B. M. W. HANSON.

METAL REDUCING MACHINE.

APPLICATION FILED MAR. 23, 1908.

921,986.

Patented May 18, 1909.

2 SHEETS—SHEET 1.

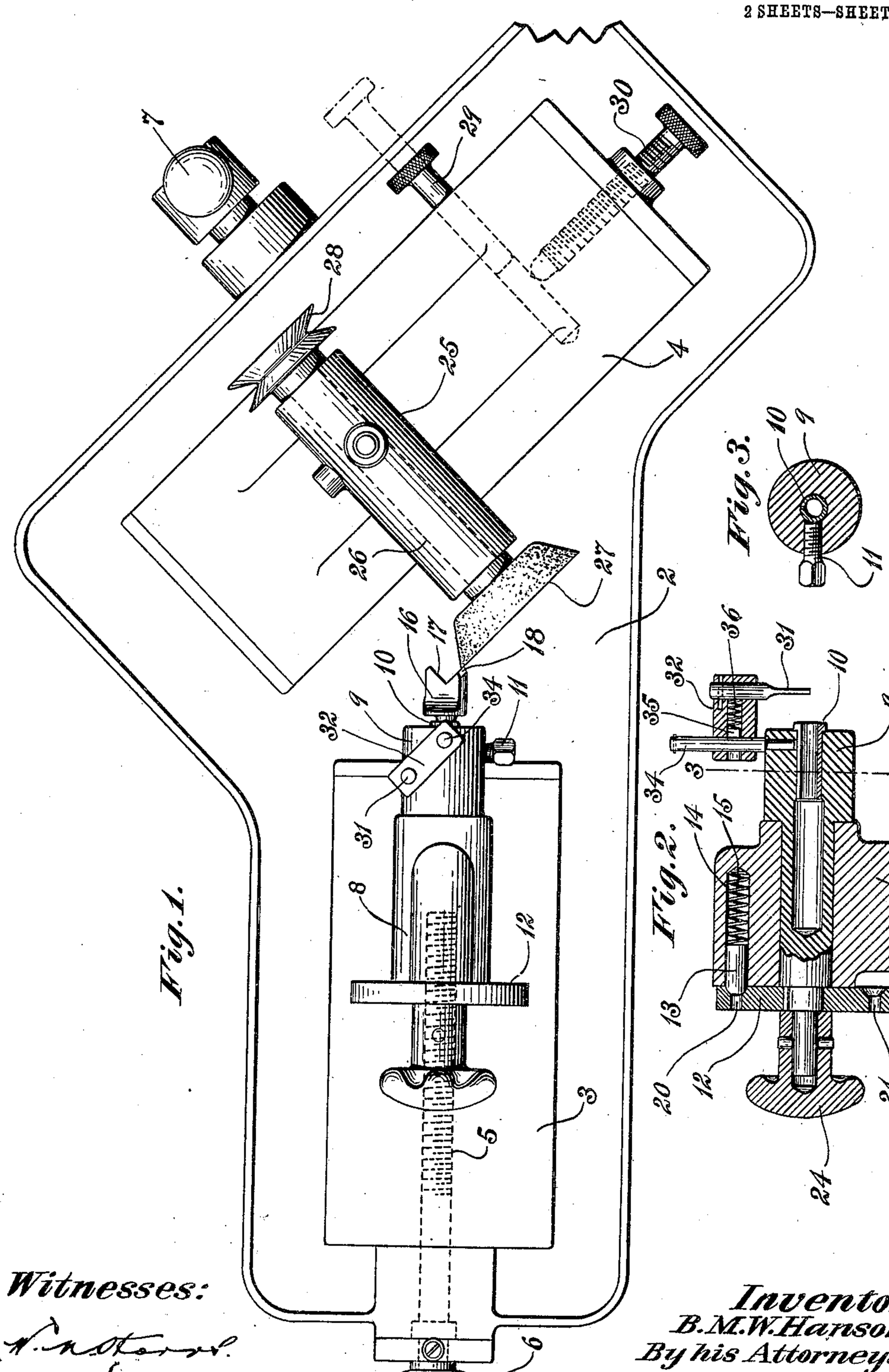

Fig. 1.

Fig. 3.

Fig. 2.

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2 SHEETS—SHEET 2.

