

D. R. GALLAGHER.
ADJUSTABLE REAMER.
APPLICATION FILED MAR. 2, 1920.

1,414,565.

Patented May 2, 1922.

2 SHEETS—SHEET 1.

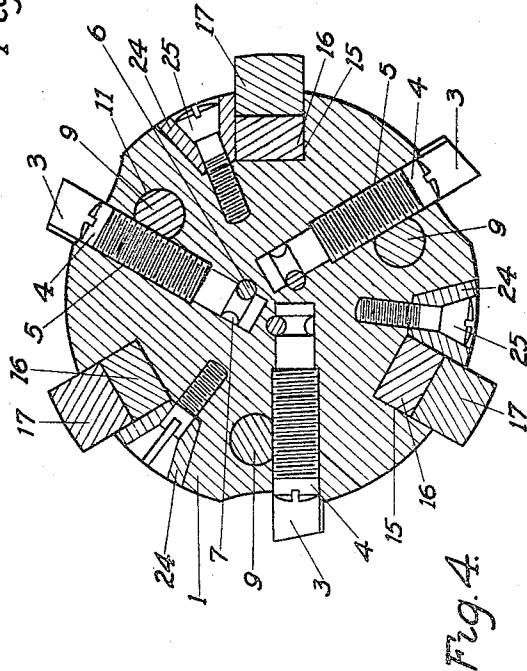
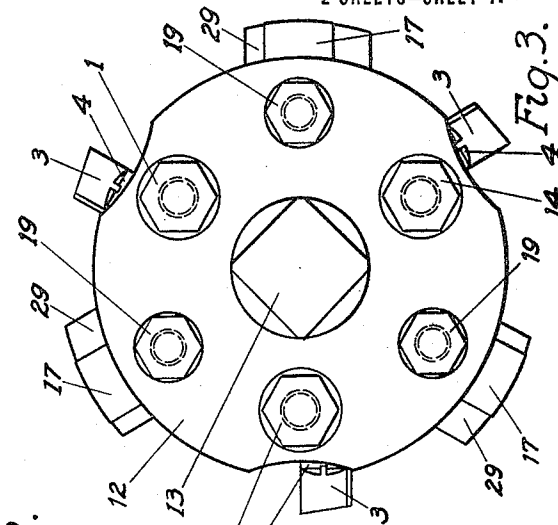
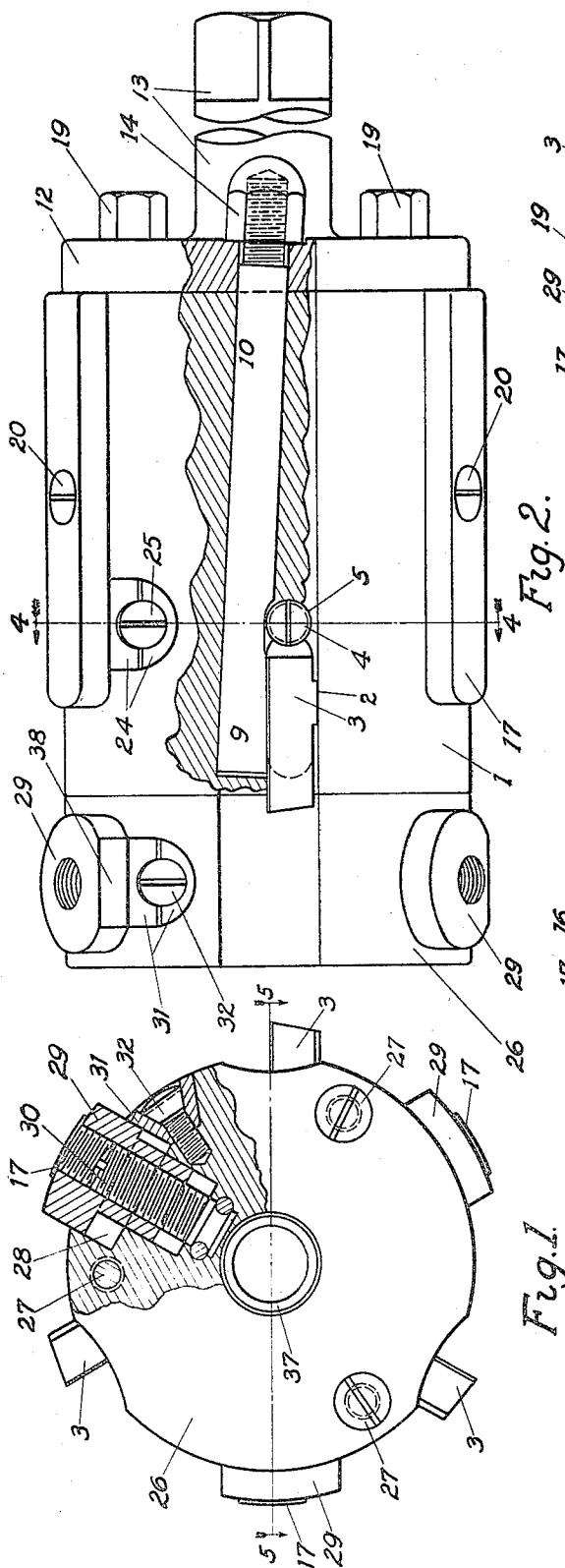


