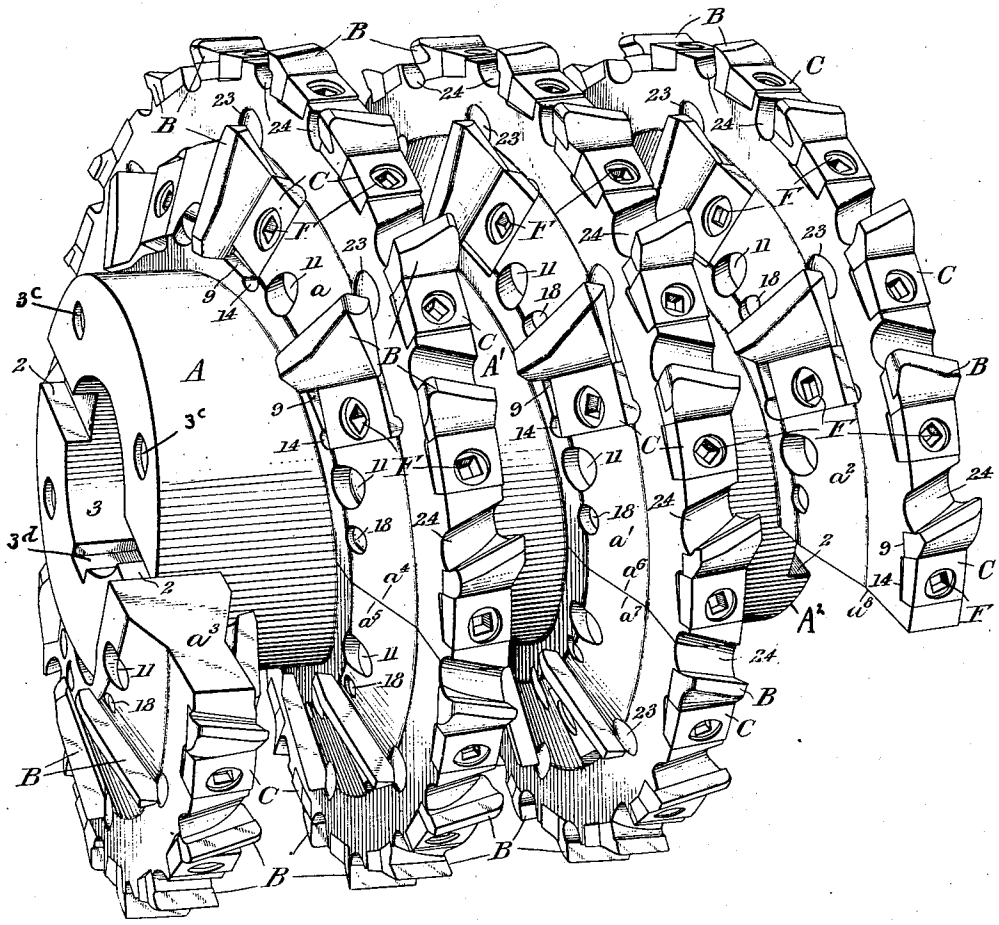
May 20, 1924. 1,495,067

G. W. CONKLIN

HOB HAVING SIDE TOOTH INSERTS

Filed Dec. 22 1922 3 Sheets-Sheet 1

Fig. 1.



