No. 775,109. PATENTED NOV. 15, 1904.

B. M. W. HANSON.

TURRET TOOL.

APPLICATION FILED SEPT. 25, 1902.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1

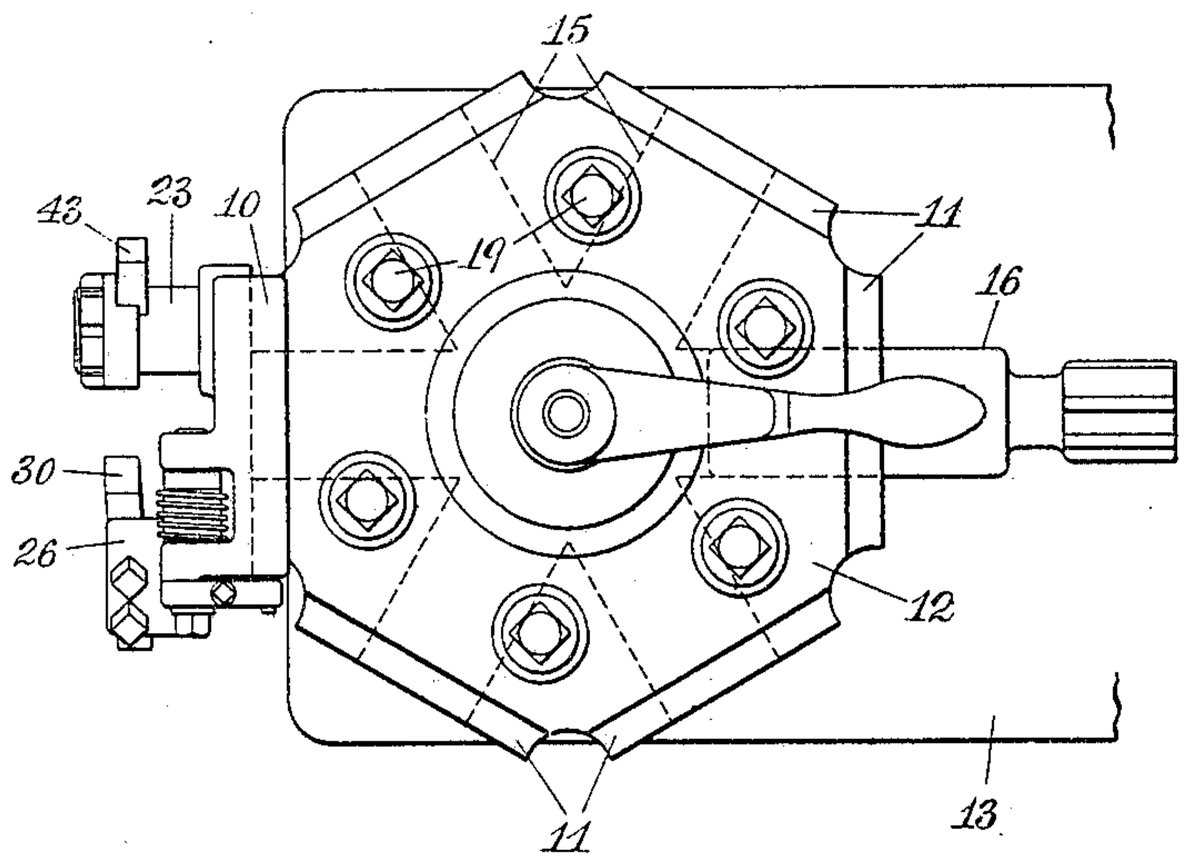
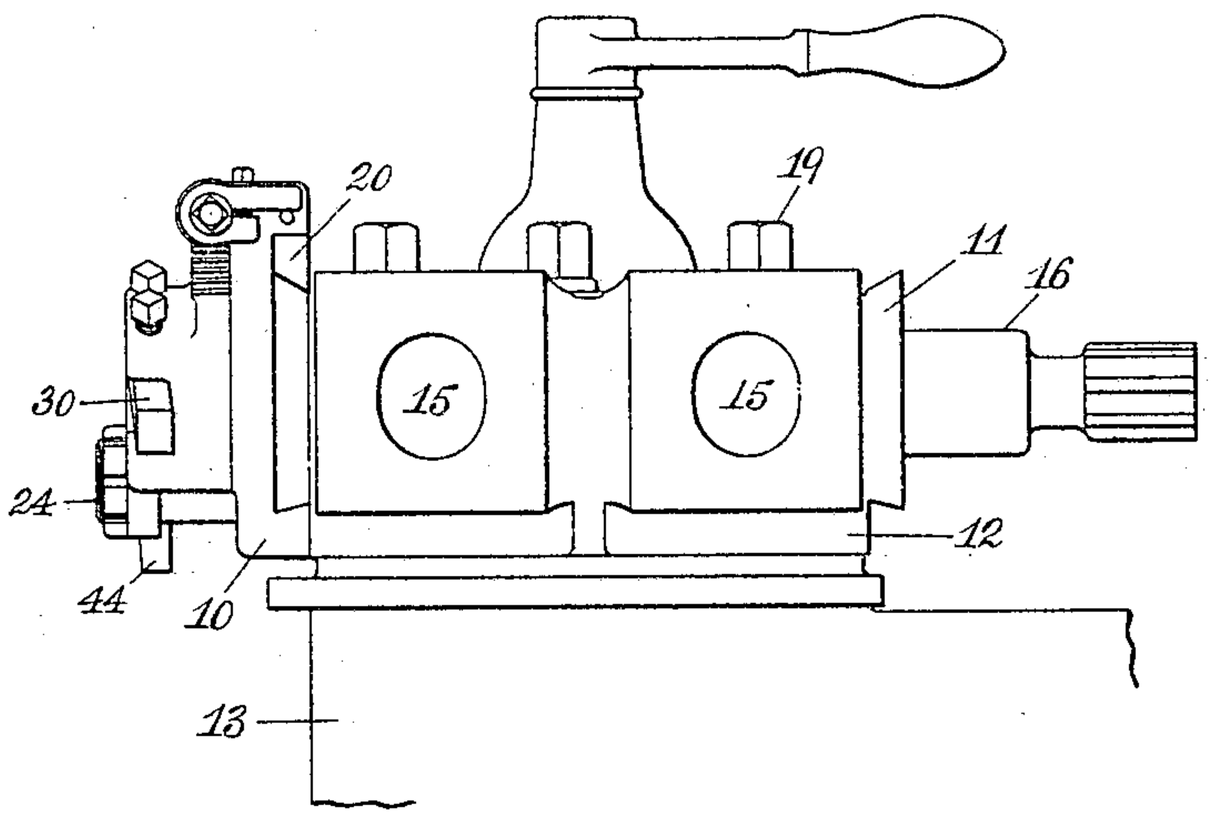