Fig. 4.

Inventor
David R. Gallagher

By Frank C. Curtis
Attorney

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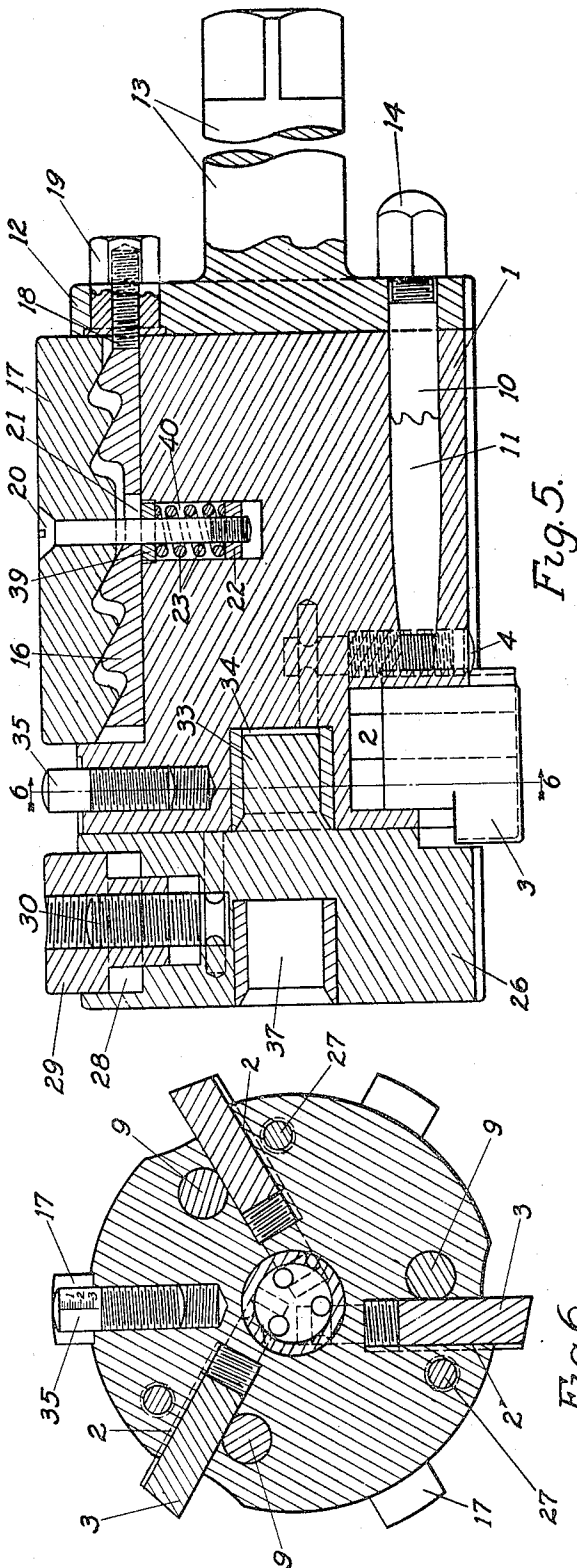


Fig. 5.

Fig. 6.

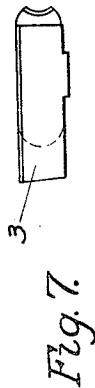


Fig. 7.