Witness
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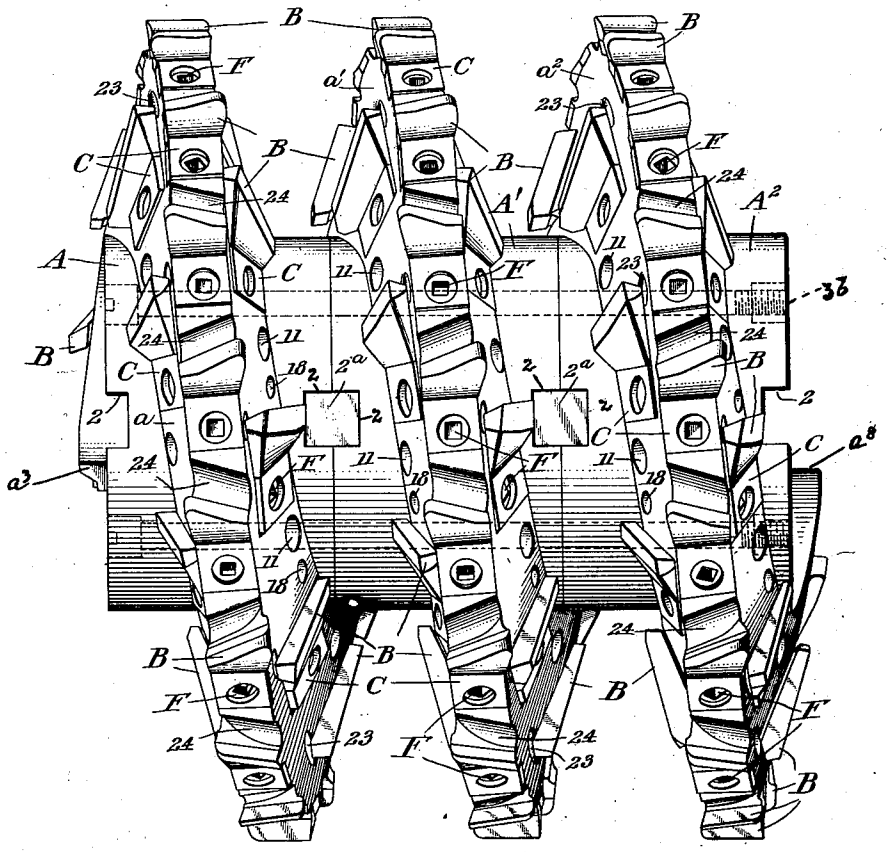
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HOB HAVING SIDE TOOTH INSERTS

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Fig. 2.



Witness
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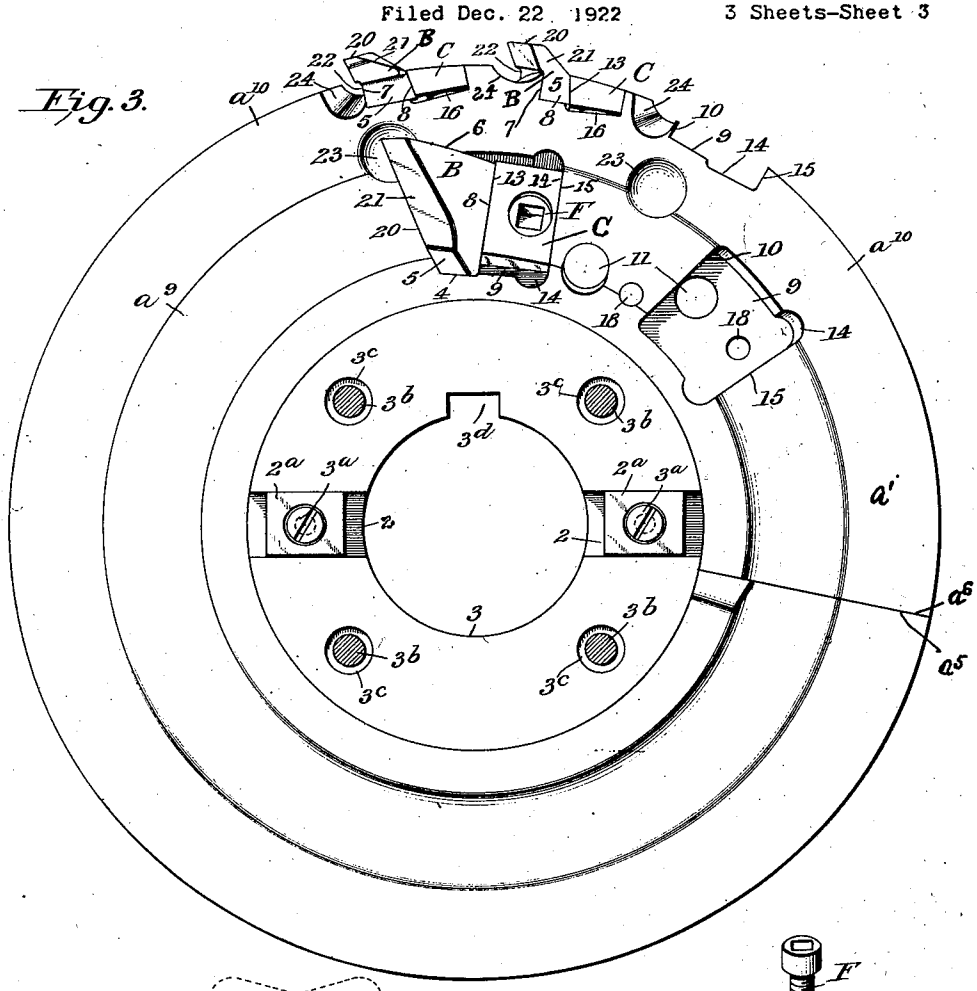
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HOB HAVING SIDE TOOTH INSERTS