Fig. 2



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APPLICATION FILED SEPT. 25, 1902.

NO MODEL. 2 SHEETS—SHEET 2.

Fig. 3

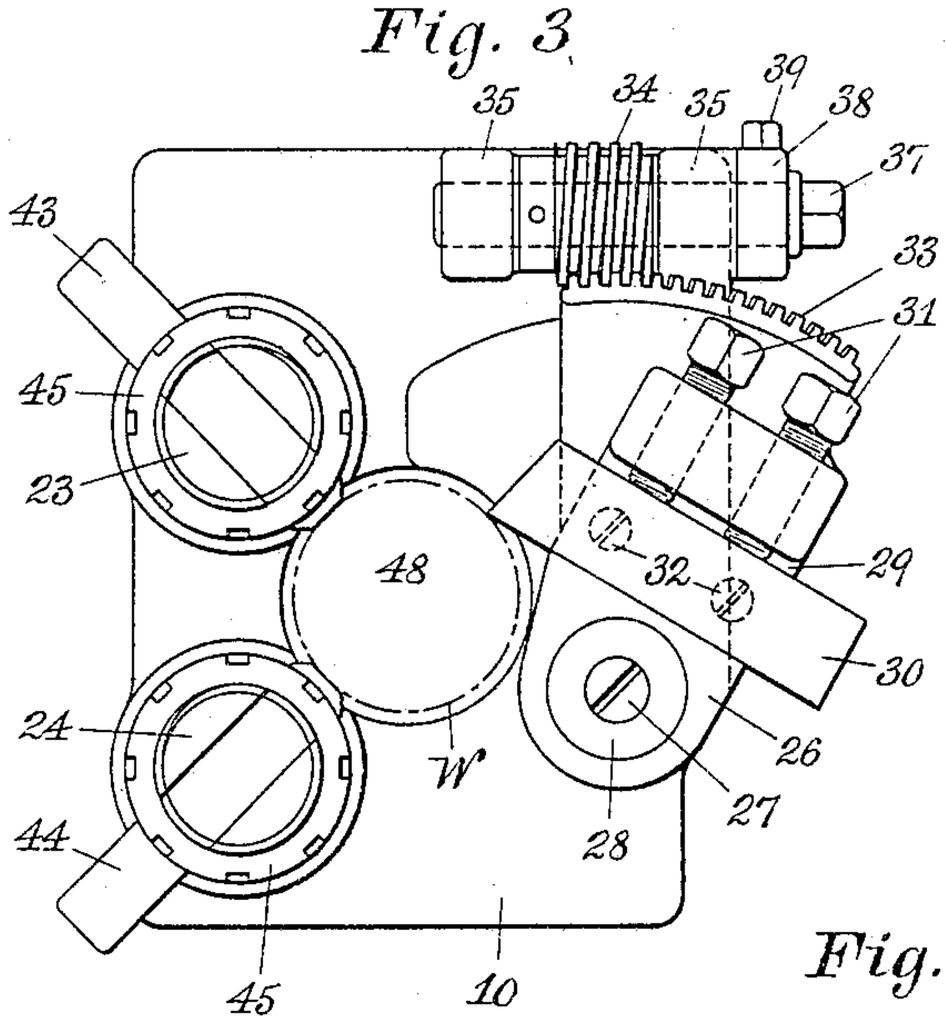


Fig. 4

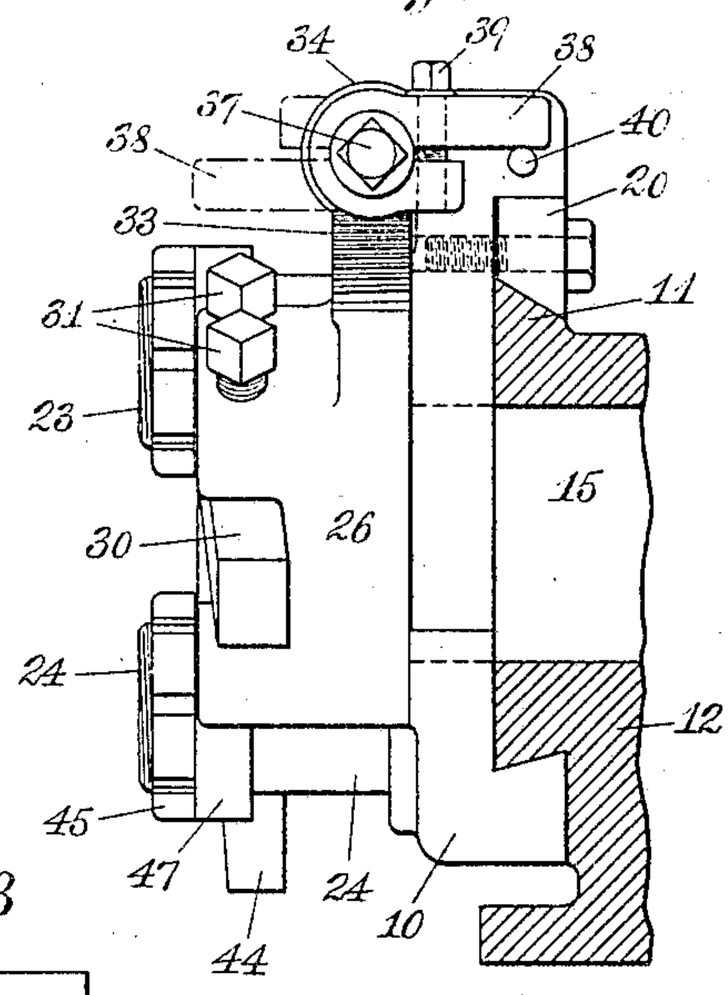


Fig. 8

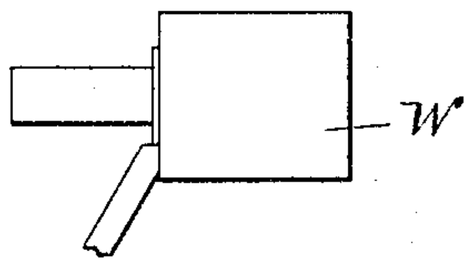


Fig. 5

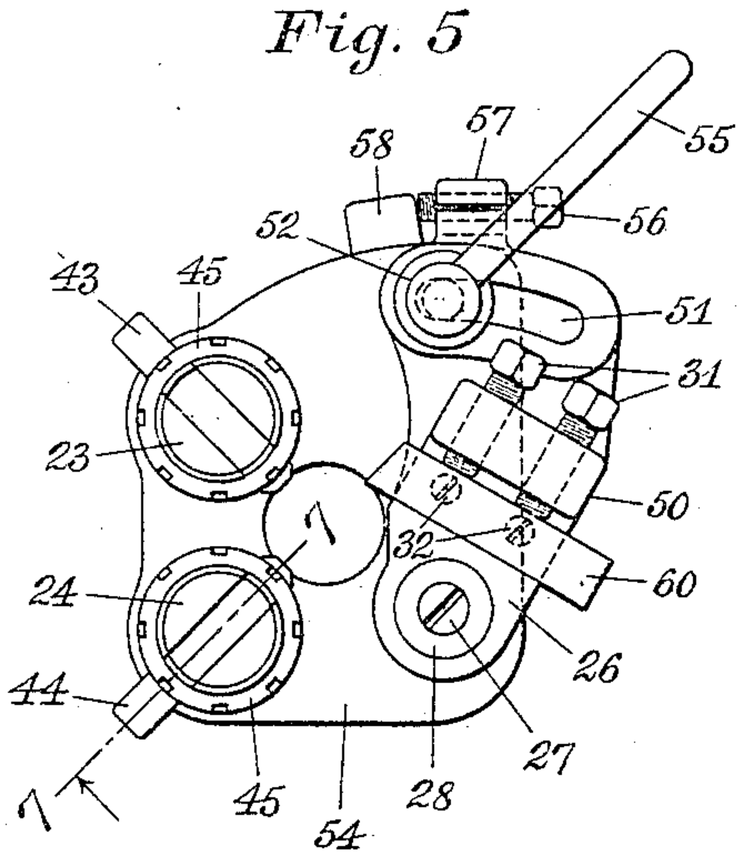


Fig. 6

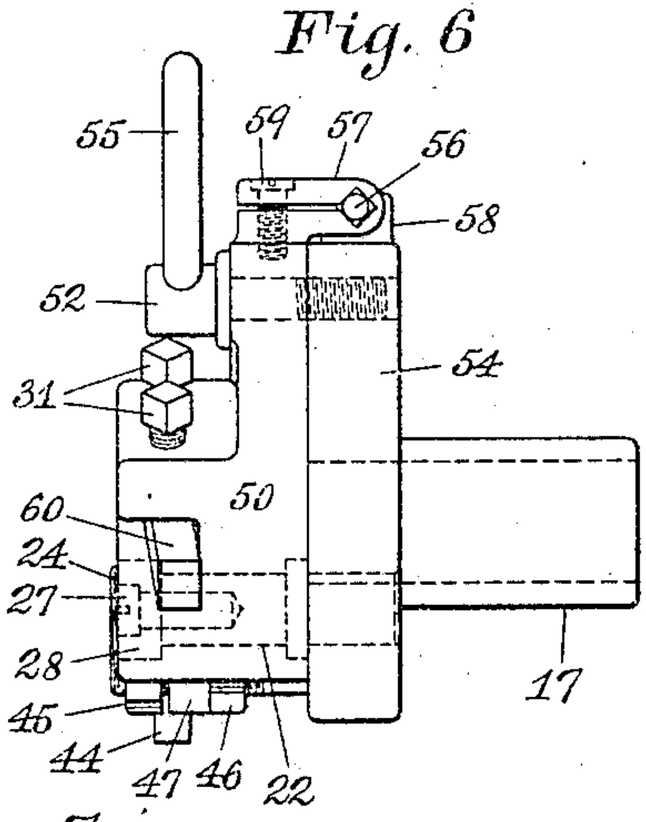
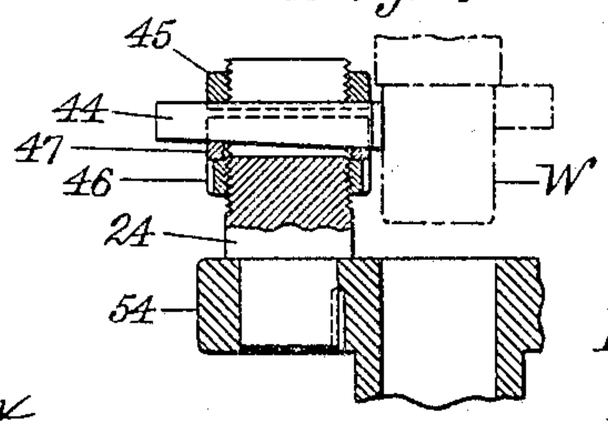


Fig. 7



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No. 775,109. Patented November 15, 1904.

UNITED STATES PATENT OFFICE.

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

TURRET-TOOL.

SPECIFICATION forming part of Letters Patent No. 775,109, dated November 15, 1904.

Application filed September 25, 1902. Serial No. 124,779. (No model.)

To all whom it may concern:

Be it known that I, BENGT M. W. HANSON, a citizen of Sweden, and a resident of Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Turret-Tools, of which the following is a full, clear, and exact specification.

This invention relates to improvements in turret-tools and in means for attaching them to the turrets of lathes, screw-machines, and similar machines, the object being to provide tools for this purpose which shall be readily adjusted to different sizes of work and readily applied to and removed from the tool turrets or bases upon which they are held in operative relation to the work and which shall also when applied and adjusted be solidly held in adjusted relation.