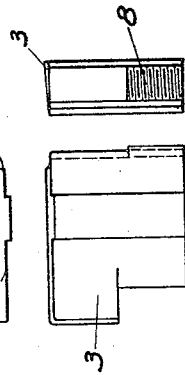


Fig. 8.

Fig. 9.

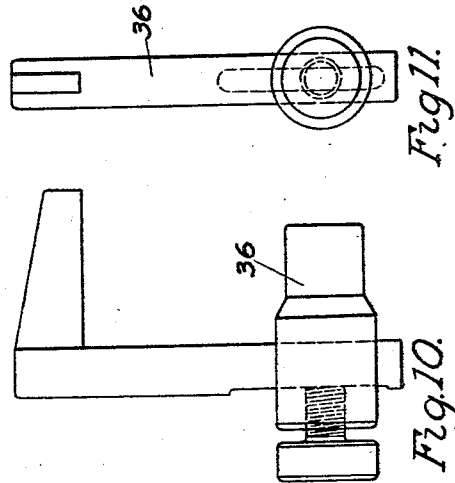


Fig. 11.

Fig. 10.

Inventor
David R. Gallagher
By *Frank C. Curtis*
Attorney

UNITED STATES PATENT OFFICE.

DAVID R. GALLAGHER, OF TROY, NEW YORK.

ADJUSTABLE REAMER.

1,414,565.

Specification of Letters Patent.

Patented May 2, 1922.

Application filed March 2, 1920. Serial No. 362,832.

To all whom it may concern:

Be it known that I, DAVID R. GALLAGHER, a citizen of the United States, residing at Troy, in the county of Rensselaer and State of New York, have invented new and useful Improvements in Adjustable Reamers, of which the following is a specification.

Reference may be had to the accompanying drawings, and the reference characters marked thereon, which form a part of this specification. Similar characters refer to similar parts in the several figures therein.

This invention is applicable to reamers of various kinds, and is particularly adapted for reamers for use in re boring cylinders of gas-engines and the like.

Certain objects of the invention are to provide for a high degree of accuracy in the dimensions of the bore formed by the reamer; to accurately pilot or guide the cutting mechanism, and to prevent or reduce vibration of the cutters; and to securely maintain the cutting and pilot mechanisms in adjusted position during the operation of the device.

Other objects will appear in connection with the following description.

Fig. 1 of the drawings is a view in front end elevation partly broken-away and shown in cross section of a reamer embodying my invention.

Fig. 2 is a view in side elevation of the same partly broken-away and shown in section.

Fig. 3 is a view in rear end elevation of the same.

Fig. 4 is a view in cross-section through the cutter-head taken on the broken line 4—4 in Fig. 2.

Fig. 5 is a central longitudinal section of the same taken on the broken line 5—5 in Fig. 1.

Fig. 6 is a cross-section through the cutter-head taken on the broken line 6—6 in Fig. 5.

Fig. 7 is a plan view of the outer end of one of the cutters detached.

Fig. 8 is a view in side elevation of the same.

Fig. 9 is a view in elevation of the right-hand edge of the same as shown in Fig. 8.

Fig. 10 is a view in side elevation of the adjustable gage adapted for use in connection with the tool above described for accurately adjusting the cutters and pilot blocks and plates.

Fig. 11 is a view in elevation of the same as seen from the right-hand side of Fig. 10.

Referring to the drawings wherein the invention is shown in preferred form, 1 60 is a cutter-head provided with three symmetrically disposed slideway openings, 2, extending inwardly through its periphery, said openings being adapted to receive and form slideways for the respective cutters, 3, which are thus mounted upon the cutter-head with provision for adjustment inwardly and outwardly with respect to the axis of the head.

As a means for adjustably moving the cutters, 3, inwardly and outwardly in their respective slideways, 2, I mount upon the cutter-head at one side of each of said cutters and parallel therewith a screw, 4, adapted to freely rotate within a plain bored hole, 5, extending inwardly through the periphery of the cutter-head, which screw is prevented from longitudinal movement, while permitted to freely rotate, by means of a pin, 6, inserted through a portion of the cutter-head in engagement with a circumferential-groove, 7, on the inner end of said screw.

The neighboring portion, 8, of the cutter is formed with segments of screw-threads adapted to engage the threaded portion of the screw, 4, whereby rotative movements of the screw, 4, in opposite directions will cause inward and outward movements of the cutter in its slideway.