Fig. 4.

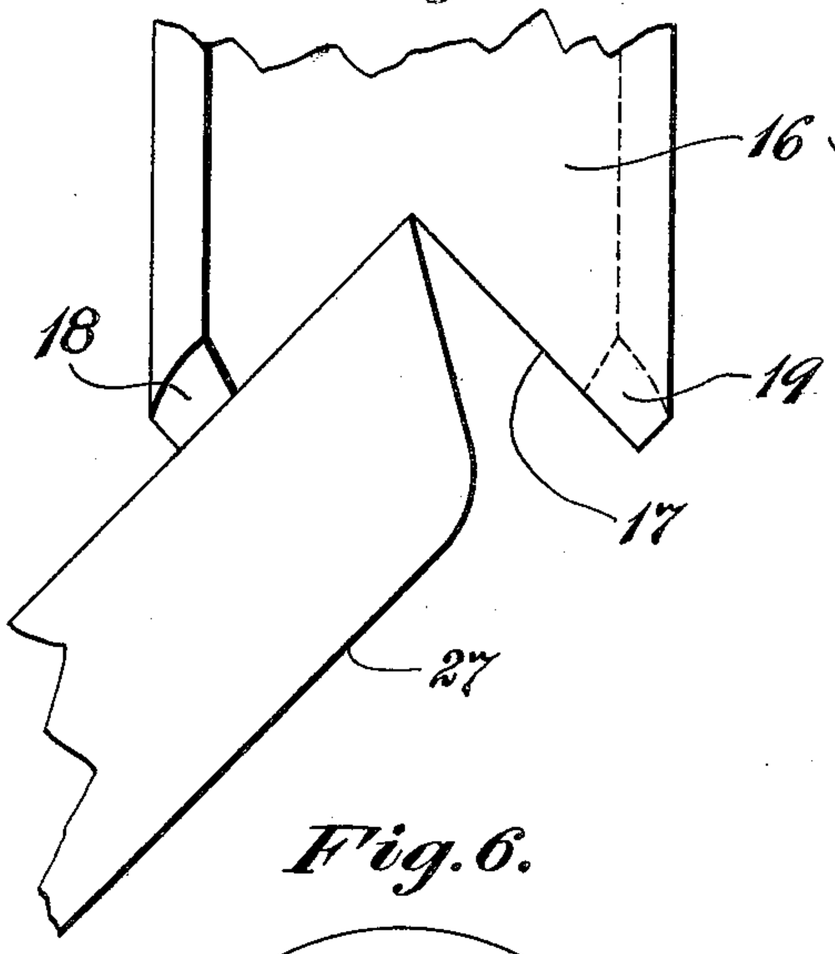


Fig. 5.