A further object of the invention is to enable the cutting-tool to be easily thrown back from the work when it has completed its cut and before drawing the tool-turret back, so as to prevent the tool from traveling back in contact with the finished work and also to allow the tool to be returned readily and accurately to its cutting position before beginning operations on the succeeding piece of work.

Tools of this class are commonly mounted in their tool-turrets by means of a longitudinal shank which is inserted in a corresponding cylindrical seat in the turret. These shanks are almost of necessity of comparatively small diameter, and therefore the stability of their attachment to the tool-turret is not as great as is desirable for some classes of work. It is furthermore desirable in most instances to retain the aforesaid cylindrical seats in the tool-turret for the insertion of smaller tools, such as taps and reamers, which are preferably made with cylindrical shanks. In the present improvements provision is made for attaching the heavier tools upon any face or side of the turret, while retaining the aforesaid customary cylindrical seats, so that all sides or faces of the turret are available for the application of tools having the cylindrical shank or all tools having the improved form of attachment of my present invention.

Figure 1 of the drawings is a plan view, and Fig. 2 is a side view, showing a tool-turret and tools constructed and arranged in accordance with my present invention. Fig. 3 is an end view, and Fig. 4 a side view, of my preferred embodiment of this improved tool, Fig. 4 showing also in section the adjacent portion of a tool-turret. Fig. 5 is an end view, and Fig. 6 is a side view, of a modified form of this invention. In Fig. 6 the tool is shown to be provided with the customary cylindrical shank instead of the dovetailed face of Figs. 3 and 4. Fig. 7 is a longitudinal sectional view taken along and at right angles to the line 7 7 of Fig. 5, showing the arrangement for supporting, adjusting, and clamping the back-rest jaws which are commonly employed in this class of tools. Fig. 8 is substantially a plan view of a piece of work, showing the tool of Figs. 3 and 4 in operation thereon and illustrating how that tool may be employed for facing or squaring a shoulder of the work which is too wide to be covered by the face of the tool or which for any reason requires to be faced squarely at right angles with the axis of the work in the manner commonly employed in the use of the ordinary lathe.