Each cutter, 3, is fixedly secured in adjusted position by means of a wedge, 9, which wedge with its shank, 10, occupies a longitudinal opening, 11, extending through the rear end of the cutter-head and through the flange, 12, on a shaft, 13, which carries the cutter-head.

The outer end of the shank, 10, of the wedge is screw-threaded to fit a nut, 14, engageable with the outer side of said flange, 12, by means of which nuts, the wedges, 9, can be drawn into tight engagement with the respective adjusted cutters, and which nuts also serve to secure the cutter-head to said flange, 12.

The wedge, 9, and the shank, 10, are of general circular form in cross-section with the wedge portion slightly flattened where it engages the cutter as shown more particularly in Fig. 6.

In rear of the cutters, 3, the cutter-head is formed with a plurality of longitudinal peripheral slots, 15, each of which contains

a slidable wedge-plate, 16, and a pilot-plate, 17. These plates have wedgewise engaging surfaces as shown, and the wedge-plate, 16, has a screw-threaded shank, 18, extending out through an aperture in the flange, 12, which shank is engaged by a nut, 19, rotatively mounted in said aperture in said flange whereby inward and outward sliding movements can be imparted to the wedge-plate, 16, by rotative movements of said nut.

Slide movements thus imparted to the wedge-plate, 16, cause the pilot-plate, 17, to be forced more or less out of the slot beyond the periphery of the cutter-head.

The pilot-plate, 17, and wedge-plate, 16, are yieldingly held together with their wedgewise-engaging surfaces in contact with one another by means of a bolt, 20, inserted through the pilot-plate and through a slot, 21, in the wedge-plate, the end of said bolt having on its inner end a nut, 22, with a coil-spring, 23, confined between said nut and a bushing, 39, screwed into an aperture, 40, formed in the cutter-head to receive said bolt and spring.

The pilot-plate, 17, is fixedly secured in adjusted position by means of a split or divided wedge, 24, and a wedge-shaped screw, 25, whereby one member of the divided wedge is driven into firm engagement with the pilot-plate.

A pilot-head, 26, is removably mounted upon the front end of the cutter-head, 1, by means of screws, 27.

This pilot-head is provided with a plurality of slideway-openings, 28, extending inwardly through the periphery of the pilot-head, each adapted to receive and form a close-fitting slideway for a pilot-block, 29, interiorly screw-threaded to receive a screw, 30, which screw is mounted upon the pilot-head by means of a pin-and-groove similar to the pin, 6, and groove, 7, whereby longitudinal movement of the screw is prevented while the screw is permitted to freely rotate.

By rotation of the screw, 30, in opposite directions the pilot-block, 29, can be adjustably moved inwardly or outwardly to project more or less out of the opening 28, beyond the periphery of the pilot-head.

The pilot-block, 29, is fixedly secured in adjusted position by means of a divided wedge, 31, and wedge-shaped screw, 32, whereby one member of the wedge can be driven into firm engagement with the adjusted pilot-block.

The position of the pilot-head upon the cutter-head is accurately determined by engagement of a central boss, 33, on the pilot-head with a central bearing-opening, 34, formed upon the front end of the cutter-head.

The cutter-head has mounted thereupon a micrometer-screw, 35, fitting a screw-threaded opening extending inwardly through the

periphery of the cutterhead, the outer end of said micrometer-screw being adapted to project more or less beyond the periphery of the cutter-head.

The outer end of this micrometer-screw is preferably calibrated to accurately indicate the distance from the axis of the cutter-head to the outermost surface of said screw.

The bearing-aperture, 34, in the front end of the cutter-head is adapted to form a bearing to receive a gage, 36, shown detached in Figs. 10—11, which gage can be rotatively moved in said bearing to bring the gage opposite each of the respective cutters, 3, and each of the pilot-plates, 17, to assist in accurate adjustment of the cutters and pilot-plates to the diameter of bore desired.

In using said gage for adjusting the cutters, 3, and pilot-plates, 17, the micrometer-screw, 35, is first adjusted for the desired diameter of bore. The gage, 36, is then mounted upon the cutter-head in connection with the bearing, 34, the pilot-head, 26, having been removed, and said gage is then adjusted accurately with respect to said micrometer screw. The gage can then be swung from one to another of the cutters, 3, and pilot-plates, 17, each of which is accurately adjusted with respect to the gage and thus with respect to the diameter indicated by the micrometer-screw.