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Fig. 3.



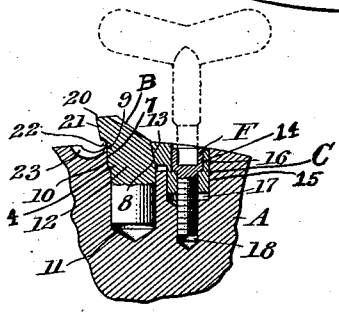


Fig. 4.

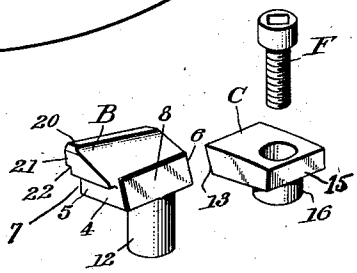


Fig. 5.

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Patented May 20, 1924. 1,495,067

UNITED STATES PATENT OFFICE.

GEORGE W. CONKLIN, OF SHELTON, CONNECTICUT, ASSIGNOR TO THE O. K. TOOL COMPANY, OF SHELTON, CONNECTICUT, A CORPORATION OF CONNECTICUT.

HOB HAVING SIDE-TOOTH INSERTS.

Application filed December 22, 1922. Serial No. 608,501.

To all whom it may concern:

Be it known that I, GEORGE W. CONKLIN, a citizen of the United States, and residing at Shelton, in the county of Fairfield and State of Connecticut, have invented a new and Improved Hob Having Side-Tooth Inserts, of which the following specification is a full disclosure.

This invention deals with rotatable cutters for metal, and is of special utility when embodied in the structure of a rotary metal-cutter having an extended series of helicoidal convolutions, whether these convolutions are truly helical in form, or more in the nature of an extended spiral, or are otherwise of helicoidal form.

Such helicoidal cutters are formed in general from integral blanks of metal, and if one or more of the convolutions is seriously damaged by accident, or under stress of the work to be performed, it is often necessary to discard the entire cutter, or perform extensive repairs, with an incidental expense and loss of time which have been found unavoidable heretofore. An additional disadvantage of such helicoidal cutters has been the practical impossibility of providing insert-teeth or spaced cutting-bits upon the side-faces of the circumferential base convolutions which characterize many types of helicoidal cutters, in the effort to utilize for the cutting-portions a harder metal than it is desirable to employ for the body-portion of the cutter in accordance with modern development of the inserted-tooth type of rotary metal-cutter.

This disadvantage is due to the confined nature of the spaces between the base convolutions, which afford very inadequate room for operation of the tools required to install spaced cutting teeth of the insert type, and the use of such insert-teeth has therefore been limited to the periphery of such helicoidal cutters.

Accordingly, the primary object of my present invention is to produce a rotary metal-cutter of helicoidal form comprising a plurality of sections assembled end to end to constitute a unitary operating structure of considerable extent, each section being provided with a cutting member, or series of cutting members, operating as portion of a convolution of the helicoidal structure, whether the convolutions be truly helical, or spiral, or of a contour generally helicoidal, which latter expression I use hereinafter, for the sake of brevity, without limited technical significance, to designate the operating convolutions of a rotary metal-cutter having a series of convolutions, whatever the specific contour of the convolutions may be. Any of these sections can be removed readily for repairs, or replaced by a substitute section, with a minimum expenditure of time, and thus I obviate the necessity for discarding the entire cutter, and eliminate much of the expense of repairs, which can be more readily made on the separated sections than upon an extended structure.

