon a worm wheel 54, that is in meshed relation with a vertical rack 55 on cylinder 7, is both revoluble and slidable in a bearing aperture provided therefor in enlargement 6 of the frame.

The rack 55 itself serves as a spline that engages a slot 55^a in enlargement 6 to key the cylinder against rotation in the frame.

The shaft 9 is provided with the gear wheels 56 and 57, which are respectively of smaller and larger diameters, the smaller diameter gear 56 being in mesh with a relatively large gear 58 mounted on rod 15, and the gear 57 being in mesh with a relatively small gear 59, also mounted on rod 15. A spline 60, carried by rod 15 may, by shifting said rod, be caused to enter either a slot 61 in gear 58 or a slot 62 in gear 59, according to whether the feed drive is to be slow or fast. Preferably, in making the first cut in a cylinder surface I employ the fast speed for the feed and for the next cut I employ the slow speed, especially as by this means the burnishing effect produced by the roller is more pronounced at the slow speed.

The worm wheel 54 operates in a recess 63 therefor formed in enlargement 6, said recess having an upper thrust plate 64, secured to the material of the enlargement by screw 65.

The tube 52 has terminal flange 66, to prevent its withdrawal downwardly.

It will be noted that the bearing of shaft 9 within cylinder 7 is co-extensive with the shaft length, whereby the cutting device is held closely to its work. But to avoid excessive friction between these members an intermediate, annular clearance 68 is provided, which may be charged with lubricant, leaving only limited upper and lower portions of the shaft in actual bearing relation with the cylinder.

The motor 51 may be carried by the shaft 9, to which it is here shown connected, as by a bracket 69 that extends from a collar 70 which is revolubly mounted upon said shaft 9. To prevent rotation of the motor with the revoluble movement of shaft 9, I provide means such as an extension 71 of the rigid member 11, said extension 71 being secured as by a screw 72 to the bracket 69.

Variations within the spirit and scope of my invention are equally comprehended by the foregoing disclosure.

I claim:

1. A cylinder re-boring tool comprising a hollow frame, means for securing said frame with relation to the cylinder to be re-bored, a tubular member non-rotatably mounted in said frame, and longitudinally slidable therein, a shaft revoluble in said tubular member, the bearing surfaces of the tubular member and shaft being nearly co-extensive, and cutting means carried by said shaft.

2. A cylinder re-boring tool comprising a hollow frame, means for securing said frame with relation to the cylinder to be re-bored,

a tubular member non-rotatably mounted in said frame, and longitudinally slidable therein, a shaft revoluble in said tubular member, the bearing surfaces of the tubular member and shaft being nearly co-extensive, cutting means carried by said shaft, and means also carried by said shaft for co-acting with the cylinder to center said cutting means relatively thereto.

3. In a cylinder re-boring tool in combination, a frame, a tubular member slidable therein, a rack on said member, a shaft revoluble in said member and carrying variable speed gears, a cutter carried by said shaft, a worm mounted in said frame and meshed with said rack, a tubular member splined to said worm, a rod splined to said tubular member, variable speed gears carried by said rod respectively in mesh with the gears on said shaft, and selective means for translating the revoluble movement of said shaft into endwise movement for said tool, through said variable speed gears.

Signed at the borough of Manhattan, in the city, county and State of New York, this 21st day of June, A. D. 1921.

HAROLD NESS.