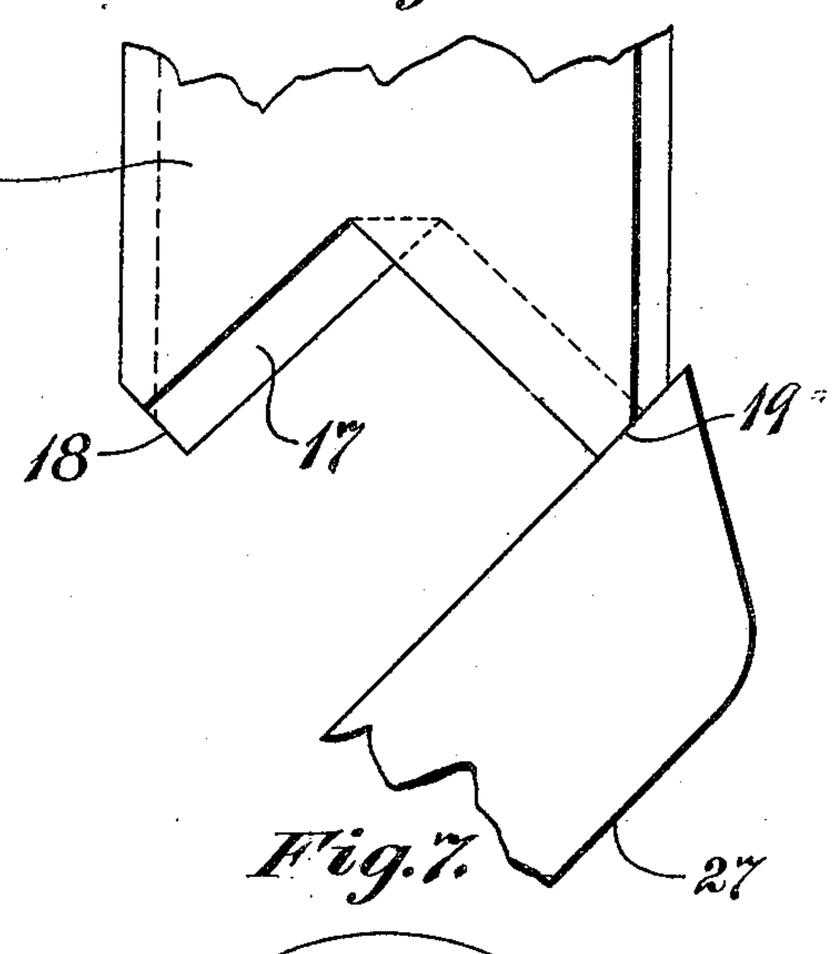


Fig. 6.

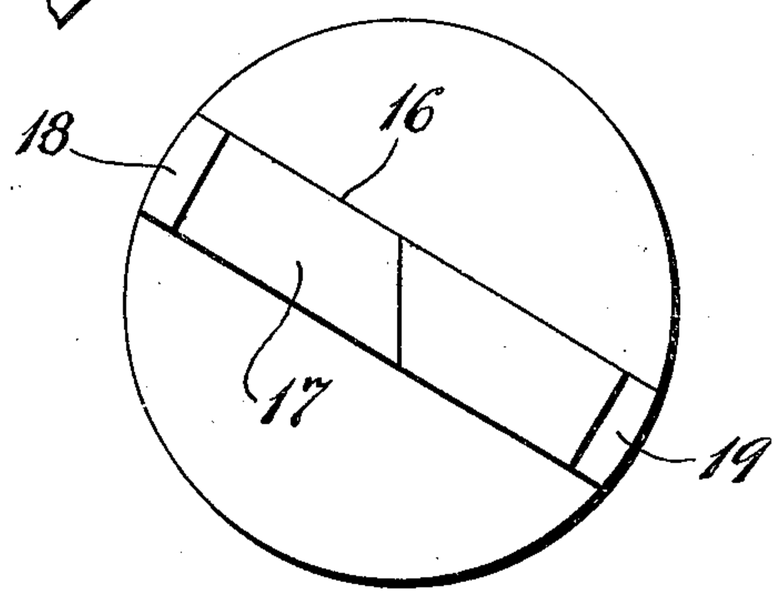


Fig. 7.