In my preferred embodiment of this invention (shown in Figs. 1 to 4, inclusive) the tools and back-rests are mounted upon a base 10, which is dovetailed to fit upon corresponding dovetailed projections 11 of the turret 12, which is here shown to be mounted in the usual way upon a turret-slide 13 upon a vertical axis, upon which the turret is rotated in well-known ways to bring the successive tools into operation upon the work. Each tool-face of the turret is preferably provided with one of these dovetailed projections 11, so that tools having a base 10 may be mounted upon any or all of the working faces of the turret. Each tool-face is also preferably provided with the customary cylindrical seats 15 for receiving a cylindrical shank of the customary form, like the shank 16 of the reamer shown

in Figs. 1 and 2 or the shank 17 of the tool shown in Fig. 6, so that tools having this customary form of shank may also be mounted upon any or all of the tool-faces of the turret or so that the same turret may be provided with some tools having the base 10 and with other tools having the cylindrical shanks 16 or 17. These cylindrical seats 15 are preferably made in the center of the projections 11, as herein shown, the faces of these projections being preferably at right angles with the axis of the cylindrical seats 15. The shanks 16 or 17 are clamped in place by means of the customary bolts 19, and tools having the bases 10 are clamped in place by means of a gib 20. The tool-holders and back-rests for these tools are mounted upon the studs 22, 23, and 24, respectively, which are firmly seated in the base 10 and project rigidly therefrom in a parallel relation with each other and with the work. The tool-holder 26 is mounted upon the stud 22, fitting snugly thereon, with only sufficient freedom to enable it to be turned for adjustment of the tool, and is held longitudinally upon the stud by means of the screw 27 and the washer 28, the latter being preferably counterbored into the face of the tool-holder so as to be flush therewith, as best shown in the tool of Fig. 6, which in respect of the mounting of the tool-holder and the back-rests does not differ from the tool of Figs. 3 and 4. The front face of the tool-holder 26 is recessed at 29 to receive the tool 30 and sustain it in a substantially tangential relation to the work, as shown in Fig. 3, being clamped in position by means of the set-screws 31. It is sometimes desirable to support the tool at different angles with the axis of the work, and for this purpose the adjusting-screws 32 are provided in the tool-holder, which abut against the back of the tool and by means of which it can be adjusted to any desired inclination, which is mainly for the purpose of affording proper cutting clearance. As a means for adjusting the point of the tool to a proper distance from the axis of the work W and also for the purpose of utilizing it for facing operations, as shown in Fig. 8, the tool-holder is provided with a worm-threaded portion 33, which is engaged by a suitable threaded worm 34, mounted to rotate in the hubs 35 of the base of the tool. The worm is here shown to be pinned upon the worm-shaft 36, which is squared at its front end 37 to receive a suitable wrench or crank for turning the worm. The tool-holder thus coöperates with the worm 34 as a sector worm-gear, the turning of which by the worm swings the point of the tool radially toward or from the axis of the work, so as to adjust it to cut different desired diameters or to face off the ends of shoulders.

After turning a cylindrical piece of work with one of these tools and while drawing the tool longitudinally back over the finished surface it is desirable to draw the cutting-point of the tool away from that finished surface, so as not to score or mark it during the retracting movement. The chief difficulty attendant upon this withdrawal of the tool is that of returning it again to its operative position with sufficient accuracy to enable the successive pieces of work to be turned to exactly the same diameter. As a means for accomplishing this I provide the worm 34 with a stop-dog 38, which is clamped upon the worm-shaft by means of a screw 39, the end of the dog projecting into contact with a pin 40, fixed in and projecting from the tool-base 10. The dog 38 is adjusted and clamped so as to rest upon the pin 40 when the cutting-tool 30 is adjusted to proper position. When it is desired to withdraw the tool slightly from the work for the purpose just indicated, the worm is rotated only part way around, so as to carry the dog away from the stop-pin—for example, to the position shown by dot-and-dash lines in Fig. 4—thus slightly retracting the point of the tool while it is withdrawn from the work, after which the tool 30 is restored accurately to its cutting position for the next piece by turning the worm so as to carry the dog 38 against the stop-pin 40.