A cognate object of my invention is to provide such a helicoidal metal-cutter with the convolutions, or part convolutions, on the respective sections, arranged in interlocking relation to form a plurality of continuous convolutions which will respectively aid each other to withstand the stress of work, regardless of the means which may be adopted to secure the sections in assembled relation.

A further object of particular importance is to construct the convolutions so formed as the base for a plurality of spaced cutting-bits of the insert type, in a plurality of series, of which one series is arranged upon the periphery of the base convolutions, the remaining series being arranged upon the side faces of the base convolutions, preferably in staggered relation, in accordance with the invention described and claimed generically in my co-pending application for United States Letters Patent, Serial No. 597,636, or in such fashion as may be required by the exigencies of particular installations in any type of helicoidal rotary metal cutter. My invention is of special utility when embodied in a helicoidal metal-cutter in the nature of a hob, but I contemplate the use of my improvements in any field for which they are adapted by their nature.

Other objects and advantages will be in part indicated in the following description and in part rendered apparent therefrom in connection with the annexed drawings.

To enable others skilled in the art so fully to apprehend the underlying features hereof that they may embody the same in the various ways contemplated by this invention, drawings depicting a preferred

typical construction have been annexed as a part of this disclosure and, in such drawings, like characters of reference denote corresponding parts throughout all the views, of which:

Fig. 1 is a perspective of a rotary metal-cutter in the nature of a hob and which embodies characteristics of this invention. Fig. 2 is a front elevation of the said cutter. Fig. 3 is a diametral section taken through the axis of a partially finished cutter showing more clearly the formation of the base and the mounting of the cutting-bits thereon. Fig. 4 is a fragmentary section showing how the cutting-bits are assembled on the periphery of the base. Fig. 5 shows in perspective one of the isolated cutting-bits with its isolated wedge-block and the isolated screw for retaining the wedge-block in place.

In the illustrated embodiment of the invention, the rotary metal-cutter in the nature of a hob assumes in general the helical form characteristic of many hobs and, in accordance with my invention, is shown as composed of sections A, A′ and A^2, which characters designate the central or hub-portions of the respective sections, while the reference characters a, a', and a^2 designate corresponding sections of a circumferential base member projecting in convolutions from the respective hubs A, A′ and A^2.

I prefer to compose the hubs and base-sections of tough steel and to provide each hub-portion with key-ways 2 radiating from its center-bore 3, and keys 2^a, secured by screws 3^a in the key-ways to prevent relative rotation of the sections when assembled as shown in Figs. 1 and 2.

The sections are preferably secured in assembled relation by suitable means such as the bolts 3^b passing through bores 3^c therein parallel with the axis of the cutter, in order to constitute the assembled sections a unitary structure operable as such, in accordance with my invention, and the sections will preferably have the usual key-way 3^d to permit the hob to be secured upon its operating shaft.

In the form of hob illustrated, the base hub A has formed thereupon a cricumferential base portion a constituting one complete covolution of a helix, one end of the convolution being shown at a^3 in Fig. 1 while the other end of the convolution is indicated at a^4, this being the preferred form of structure in a helical hob although I contemplate the provision of a base portion of any convenient circumferential extent.

In the instance illustrated, the hub section A′ has a helical base member a' of similar arrangement and extent, and the parts are so assembled that the terminus a^5 of the base convolution a' is in abutting relation with the terminus a^4 of the base convolution a, and similarly the base convolution a^2 of the section A^2 corresponds with the base convolutions already described, abutting at a^7 against the terminus a^6, while the free end of the base section a^2 is shown at a^8.

It will be seen from the above description, in connection with the illustration, that the several base convolutions a, a' and a^2 join in continuous interlocking relation to form a plurality of continuous convolutions when assembled, and that when the sections are removed, each section presents its circumferential base convolution free from interference with the other base convolutions, as shown in Fig. 3, for the formation or application of the cutting means upon the side-faces a^9 thereof. as well as upon the periphery a^{10}, thus making it possible to carry into effect an important object of my invention, already stated, which is to permit the ready formation of cutting-members or means upon the side-faces of the convolutions of a hob, this formation being practically impossible in existing forms of hobs where the base convolutions are formed continuously upon an extended hub.

