No. 852,274. PATENTED APR. 30, 1907.

R. T. JOHNSTON.

ADJUSTABLE TOOL.

APPLICATION FILED MAR. 6, 1905.

2 SHEETS—SHEET 1.

Fig. 1.

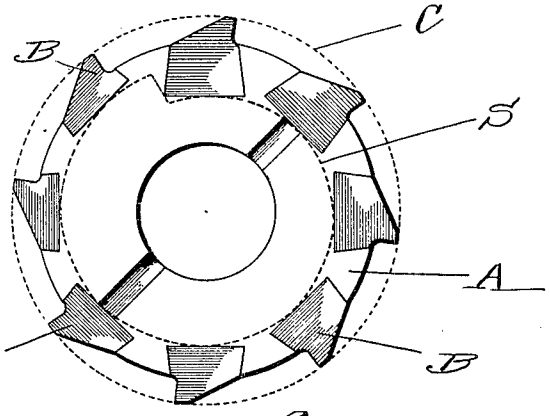
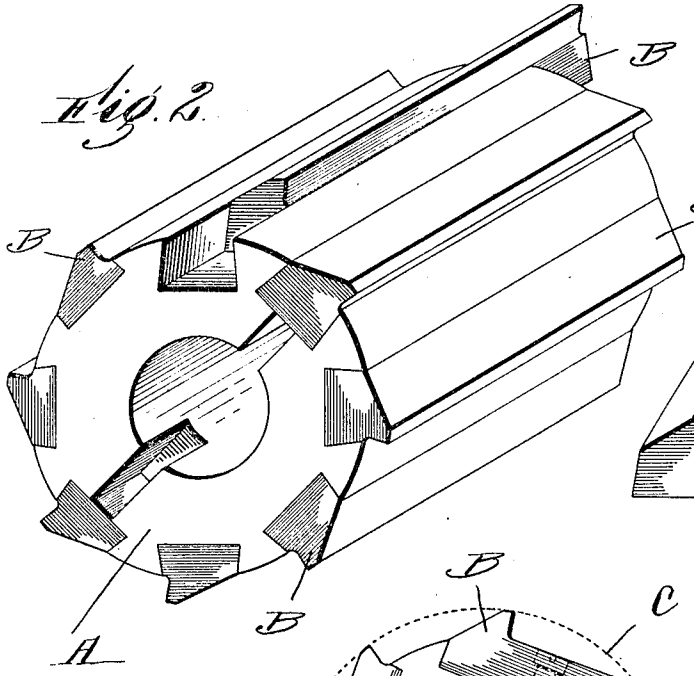


Fig. 2.



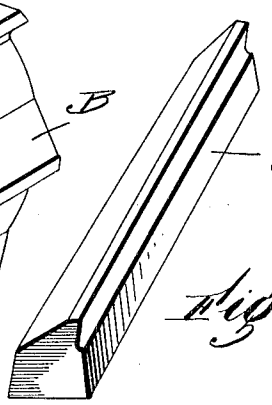
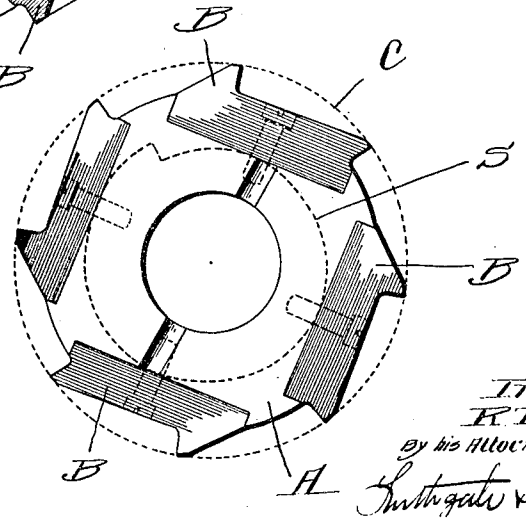


Fig. 3.

Fig. 4.



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2 SHEETS—SHEET 2.

Fig. 5.

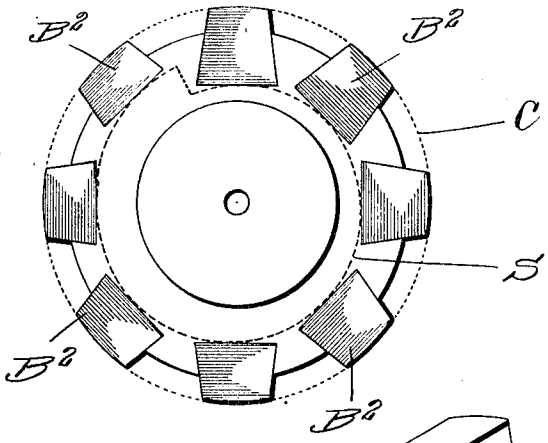


Fig. 6.