The back-rest jaws 43 and 44 are adjustably mounted in the posts 23 and 24, respectively, as best shown in Fig. 7. The posts are provided with slots in which the jaws fit snugly, these slots being disposed in a radial relation to the axis of the work. As a means for adjusting the jaws longitudinally of the axis of the work the posts 23 and 24 are provided with circumferential screw-threads, upon which are fitted the clamping-nuts 45 and 46, clamping against the respective opposite edges of the back-rest jaws. Those edges may be parallel with each other; but in order to support the jaws against lengthwise movement outwardly from the axis of the work I prefer to construct and arrange the parts as shown in Fig. 7, in which the jaw is shown to be tapering—smallest at its outer end. I prefer to maintain one of these edges of the jaw at right angles with the axis of the work, thereby making the inclination all on the other edge. To accommodate this inclination of the edge of the jaw, whether on one or both edges thereof, I employ one or more clamping-washers 47, which slide over the outside circumference of the thread of the post and are provided with an inclined seat for the jaw, made by slotting the washer at diametrical portions of one edge of a width equaling the thickness of the jaw, the bottom of the slot being inclined in accordance with the inclinations of its cooperating edge of the jaw. In this way the ends of the jaw projecting from the slot in the post pass through the inclined seat of the washer, thereby preventing those washers from turning, while the opposite or unslotted face of the washer is at right angles with the

axis of the post, and hence allows the clamping-nut 46 to set squarely against it, while the collar 45 also clamps squarely against the opposite edge of the jaw. One or both of the collars 45 and 46 are milled or otherwise adapted to receive a spanner or wrench by which they may be firmly tightened to place. By loosening one of these nuts both the nuts and the jaw and its washer may be adjusted longitudinally of the work, and the jaw may be adjusted radially to suit the diameter of the work, after which the nuts are clamped tight. The outward radial pressure which these back-rest jaws receive from the work is resisted by the tapering construction, since that pressure tends to seat the jaw more firmly, and it cannot be pushed back without stripping the threads or stretching the metal of the post.

Where it is not necessary or desirable to adjust the back-rest jaws 43 and 44 longitudinally of the work, the rearward clamping-collar 46 may be omitted and the washer 47 be placed upon the forward side of the tool, as shown in Figs. 1 and 4, thus clamping the rearward side of the back-rest jaws against the bottoms of the slots in the posts 23 and 24. By such transpositions of the respective parts and by other obvious changes in the size or form of the jaws it may be adapted to the different requirements of service that may arise.

For smaller sizes of work or where the worm and worm-wheel movement is not required for facing or squaring operations upon the work the form of tool shown in Figs. 5 and 6 may be employed. In that construction the tool-holder 50 is mounted and supports its cutting-tool in the same manner as in the previous figures; but its upper end instead of being provided with a worm-thread is provided with a slot 51 for receiving the bolt 52, which passes through the slot and is threaded into the base 54 of the tool. The outer end of the bolt 52 may be squared in the usual way to receive a wrench; but for convenience in use I prefer to provide it with a handle 55. In this embodiment of the device the adjustable stop for setting the tool and determining its positions each time that it is returned to place comprises the set-screw 56, which is threaded through a hub 57, which projects from the tool-holder 50 behind the stop-lug 58 of the base 54, the hub being preferably split and provided with a clamp-screw 59, as shown in Fig. 6, by means of which the closeness of fit of the screw 56 may be adjusted to a suitable degree. To withdraw the tool 60 from the work, it is only necessary to loosen the bolt 52 and swing back the tool-holder 50, and after withdrawing the tool from the work it is reset accurately for the next piece of work by pushing it forward until the set-screw 56 strikes against the stop-lug 58.