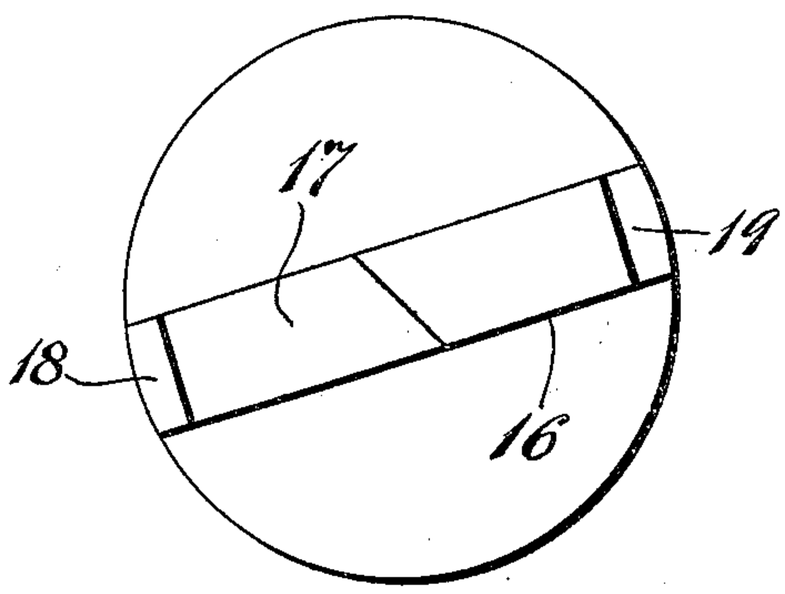
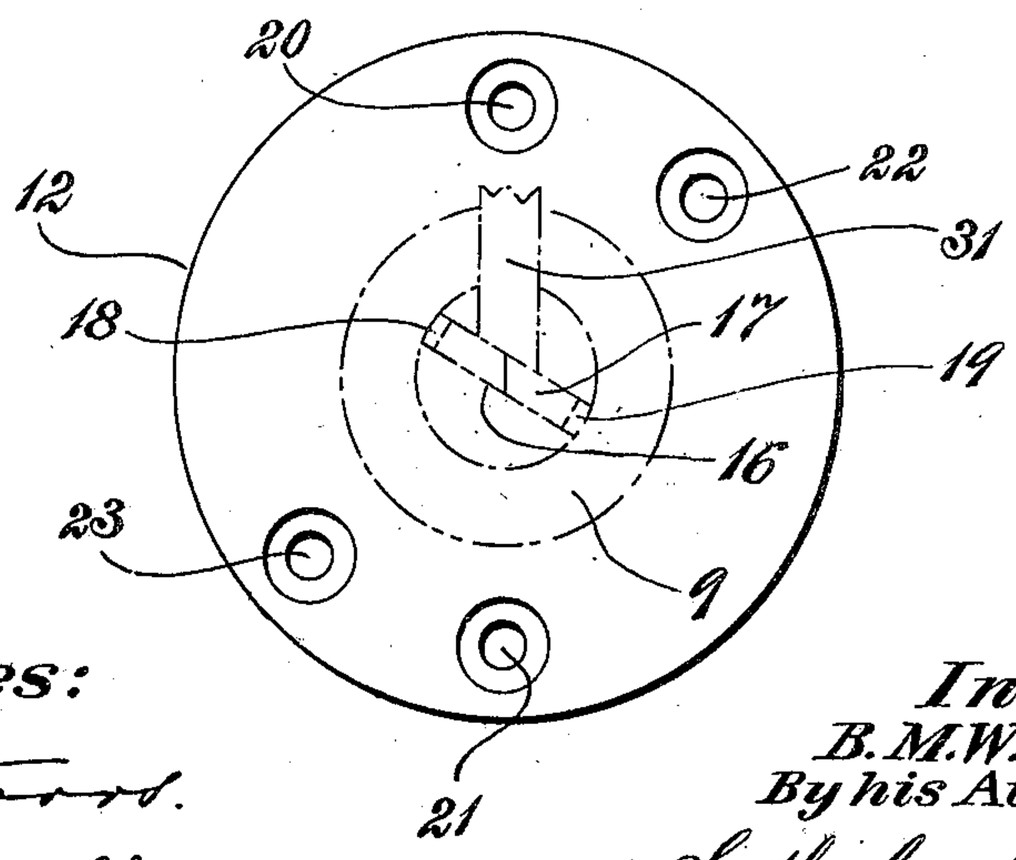


Fig. 8.



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UNITED STATES PATENT OFFICE.

BENGT M. W. HANSON, OF HARTFORD, CONNECTICUT, ASSIGNOR TO PRATT & WHITNEY COMPANY, OF HARTFORD, CONNECTICUT, A CORPORATION OF NEW JERSEY.

METAL-REDUCING MACHINE.

No. 921,986. Specification of Letters Patent. Patented May 18, 1909.

Application filed March 23, 1908. Serial No. 422,804.

To all whom it may concern:

Be it known that I, BENGT M. W. HANSON, a citizen of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Metal-Reducing Machines, of which the following is a specification.

This invention relates to metal reducing machines.

A machine embodying my invention may be employed with utility in many different connections. I have found it of particular advantage in grinding tools having beveled cutting edges at an angle to each other. As a type of such a tool may be mentioned what is known as a "fish-tail" cutter. This kind of a device has four of such beveled edges or faces and it is one of the primary purposes of my invention to so organize the machine that these faces can be ground with precisionized accuracy. The machine possesses other advantageous points which with the foregoing will be set forth at length in the following description wherein is outlined that form of embodiment of the invention which I have selected for illustration in the drawings accompanying and forming a part of this specification.

