

J. MUTH, W. E. KELLY & C. F. HEINKEL.
REAMER.

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931,883.

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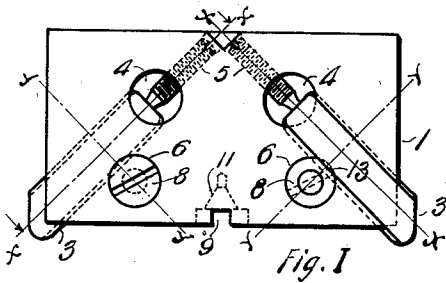


Fig. I

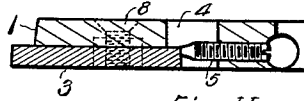


Fig. II

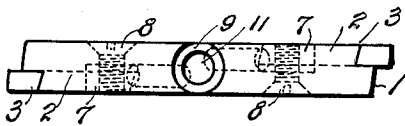


Fig. III

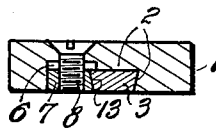


Fig. IV

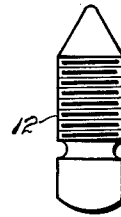


Fig. V

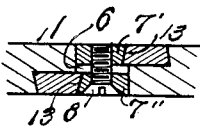


Fig. VI

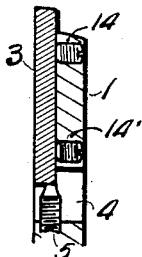


Fig. VIII

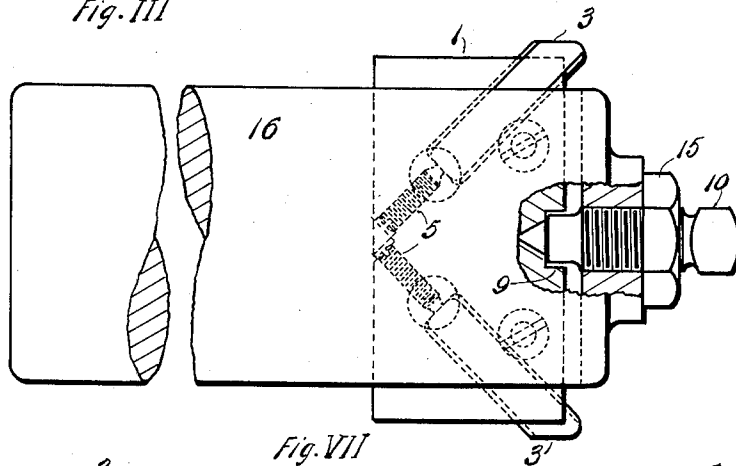


Fig. VII

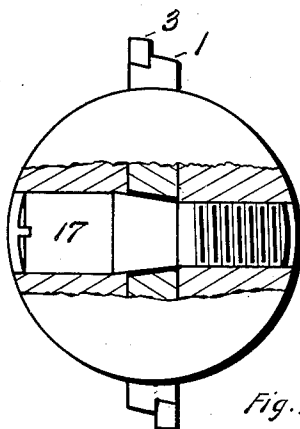


Fig. IX

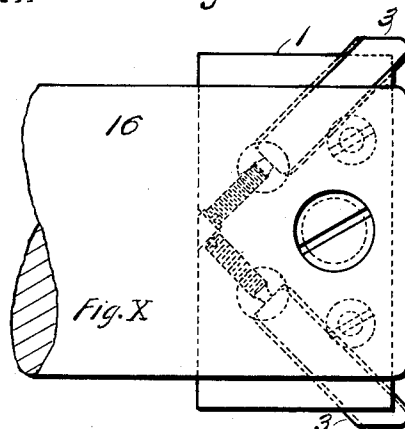


Fig. X

Witnesses:

Albert S. Smith
Frank S. Smith

Inventors

John Muth
W. E. Kelly
Christian F. Heinkel

UNITED STATES PATENT OFFICE.