The sectional structure of the hob above described is of particular advantage, because it permits the application to a helical structure of spaced insert-teeth or cutting-bits such as those forming the subject of my co-pending application Serial No. 597,636, to which reference may be had for a more detailed description of their structure and capabilities.

These spaced cutting-bits may be of any suitable material and structure, and one suitable form of structure is shown in the drawings.

The particular form illustrated will be explained briefly hereinafter, and to receive these cutting-bits, the base convolutions a, a' and a^2 are respectively provided above the hub with sides configurated to seat one or more series of side-face cutting-bits; the series on each side being concentric and having the cutting-bits arranged in the peculiar manner shown on the drawings and set forth in detail hereinafter.

In the form illustrated, the respective base convolutions are conical in transverse section and are provided with a plurality of series of recesses 9 to receive the several cutting-bits B, one series upon the periphery a^{10} and the remaining series upon the side-faces a^9 respectively.

Each of the cutting-buts B is of the peculiar form shown by the several drawings but more distinctly by Figs. 4 and 5 thereof. These cutting-bits have a base or seating-portion 4 elongated somewhat in the shape of a truncated right-angled triangle

providing a wide end 5 constituting the one side face of the base of the cutting-bit, and have a truncated apex 6 constituting the other side face of the base of the cutting-bit. The inclined leg 7 of the truncated triangle constitutes the forward gripping face of the base of the cutting-bit and the upright leg 8 of the triangle constitutes the rearward clamping face of the base of the cutting-bit. This latter face is also slightly beveled (as shown best by Fig. 5) to adapt it for cooperation with a wedge-block C utilized for locking the cutting-bit positively in place. The portions of the respective base convolutions a, a' and a^2 that receive the cutting-bit are recessed (as indicated by 9 in Fig. 1) to provide in each instance an appropriate seat for the part just described and especially to provide a forward substantial shoulder indicated by 10 against which the forward edge 7 of the base of the cutting-bit is forcibly maintained. Each recess 9 in the base portion which receives the base 4 of the cutting-bit B is also provided with an aperture 11 extending cross-wise to the cutting-plane of the cutting-edge (as shown best by Fig. 5) and the base portion 4 of each cutting-bit is likewise provided with an integrally projecting pin 12 which is adapted to snugly (and in fact tightly) seat within the cylindrical recess aforesaid. Each cutting-bit is forced down until the under side of its base 4 rests firmly on the floor of the recess and its forward edge 7 presses firmly against the shoulder 10 of the said recess.

This relation is ensured and maintained by the wedge-block C which may be either substantially square in contour, as shown by Fig. 3, or may be of any suitable contour, as for example the segmental contour shown in the preferred form of the invention depicted by Figs. 6, 8 and 9 in my aforesaid application Serial Number 597,636. The wedge-block C provides a flat side 13 which is bevelled conversely to the rear edge 8 of the base of the cutting-bit; this formation serving the three-fold purpose of holding the cutting-bit firmly (1st) against retreat under the cutting pressures, (2nd) against turning or twisting in its mounting and (3rd) against rising out of its socket under the pull of the cutting forces.

The wedge-block C has a backing against a straight or circular shoulder 15 (as the case may be) provided by an auxiliary socket 14 recessed into the main body A of the cutter. This wedge-block C is likewise centralized by a tubular extension 16 which enters a corresponding hole 17 in the main-body A.

To assist in forcing the wedge-block C into its socket and to hold it there, a screw F is threaded into a hole 18 in the main-body and has a head which is countersunk into the exposed face of the wedge-block, as shown; this screw preferably having a square recess in its head to be engaged by a wrench.

The cutting-edges 20 of the inserted teeth are located at the extreme edges of tapered extensions 21 which are integral with the base-portions of the cutting-bits. These extensions are formed to flare or diverge so as to provide relatively long cutting-edges and said extensions are also formed to overhang and thereby provide an under-side 22 which receives and directs the chips away from the blank being tooled.

The cutting-bits located on the sides of the device have their edges arranged at an angle to a radius line so that each cutting edge will take a shearing cut and tend, thereby, to direct the chips towards the axis of the cutter and thus function to carry said chips away from the region which is being machined in the blank or so-called "work." This will be understood by referring to each of the figures of the drawings and it will, likewise, be seen that the cutting edges on the actual periphery of the cutter are arranged to slope in alternate directions so as not only to give a true shearing cut, but also to distribute the chips equally towards each side of the cutter.