In order to adjust the tools 30 and 60 to different diameters of work, while maintaining their approximately tangential relation thereto, the tool-supports are swung forward or back and the tools are adjusted longitudinally in their seats. These two adjustments of the tool and the holder may also be utilized to obtain any desired angle of clearance of the under side of the tool other than an exact tangential relation. The approximately tangential position of the tool enables it to receive the principal cutting strains in a direction longitudinal of the tool, and therefore reduces to a minimum the tendency to spring the point of the tool away from the work.

The tool of Figs. 5 and 6 is shown to be provided with a cylindrical shank 17, fitting one of the customary cylindrical seats 15 of the turret, and this shank, as well as the base 54, is shown to be bored through in a concentric relation to the work, so that an extended piece of work may pass through the tool and even into the turret. The tool-base 10 of Figs. 3 and 4 is also provided with a similar-bored aperture 48 to receive the ends of long pieces of work, and this aperture is preferably made of the same diameter as the cylindrical bore 15 of the turret, so that the tool of the construction shown in Figs. 3 and 4 may be quickly and accurately set when slid upon the dovetailed projections 11 by inserting a cylindrical dowel or gage-piece through the aperture 48 and the seat 15, thereby bringing them accurately into alinement, and thus locating the entire tool in proper concentric relation with the work.

In assembling a series of these tools upon a turret those tools having dovetailed bases are preferably first pushed into place from the ends of the dovetailed seats and centered in position by means of a dowel, plug, or gage, as above stated. It is, however, sometimes desirable to apply or remove one of these tools when the adjacent tool-faces of the turret are occupied by tools of a size or form which does not allow of the first-named tool to be slid off or on from either end of its dovetailed seat. Therefore the upper edges of the dovetailed seats are made to project above the general plane of the top of the turret, as best shown in Fig. 4, far enough to enable the gib 20 and its screw (shown in that figure) to be readily removed and the tools removed from and applied to their respective seats on the turret in a direction radial to the axis of the turret instead of in a tangential direction.

These tools may be applied to other forms of turrets and may be otherwise modified in ways that will suggest themselves to those familiar with this art.

I claim as my invention—

1. The combination of a tool-turret provided with a series of dovetailed seats having their upper edges projecting above the general plane of the top of the turret, and a turret-tool

having a dovetailed base provided with a removable gib for said upper edge of the seat, above the general plane of the top of the turret.

2. The combination of a tool-turret provided with a cylindrical seat disposed in a radial relation to the axis of the turret, and having a dovetailed seat, a turret-tool provided with a dovetailed base for fitting the said seat, and having a tool-holder and back-rest devices mounted thereon, the said tool-turret being also provided with a cylindrical opening substantially concentric with the cylindrical seat in the turret for receiving a cylindrical-shanked tool, to centralize the tool-holder and back-rest devices with the work.

3. The combination of a turret-tool, comprising a base provided with means for seating and centralizing it upon a turret, a tool-holder mounted for rocking movement upon the base, and provided with a seat for supporting the cutting-tool, and a plurality of independent back-rest posts each provided with a back-rest jaw, and provided with means for adjusting the respective jaws independently of each other and longitudinally of the work.

4. The combination in a turret-tool, of a base provided with means for seating and centralizing it upon a turret, back-rest devices mounted upon the base, a tool-holder mounted for rocking movement upon the base, and provided with a seat for supporting a cutting-tool, a worm-threaded sector appurtenant to the tool-holder, and a worm mounted for rotation upon the turret-tool, and engaging with the worm-sector to swing the tool toward and from the back-rest devices.

5. The combination of a tool-base adapted to be secured to a turret, a series of individual posts secured to the base and projecting therefrom in parallel relation, a tool-holder mounted for rocking movement upon one of the posts, and provided with a seat for clamping a cutting-tool, one of the other posts being provided with a slot extending longitudinally from its projecting end for receiving a back-rest jaw, and provided with a circumferential screw-thread, and a pair of screw-nuts mounted upon the said thread, for adjusting and clamping the said jaw upon the base in operative relation to the tool.

Signed at Hartford, Connecticut, this 16th day of September, 1902.

BENGT M. W. HANSON.

Witnesses:
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W. H. HONISS.