JOHN MUTH, WILLIAM E. KELLY, AND CHRISTIAN F. HEINKEL, OF CLEVELAND, OHIO, ASSIGNORS
TO THE KELLY TOOL COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF OHIO.

REAMER.

931,883.

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To all whom it may concern:

Be it known that we, JOHN MUTH, WILLIAM E. KELLY, and CHRISTIAN F. HEINKEL, citizens of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a new and useful Improvement in Reamers, of which the following is a specification.

Our invention relates to improvement in reamer, which can be used either as a solid or as a floating reamer, and in which a block carries a plurality of angularly placed and independently adjustable cutters.

We are aware, that reamers have been made and patented which have a block and which will float, but could not be used as either solid or floating reamer without extra parts and cost; we are further aware, that reamers have been made and patented with angularly placed, but not independently adjustable cutters; we are further aware, that reamers have been made and patented with independently adjustable, but not angularly placed cutters; these reamers can not be made of small diameter, nor do they allow of large scope of adjustment, or of nicety of adjustment.

The object of our improvement is: first, a cheap and simple reamer; second, a reamer which has greater scope of adjustment and more accuracy of adjustment than the reamers now in use; third, a reamer which may be used either as a solid or as a floating reamer; fourth, a reamer in which the cutters may be made small, and may be easily and independently sharpened or replaced; and fifth, a reamer which can be made of small diameter.

We attain these objects by mounting the cutters on opposite sides and at an angle with a block; by placing the cutters on opposite sides of a block we are able to make a reamer of small diameter, because the cutter on one side of block will not interfere with cutter on other side of same block; by placing the cutters at an angle we attain nicer adjustment, the adjusting screws act directly against cutting face of reamer, and, as is well known in the art, a reamer, in order to size holes accurately, must have its cutters securely fastened; this we attain by our clamping device and by placing the cutters at an angle, thus obtaining a longer bearing face, and further we can use a comparatively narrow cutter, thus reducing cost of material especially when high priced steel is used for cutters;

we attain the object of using our reamer either as a solid or as a floating reamer by the use of one stem, thus saving stems, since one stem may be used for any number of reamers, and any or all of these reamers may be used as either solid or floating by manipulating one screw.

Reference is to be had to the drawings, in which: Figure I is a general plan-view of reamer proper, without stem, showing arrangement of parts. Fig. II is a section on line $x-x$, showing cutters and adjusting screws. Fig. III is a general end-view, showing relative location of cutters in block. Fig. IV is a section on line $y-y$, showing one method of clamping cutters in block. Fig. V shows screw for securing the block rigidly and centrally to the stem; for use as a solid reamer. Fig. VI is a section of locking-device for small reamers, where one locking-screw only can be used. Fig. VII is a general view of complete reamer, partly broken away, to show method of holding the block when the reamer is used as a floating reamer. Fig. VIII is a section on line $x-x$, showing method of clamping cutters to block for smallest sizes of reamers. Fig. IX is an end-view of reamer, partly broken away, to show modified method of holding block in stem. Fig. X is a general view of reamer, which may be used when projections on end of stem, shown in Fig. VII, are objectionable, or, where reamer is used as a bottoming-reamer.

Similar numerals refer to similar parts throughout the several views.

The block 1, shown in Fig. I, is made rectangular or square; is provided with grooves 2, for the purpose of receiving cutters 3; is also provided with openings 4, for the purpose of allowing the tool to run off when planing or milling said grooves 2 and to facilitate tapping for adjusting-screws 5; is also provided with openings 6, for the purpose of receiving clamping-bushing 7 and clamping-screw 8; is also provided with counterbore 9, for the purpose of receiving end of holding-screw 10; and is also provided with countersink 11, for the purpose of receiving point of locking-screw 12. The said cutters 3 are placed on opposite sides of said block 1, and at an angle with center-line of said block 1, and said cutters 3 are, preferably, beveled on each side, and said grooves 2 are made to fit, as shown in Figs. IV and VI; said cutters 3