Referring to said drawings, Figure 1 is a top plan view of a machine including my invention. Fig. 2 is a vertical section of a standard, and certain indexing and gage means sustained thereby, portions of said two means being in elevation. Fig. 3 is a transverse section on the line 3—3 Fig. 2. Figs. 4 to 7 inclusive are diagrammatic views showing the different positions of the cutter, etc., and all of which will be hereinafter more fully described. Fig. 8 is a face view of an index member, and a portion of the gage means, the latter being in dotted lines.

Like characters refer to like parts throughout the several figures.

The different parts of the machine may be carried upon any suitable framework; the latter illustrated involves a base or bed as 2. On the said base or bed are mounted a plurality of carriers, with one of which the work is connected and with the other of which the working-tool is connected. These carriers are preferably movably mounted and while they may be of any desirable nature slides as 3 and 4 may be advantageously used for the purpose. The work in the present case is supported by the slide 3 while the tool which may be a suitable form of grinding device is supported by the slide 4. These slides may be of any suitable character so that a detailed description of them is not deemed necessary. It might be remarked, however, that during the action of the machine, the slide 4 moves in a plane at an obtuse angle to the plane of movement of the slide 3, this being for the purpose of securing the movement bodily of the grinding tool along angular paths relative to the axis of the work support. In the present case the slides are moved manually and any known means may be provided for this purpose. For instance a feed-screw as 5 (see dotted lines Fig. 1) can be employed for reciprocating the slide 3, said screw being provided at its outer end with a hand-wheel as 6 to facilitate its being turned. The slide 4 may be operated by a hand-lever as 7 operatively connected therewith.

I have represented the slide 3 equipped with an upright or standard as 8. Through the upper portion of this standard 8 there is illustrated as extended a work-support which may consist of a spindle as 9. The spindle 9 is rotary for a purpose that will hereinafter appear, and it is represented as bored to receive the split-sleeve or divided bushing 10 into which the shank or body of the work fits. The shank of a fish-tail cutter is generally cylindrical and therefore the sleeve or bushing 10 is of a corresponding internal shape. Through the forward end of the spindle 9 is tapped a screw as 11, the inner end of which is adapted to bind against said bushing or sleeve so as to cause the latter to tightly and firmly hold the cutter, blank or work in position during the grinding operation. It is therefore clear that the work or fish-tail cutter blank is solidly clamped in position and against movement relatively to its supporting spindle 9.

In conjunction with a work-support such as 9 I provide an index member, and while this index member may be of any suitable kind, I find that a circular plate or disk as 12 is advantageous. The index member or disk 12 is in the present case rotative with the work support or spindle 9 and for this purpose it may be keyed or otherwise suitably fastened thereto. There is combined with this index member a stop and in like manner this stop may be of any suitable form; for

instance I have found a plunger as 13 as meeting the necessary conditions. This plunger 13 is preferably yieldingly mounted; it is shown as seated in a bore 14 in the standard 8 and as normally urged outward by a coiled push-spring as 15 seated in said bore and the ends of which respectively bear against the bottom of the bore and the tail of the plunger. In the present case this index member is capable of occupying several different positions, and when a fish-tail cutter is being ground these positions will be four in number as will hereinafter appear. Said index member 12 and its coöperating stop maintain the work-support or spindle 9 in the different adjusted positions thereof and assure also the correct angular presentation of the work to the operating tool. As will hereinafter appear I do not rely upon guesswork or mere speculation to obtain a definite or precisionized relation between the work and the index member of whatever character the latter may be, but provide means of a positive nature to obtain this important result so that the finished or ground fish tail cutter will be precise in form.

A fish tail cutter has in addition to the shank to which I have referred, a head and it is the latter that has the fish-tail form. In Figs. 4 and 5 I have shown such a head, it being denoted by 16 and having in it a V-shaped notch or aperture 17, the walls of which are oppositely inclined to each other; in fact the surfaces of these two walls in a finished tool are at a right angle to each other. When these walls or surfaces are ground down there will be produced as will be obvious two cutting edges or portions. In action these two surfaces are ground in succession and afterward the outer or forward ends or tips of the two sides 18 and 19 of the flat-headed cutter are ground along planes at right angles to each other and of different pitch than the other angles. There are therefore four surfaces to be ground on a blank and it is the office of the index member 12 in connection with its stop to obtain the correct angular presentation of the work or blank to the grinding tool.