Reverting now to Fig. 3, it will be seen that each gouge 23 forms a curved pit leading away from the base of the tooth so that such chips as are directed along the under-surface 22 of the tooth-shank 21, will be received (and deflected away) by the scoop-like bottom of the gouge 23. This gouge is relatively shallow but is made ample in diameter so as to provide the easiest way possible for the escape of the chips.

The peripheral teeth are also combined with gouges indicated by 24; each of these gouges sloping in the same direction as the cutting-edge of its peripheral tooth and said peripheral gouges being adapted to receive the chips and direct them towards the side of the cutter, as will be understood. The proportions and formations of the peripheral gouges are shown clearly by the drawings.

It will thus be seen that this invention provides a composite cutter characterized by great strength and providing a large number of cutting-edges arranged in a peripheral series combined with concentric side-series to ensure progressive cutting action; the cutters of each series being adapted to cooperate with those of the next-adjacent series and to assist in clearing away the chips delivered by the preceding cutters.

In its broader aspect, this invention is not limited to the nature or location of the cutting teeth but covers the broad idea of a cutter-base formed of a plurality of interchangeable sections of helicoidal form so

constructed that they may be readily joined together with the terminus of one helicoid abutting the terminus of the next helicoid so that the whole forms one continuous helicoidal cutter of any desired length.

Without further analysis, the foregoing will so fully reveal the gist of this invention that others can, by applying current knowledge, readily adapt it for various utilizations by retaining one or more of the essential characteristics of either the generic or specific aspects of this invention, and, therefore, such adaptations should be, and are intended to be, comprehended within the meaning and range of equivalency of the following claims.

Having thus revealed this invention, I claim as new and desire to secure the following combinations and elements, or equivalents thereof, by Letters Patent of the United States:

1. A rotary metal-cutter of helicoidal form comprising a plurality of interchangeable helicoidal sections and means to connect said sections co-axially to constitute a unitary operating structure.

2. A rotary metal-cutter of helicoidal form comprising a plurality of interchangeable helicoidal sections and means to connect said sections in interlocking relation co-axially to constitute a unitary operating structure.

3. A rotary metal-cutter of helicoidal form comprising a plurality of interchangeable helicoidal sections assembled co-axially and each embodying a cutting member operating as portion of a convolution.

4. A rotary metal-cutter of helicoidal form comprising a plurality of interchangeable helicoidal sections assembled co-axially and each embodying a cutting member operating as portion of a helicoidal convolution.

5. A rotary metal-cutter of helicoidal form comprising a plurality of interchangeable helicoidal sections each embodying a cutting member operating as portion of a convolution, and means to connect said sections in a unitary operating structure with said convolutions in substantially continuous relation to form a plurality of operating convolutions.

6. A rotary metal-cutter of helicoidal form comprising a plurality of interchangeable helicoidal sections assembled co-axially and each embodying a plurality of cutting members constructed and arranged to operate as portion of a convolution.

7. A rotary metal-cutter of helicoidal form comprising a plurality of interchangeable helicoidal sections assembled co-axially and each embodying a plurality of cutting members constructed and arranged to operate as portion of a convolution, and means to connect said sections in a unitary operating structure with said convolutions in substantially continuous relation to form a plurality of operating convolutions.

8. A rotary metal-cutter of helical form comprising a plurality of interchangeable helical sections assembled co-axially and each embodying a plurality of cutting members constructed and arranged to operate as portion of a convolution, and means to connect said sections in a unitary operating structure with said convolutions in substantially continuous relation to form a plurality of operating convolutions.

9. A rotary metal-cutter of helicoidal form comprising a plurality of interchangeable helicoidal sections assembled as a unitary structure and each constituting substantially a complete helicoidal convolution.

10. A rotary metal-cutter of the inserted-tooth type comprising a helicoidal base and a series of spaced cutting-bits arranged on a side-face of said base.

11. A rotary metal-cutter of the inserted tooth type comprising a helicoidal base, and a plurality of series of spaced cutting-bits arranged on the side-faces of said base.