The outer end of the pilot-head, 26, is provided with a bearing-opening, 37, similar to the bearing-opening, 34, in the cutter-head with which bearing-opening, 37, said gage, 36, is adapted to cooperate in the accurate adjustment of the pilot-blocks, 29; in substantially the same manner that it cooperates with the bearing-opening, 34, in the cutter-head in adjusting the cutters and the pilot-plates, 17.

The device with its parts properly adjusted in the manner above described is used in the ordinary manner of a reamer or the like, the adjusted pilot-blocks, 29, facilitating the insertion of the reamer into the bore of the cylinder to be rebored or any similar generally cylindrical opening, and as the device passes within the cylinder, the pilot-plates, 17, cooperate with the pilot-blocks, 29, to steady the reamer and prevent undue vibration or chattering of the cutters, and to guide the reamer in a straight path.

The mechanisms above described provide for a high degree of accuracy in the adjustment of both the cutters and the pilot mechanisms, while the several parts are readily accessible for adjustment and removable for repair.

I have shown the pilot-blocks, 29, of general circular form in cross-section, each block however having a flattened surface, 38, for engagement with the neighboring member of the divided wedge, 31.

I have also shown the axis of the wedge, 130

9, and its shank, 10, obliquely arranged with respect to the axis of the reamer to facilitate the wedging action upon the cutter, 3, by longitudinal movement of said wedge and its shank.

For certain purposes of the invention, I do not wish to be limited to the details of construction shown in the drawings and above particularly described, as various changes can be made in the form and arrangement of the parts without departing from the spirit of my invention.

What I claim as new and desire to secure by Letters Patent is—

1. In a device of the class described and in combination, a head; a cutter mounted upon the head with provision for adjustment toward and from the axis of the head, said head being provided in its end with a centrally located bearing adapted to receive a gage whereby the projection of the cutter can be accurately determined; and a gage having a member rotatably seatable in said bearing.

2. In a device of the class described and in combination, a head; a plurality of cutters mounted upon the head with provision for separate adjustment of each cutter toward and from the axis of the head, said head being provided in its end with a centrally located bearing adapted to receive a gage whereby the projection of the cutters can be accurately determined; and a gage having a member rotatably seatable in said bearing.

3. In a device of the class described and in combination, a cutter-head; cutters adjustably mounted upon the cutter-head; a pilot-head having pilot-members adjustably mounted thereupon; said cutter-head and said pilot-head being each provided with a central bearing adapted to receive a gage whereby the projection of the cutters can be accurately determined with respect to the axis of the cutter-head, and the projection of the pilot-members can be accurately determined with respect to the axis of the

pilot-head, said pilot-head having means for engagement with said bearing on the cutter-head whereby the pilot-head can be removably mounted upon the cutter-head.

4. In a device of the class described and in combination, a head provided with longitudinal slots in its periphery; pilot-mechanism mounted within the respective slots, comprising an inner wedge-plate and an outer pilot-plate, said plates having wedge-wise-engaging surfaces; screw-mechanism for adjustably moving one of said plates relatively to the other; spring-mechanism for holding said wedge-wise-engaging surfaces in engagement with one another; and means for fixedly securing said pilot-plate in adjusted position.

5. In a device of the class described and in combination, a head provided with longitudinal slots in its periphery; pilot-mechanism mounted within the respective slots, comprising an inner wedge-plate and an outer pilot-plate, said plates having wedge-wise-engaging surfaces; screw-mechanism for adjustably moving said wedge-plate relatively to said pilot-plate; a screw-bolt extending through said pilot-plate and through a slot provided therefor in said wedge-plate; a nut on said bolt; a spring confined between said nut and said head; screw-mechanism for adjustably moving said wedge-plate relatively to said pilot-plate, and a screw-actuated wedge for fixedly securing said pilot-plate in adjusted position.

6. In a device of the class described and in combination, a cutter-head; cutters mounted thereupon with provision for adjustment toward and from the axis of the cutter-head; and a micrometer-screw adjustably mounted upon said cutter-head, said cutter-head being provided with a central end-bearing adapted to receive a gage for the accurate adjustment of said cutters with respect to said micrometer-screw.

In testimony whereof, I have hereunto set my hand this 23rd day of February, 1920.

DAVID R. GALLAGHER.