The index member 12 to adapt it to the work set forth has four seats into which the stop or plunger is adapted to be interchangeably fitted, and these seats may consist of holes as 20, 21, 22 and 23 which are arranged as will be evident in pairs, the holes 20 and 21 being complemental to each other and the same applying to the holes 22 and 23. It will be seen that the holes of the two pairs are diametrically opposite to each other. In grinding along the surfaces of the walls of the notch 17 the holes 20 and 21 are employed while for grinding the outer or tip portions of the blank or work, the holes 22 and 23 are used. The hole 20 is preferably initially employed and the gage means to which I have hereinbefore briefly referred and which will be more fully alluded to hereinafter insures a definite relation between this hole 20 and the stop or plunger 13; in fact after the said gage means has performed its function all of the holes will be in a definite relation with the said stop. I might explain that in grinding a cutter of the kind referred to the same is presented at an angle to the grinding tool; this angle should always be uniform with respect to the grinding tool and should also be relative to the work-support. Without gage means such as that comprehended by my invention the correct angle cannot be obtained by the mere insertion of the shank of the fish-tail cutter blank into the sleeve or bushing 10 or other part which directly holds the work; said gage means however assures the accuracy of said angle. Initially or prior to grinding the first surface of the blank the gage means is employed and after the definite relation between the index member and its coacting stop is thus fixed it is not necessary to thereafter employ the said gage means. When a second blank however is mounted in place, the gage means will be utilized.

The index member or disk 12 may be rotated in any suitable manner, for example by a knob as 24 fastened by a pin or otherwise to the outer end of the work-supporting spindle 9. When the index member is turned the spindle 9 is rotated simultaneously therewith. The power of the spring 15 is just sufficient to prevent accidental turning movement of the index-member 12 although its stress is not enough to prevent free turning of said index member by an operator or attendant of the machine. By turning the index member by hand the plunger 13 is caused to recede out of an opening or hole in which it may be seated, and when the index member has been given the requisite motion said plunger will be shot into another of said openings or holes by the power of its spring.

On the slide 4 is a suitable bearing as 25 and in the same is rotatively disposed a shaft as 26 to the inner end of which is represented as attached a grinding wheel as 27 while to the outer end a band-wheel or pulley as 28 may be fixed to rotate said shaft and thereby the grinding tool carried thereby. The grinding tool is of frusto-conical or tapered form peripherally.

The slide 4 has two different characters of movement, one a limited movement or when the walls of the notch 17 are being ground and the other a relatively unrestricted movement when the tips or outer ends of the blank are being ground and I will now set forth the means illustrated for accomplishing these results. At this point I might state that when the grinding tool has bottomed against the notch or for instance when it encounters one wall of said notch after having ground the other wall thereof, it is necessary

that further advancing motion of the slide 4 be positively arrested to prevent injury to the work or the cutting or nicking of the surface of said notch which is not then being ground.

On the bed or base 2 I have shown as mounted an endwise movable bolt 29 which constitutes a suitable limit stop for the slide 4 and this stop coöperates with a stop as 30 on the slide, the stop 30 being shown as a screw tapped through the outer end of said slide, the bore which receives said screw intersecting or being in communication with that in which the stop-bolt 29 is fitted. It will be seen that these two stops are shown at right angles to each other. Should it be desired to limit the advancing movement of the slide 4 the bolt 29 is pushed inward and across the path of the screw 30 and when the screw strikes the bolt this will indicate to the operator to release the lever. As the screw is adjustable I can by its operation regulate the time or point of engagement between the same and the bolt to adapt the machine to effective operation upon different-size blanks. By pulling the bolt back out of the path of movement of the screw as represented in Fig. 1 the advancing motion of the slide 4 will be not limited or the maximum feed of the said slide can be obtained.