may also be made with flanges on one side or both sides, and one or more suitable screws may be used to clamp said cutters 3 in place; the said grooves 2 may in this case have straight sides. (Not shown in the drawing.) Said openings 4 are located on each side of center-line of said block 1 for the larger sizes of reamers; for a smaller size one opening on center-line of said block 1 will answer, and for the very small sizes two openings are needed, and they will be located, respectively, on opposite sides of center-line of said block 1 than the openings shown in Fig. I; this is not shown in the drawing but may be understood easily. Said adjusting-screws 5 are for the purpose of adjusting said cutters 3 independently. The preferred clamping-device consists of said clamping-bushing 7 and said clamping-screw 8; said clamping-bushing 7 is made cylindrical, has one beveled spot 13 to fit side of said cutter 3, and is threaded to receive said clamping-screw 8; this clamping device, shown in Fig. IV, is for the larger sizes of reamers, for the smaller sizes of reamers the said cutters 3 come closer together and one clamping device only is possible to clamp said cutters 3; this clamping device is shown in Fig. VI and consists of two clamping-bushings 7' and 7'' and one clamping-screw 8; said clamping-bushing 7' is made the same way as clamping-bushing 7 previously described but said clamping-bushing 7'' is not threaded, but is drilled and countersunk to fit head of clamping-screw 8; for the smallest sizes of reamers, said cutters 3 overlap each other, there will not be room for the clamping device shown in Figs. IV and VI, and we then use clamping method shown in Fig. VIII, which consists of one or two clamping-screws 14 and 14' for each cutter; one clamping-screw 14 only may be used, but two hold better; this clamping method may be used on all sizes of reamers, but we prefer to use the clamping device previously described, wherever possible. Said counterbore 9 is made larger in diameter than the end of said holding-screw 10, so that said block 1 may have lateral movement, or what is commonly called floating; said holding-screw 10 is screwed up to bottom of said counterbore 9 so, that said block 1 may slide easily, but may not bind, and to prevent said block 1 from tipping, or said cutters 3 from digging in; check-nut 15 is for the purpose of locking said holding-screw 10 when properly adjusted; this ar-

range-ment constitutes a floating reamer. Said locking-screw 12 screws into end of stem 16, is pointed to fit said countersink 11, and is for the purpose of locking said block 1 centrally and firmly; this arrangement constitutes a solid reamer. Said stem 16 is made to fit any desired machine at one end; the other end is provided with a slot, which allows said block 1 to pass through easily, and is also provided with a threaded hole to receive said holding-screw 10 or said locking-screw 12. In case the reamer is to be used up against a shoulder, we construct one end of said stem 16 as shown in Fig. X; said slot, which receives said block 1, is placed close to the end of said stem 16, or said slot may be open on end of said stem 16 and a cap may or may not be placed over said slot; said stem 16 is provided with a suitable opening, near its end to receive pin 17; the opening in said block 1, in this case, is taper, and it will be seen that, when said screw 17 is screwed in tight, said block 1 with said cutters 3 will be held centrally and firmly, as in a solid reamer, but when said screw 17 is screwed back, or loosened, any desired amount of float, within the limit of said screw 17, may be obtained; the methods of adjusting and clamping of said cutters 3 in this case is the same as previously described.

Having thus described our invention, we claim:

1. A reamer comprising a block; independently adjustable cutters fitting into angularly placed grooves on opposite sides of said block; a clamping device for said cutters; and adjusting-screws for, and placed in line with, said cutters.

2. In a reamer the combination of a block with its cutters, a stem, and means for either floatingly or rigidly and centrally securing said block to said stem; said means consisting of a pin, an opening in said block, and an opening in said stem, said pin having a taper portion engaging in said opening in said block, a straight portion engaging in a portion of said opening in said stem, and a straight and threaded portion engaging in the other portion of said opening in said stem.

JOHN MUTH.
WM. E. KELLY.
CHRISTIAN F. HEINKEL.

Witnesses:

ALBERT SOULECK,
FRANK S. SMITH.