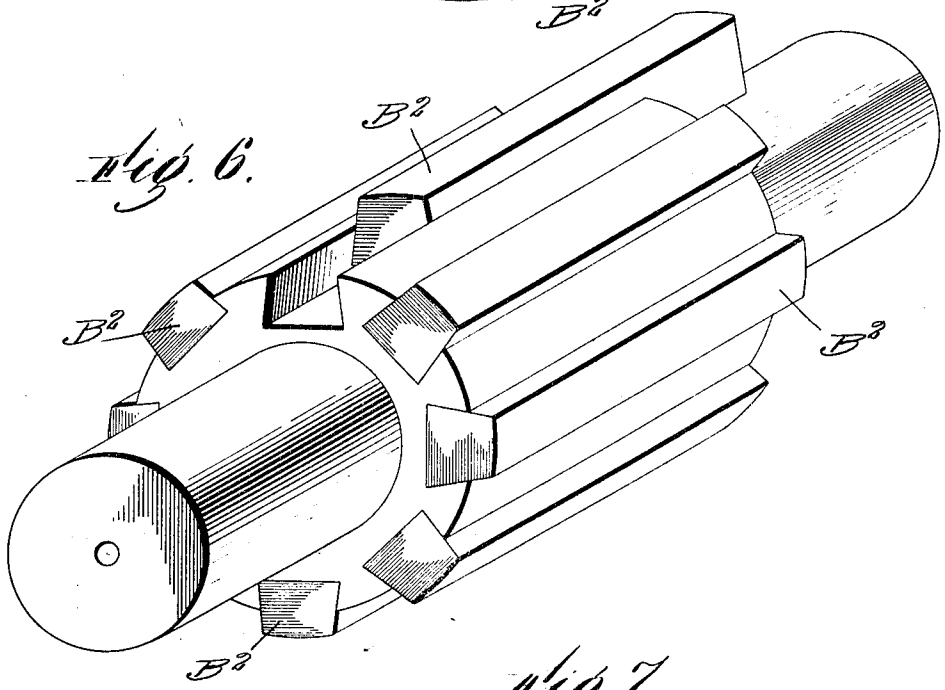
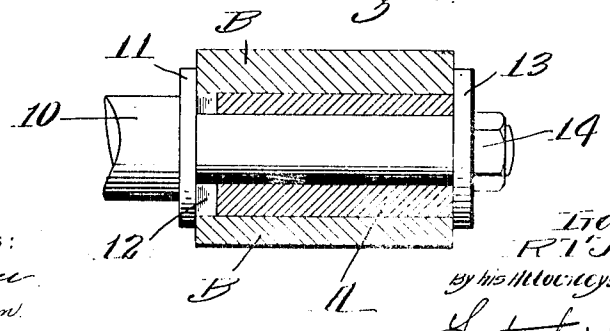


Fig. 7.



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UNITED STATES PATENT OFFICE.

ROBERT T. JOHNSTON, OF TAUNTON, MASSACHUSETTS.

ADJUSTABLE TOOL.

No. 852,274. Specification of Letters Patent. Patented April 30, 1907.

Application filed March 6, 1905. Serial No. 248,535.

To all whom it may concern:

Be it known that I, ROBERT T. JOHNSTON, a citizen of the United States, residing at Taunton, in the county of Bristol and State of Massachusetts, have invented a new and useful Adjustable Tool, of which the following is a specification.

The object of this invention is to provide a new and improved adjustable tool such as a reamer, arbor, tap, etc. and, while the invention is capable of this general application, as hereinafter described, it has been more particularly designed as an adjustable reamer.

Reamers are now made solid; that is of one piece of metal, but these have the disadvantage that when worn they have to be discarded. Reamers are also made adjustable for wear, in several ways. One way is to make a body or shell of low grade steel and to secure a plurality of blades or cutting edges thereto by screws. When the blades wear down, they are removed, packed up with paper or shims, and then again secured in place and reground to size. A serious objection exists to this style of reamer, in that if paper is used, the same absorbs moisture and oil and does not hold its size, and, in that the reamer is not as solid as a solid reamer, the screws being liable to loosen.

Another type of adjustable reamer has its blades placed in dove-tailed grooves, the bottoms of which are at a slight angle to the axis of the reamer. When the reamer wears down, the blades are driven or adjusted up and the reamer thus expanded. The reamer is reground after the blades are adjusted. A serious objection to this style of reamer exists in, that as it is handled in use, the position of the blades may be changed from one cause or another and thus the adjustment altered or else the size of the reamer can be changed by an unauthorized workman.

As a reamer is a tool for finishing holes to a standard size, the objections above noted are very serious.

Another objection that exists to adjustable reamers is that they chatter and do not make a smooth hole. The nearer solid an adjustable reamer can be made, the less it will chatter.