I will now describe the gage means shown in the drawings. Said gage means includes in its make up a gage or finger as 31, the shank of which is extended upward through and is fastened in a hole or perforation in the outer end of the block 32. This gage or finger 31 has its lower end flat and at a desired angle to its longitudinal axis, the angle being such a one as will adapt the gage to the particular work to be done. Said lower, flat end is adapted to engage one of the flat faces of the head of the work or blank. The block 32 is preferably adjustable vertically of a support or pin as 34 and in a bore in said block is fitted a friction shoe as 35. There is also located in said bore a push-spring as 36, acting against said shoe to constantly or at all times force the same in an outward direction whereby said shoe is caused to engage the support or pin with a pressure sufficient to maintain the block in a vertically adjusted position. The block and gage carried thereby of course partake of the rotary movement of the work support 9 and the index member 12 and they can be readily raised or lowered to adapt them to the thickness of the work. When the gage has exercised its function as such it can be swung back out of the way about the support or pin 34 as a pivot. (See Fig. 1). The gage is shown as occupying its operative position in Figs. 2 and 8.

In the operation of the machine, the slide 3 will if necessary be advanced to such a position as to cause the operation of the grinding wheel 27 upon the work, after which the shank of the latter will be clamped in the split bushing or sleeve 10, the slide 4 being at this time in its backward or retracted position. The block 32, if it be swung back out of the way, will now be moved forward into line with the spindle 9 and the lower flat edge or end of the gage 31 will be moved into contact with the upper flat face of the head 16 of the blank, the plunger 13 at this time being in any one of the four holes 20, 21, 22 and 23. The simple solid engagement of the working or lower end of the gage puts the work into a definite angular relation with respect to the work support 9 and also of the index member 12; the work therefore is primarily indexed with respect to the index member and in this way I assure a certain or known relation between the work and the index member and precision in operation while the different angular faces are being ground. After the work and the work support or gage are adjusted relatively to each other by the use of the gage means, the work will be in readiness to have its first surface dressed off or ground. In the present case the wall of the notch or aperture 17, on the left in Figs. 4 and 5 is first ground. When this wall is finished the spindle 9 is given one half turn so as to exactly reverse the position of the work. In grinding the first wall of the two the plunger 13 will be in the hole 20. When the second surface is to be ground the index member 12 is turned so as to bring the opening 21 opposite the plunger 13 at which point the tip or forward end of said plunger is shot into said opening 21 by the power of the spring 15. The index member therefore in connection with its coöperating and relatively fixed stop assures the correct presentation successively of different surfaces to the grinding tool. It will be evident that during the grinding of the two surfaces of the notch 17, the slide 3 is at rest and that the slide 4 is being reciprocated by hand, and that further the slide 4 has a limited forward stroke as previously set forth. When the walls of the notch 17 are dressed down to the required extent, the bolt 29 will be retracted and the index member 12 will be turned to permit the projection of the outer end of the plunger 13 into the hole 22 to dress down one of the tip portions of the blank during which action the slide 4 is being reciprocated. When this particular tip portion has been sufficiently ground, the index member 12 will be given a half turn at which time the outer end of the plunger will be forced into the opening 23 to maintain the correct angular position between the work and the grinding tool when the last of the four faces of the work is being ground.

In the diagrammatic views Figs. 4 to 7 inclusive I have shown the respective positions of the work during grinding, and in the first two of these figures I have illustrated the position of the tool with respect to the work in

making the inner and outer dresses or those along the walls of the notch 17 and the tip portions 18 and 19 of the work.

As hereinbefore indicated one form of embodiment of the invention has been illustrated and described, this being to enable those skilled in the art to practice the invention. As will be obvious my invention can be incorporated in different kinds of machinery, but when embodied in a metal working or reducing machine it is not essential that the work acted upon be a fish-tail cutter.

What I claim is:

1. In a machine of the class described, a manually-operable slide having a stop, and a stop supported independently of the first mentioned stop and movable into and out of the path of the latter.

2. In a machine of the class described, a reciprocatory slide, a stop carried by said slide, and a second stop supported independently of the first mentioned stop and movable into and out of the path of the latter.

3. In a machine of the class described, a slide, an adjustable stop carried by said slide, and a stop supported independently of the first stop and movable into and out of the path of the latter.

4. In a machine of the class described, a slide, a screw adjustably carried by said slide and constituting a stop, and a bolt supported independently of the slide and movable into and out of the path of the screw.

In testimony whereof I affix my signature in presence of two witnesses.

BENGT M. W. HANSON.

Witnesses:
W. M. STORRS,
EVERETT E. ARNOLD.