12. A rotary metal-cutter of the inserted-tooth type comprising a helicoidal base and a plurality of series of spaced cutting-bits, one of said series being arranged on the periphery of said base and the remaining series being arranged on the side-faces of said base.

13. A rotary metal-cutter of the inserted-tooth type, comprising a plurality of helicoidal sections assembled co-axially in a unitary structure and each embodying a base constituting part of a convolution with a series of spaced cutting-bits arranged on a side-face of said base.

14. A rotary metal-cutter of the inserted-tooth type, comprising a plurality of helicoidal sections assembled in a unitary structure and each embodying a base constituting part of a convolution with a series of spaced cutting-bits arranged on a side-face of said base, and means to connect said sections in a unitary operating structure with said convolutions in substantially continuous relation to form a plurality of operating convolutions.

15. A sectional element for rotary metal-cutters of the type set forth in claim 1, said element comprising a base constituting part of a helicoidal convolution and provided with cutting devices.

16. A sectional element for rotary metal-cutters of the type set forth in claim 1, said element comprising a base constituting part of a helicoidal convolution and provided with spaced inserted cutting-bits.

17. A sectional element for rotary metal-cutters of the type set forth in claim 1, said element comprising a base constituting substantially a complete helicoidal convolution.

and having a plurality of series of spaced cutting-bits, one of said series being arranged on the periphery of said base and the remaining series being arranged on the side-faces of said base.

18. A rotary metal-cutter of the inserted-tooth type comprising a plurality of sections each embodying a hub with a circumferential base constituting substantially a complete convolution, means to secure said sections together co-axially with said base convolutions in continuous relation to form a plurality of convolutions, and a plurality of series of spaced cutting-bits, one of said series being arranged on the periphery of said base and the remaining series being arranged on the side-faces of said base.

19. A rotary metal-cutter of the inserted-tooth type comprising a plurality of helicoidal sections each embodying a hub with a circumferential base constituting substantially a complete helicoidal convolution, means to secure said sections together with said base convolutions in continuous helicoidal relation to form a plurality of helicoidal convolutions, and a plurality of series of spaced cutting-bits, one of said series being arranged on the periphery of said base, and the remaining series being arranged on the side-faces of said base.

20. A rotary-metal-cutter having a series of spaced cutting-members, and a corresponding series of clearance pits for the cuttings from said members, said pits being situated in proximity to the leading ends of said cutting-members respectively.

21. A rotary metal-cutter having a circumferential base, a plurality of series of spaced cutting members, one of said series being arranged upon the periphery of said base, and the remaining series being arranged upon the side-faces of said base, and clearance gouges for the cuttings from said members respectively, said clearance gouges taking the form of pits in proximity to the leading ends of said cutting members on said side-faces, and of elongated channels in proximity to said peripheral series.

22. A rotary metal-cutter having a circumferential base, a plurality of series of spaced cutting members, one of said series being arranged upon the periphery of said base, and the remaining series being arranged upon the side-faces of said base, and clearance gouges for the cuttings from said members respectively, said clearance gouges taking the form of pits in proximity to the leading ends of said cutting members on said side-faces, and of elongated channels in proximity to said peripheral series, said gouges being constructed and arranged in co-operative relation to direct said cuttings from said side-face series toward said peripheral gouges.

23. A rotary metal-cutter in the nature of a hob, comprising a plurality of interchangeable sections and means to connect said sections co-axially in a unitary operating structure.

24. A rotary metal-cutter in the nature of a hob comprising a plurality of helicoidal sections and means to connect said sections co-axially in a unitary structure operable as such.

25. A cutter-base comprising a plurality of interchangeable sections each provided with a helicoidal tooth-supporting flange, and means to connect said sections together with the helicoidal flanges in continuous relation to form a unitary structure.

26. A cutter-base comprising a plurality of interchangeable sections each provided with a helicoidal tooth-supporting flange; tooth-seats formed on each of said flanges, and means to connect said sections together with the terminus of one flange abutting the terminus of an adjacent flange to form a continuous helicoidal cutter-base.

In witness whereof, I hereunto subscribe my name, as attested by the two subscribing witnesses.

GEORGE W. CONKLIN.

Witnesses:
OLE SEVERSON,
FRANCES J. NEVINS.