The object of this invention is to overcome these difficulties and to make an adjustable tool, particularly a reamer, so that it may be adjusted after it is worn without the above objections. To accomplish this desirable result, I provide the body or shell with a plurality or a series of grooves parallel to the axis of the reamer, the bottoms or seats of said grooves being arranged at different distances from the center, which varying distances are preferably arranged in regular progression.

The blades are made of corresponding varying thicknesses so that when inserted in position they will match with the grooves, whereby the outer or cutting edges thereof will form a true cylindrical surface relatively to the axis of the tool. The grooves are preferably made dove-tailed in shape and the blades are made to fit said grooves so that they can be driven tightly in place.

When the reamer is worn and is to be adjusted, the blades are removed and the thinnest blade is discarded and a new blade of the largest size inserted in the deepest groove and the other blades move circumferentially around the body. After the blades are secured in position in this way, the reamer is reground to accurate size. In this way, when it is desired to adjust the reamer, only one blade has to be discarded and as different adjustments take place, each new blade will be used in each of the grooves in progression. In this manner, an economical method of adjustment is obtained.

The invention is capable of application to arbors and taps and other cylindrical tools which require rigidity in use and which have to be adjusted for wear.

The accompanying two sheets of drawings illustrate the way the invention may be practiced.

Referring to the drawings and in detail, Figure 1 is an end view of a reamer constructed to embody my invention. Fig. 2 is a perspective view showing the method of adjustment. Fig. 3 is a perspective view of the new blade employed. Fig. 4 is a view similar to Fig. 1 showing a modification in which each blade has two cutting edges. Fig. 5 is a similar view illustrating my invention applied to an arbor. Fig. 6 is a perspective view showing the method of adjustment and, Fig. 7 is a sectional view showing one way of holding the blades to the body.

Referring to the drawings and in detail, A designates the body which may be made in the form of a cylindrical shell and which has a transverse key-seat. A plurality of dove-tailed grooves is cut in said shell. In the

specific illustration shown in the figures, eight of such grooves are shown. These grooves are cut of different radial depths, which depths increase in regular progressions or, in other words, the seats or bottoms of the same are arranged parallel on a spiral cylinder, as indicated by the dotted line S. A series of blades B is inserted in said grooves. These blades are made to fit said grooves and of relatively increased thickness so that when inserted in position, their outside edges will coincide with the surface of a true cylinder, as indicated by the dotted line C, in Fig. 1. The bottoms or seats of said grooves are made of the same width so that any blade, no matter what its thickness, will fit into any one of the grooves.

The blades are held to the body in any desired way, as by driving them tightly in place, by screws, or by the usual shaft as shown in Fig. 7, which shaft 10 has a collar 11 to engage one end of the blades, a key 12 to engage the key-seat in the body or shell, and a removable collar 13 on the other end, which is held in place by a nut 14 threaded on the end of said shaft.

When the reamer has become worn or when it is desired to adjust the same, the blades are removed and a new blade, of the largest thickness, as shown in Fig. 3, is inserted in the groove of the largest depth and the blades are re-inserted in the body, one groove in advance from the position they previously occupied, counting from the deepest groove to the shallowest groove. The thinnest blade which is thus crowded out is discarded. The blades are then secured in their new positions and are reground. In this way, a reamer which is as solid as is possible, is provided and an adjustment thereof only costs one blade.

The invention can be applied to that class of reamers in which each cutting blade has two cutting edges as shown at B' in Fig. 4. The invention can also be applied to arbors as shown in Figs. 5 and 6, in which case the blades B^2 making up the cylindrical or bearing surface, are adjusted in the same manner as described in connection with the reamer.

The invention is of particular use in connection with arbors as, if the progression in the depth of the grooves is made small, little or no grinding is necessary for adjustment.

The details and arrangements herein described may be greatly varied by a skilled mechanic without departing from the scope of my invention.

Having fully described my invention, what I desire to secure by Letters-Patent is:—

1. The combination of a body having a plurality of seats arranged at varying distances from the center and a plurality of interchangeable blades therefor, said blades having means whereby their cutting edges will be located at equal distances from the axis of the body when the blades are in position in the seats.

2. The combination of a body having a plurality of seats arranged at varying distances from the center and a plurality of interchangeable blades of different thicknesses therefor.

3. The combination of a body having a plurality of seats arranged parallel to its axis and at progressive radial distances therefrom and interchangeable blades of progressive relative thickness therefor.

4. The combination of a body having a series of dove-tailed grooves arranged at different distances from the axis, the bottoms of said grooves being of the same width, and blades therefor.

5. A tool having a body provided with a plurality of seats, the bases of said seats being arranged tangent to a spiral, and a plurality of blades adapted to fit removably in said seats, said blades being of varying thicknesses, whereby their cutting edges will be at equal distances from the axis of the body when they are in position in the seats.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

ROBERT T. JOHNSTON.

Witnesses:
C. J. ROBERTSON,
FRED J. VIEWEG.