April 6, 1926. 1,579,308

J. H. GRAHAM

THREAD ROLLING DIES AND METHOD OF PRODUCING SAME

Filed March 3, 1925

Fig. 1.

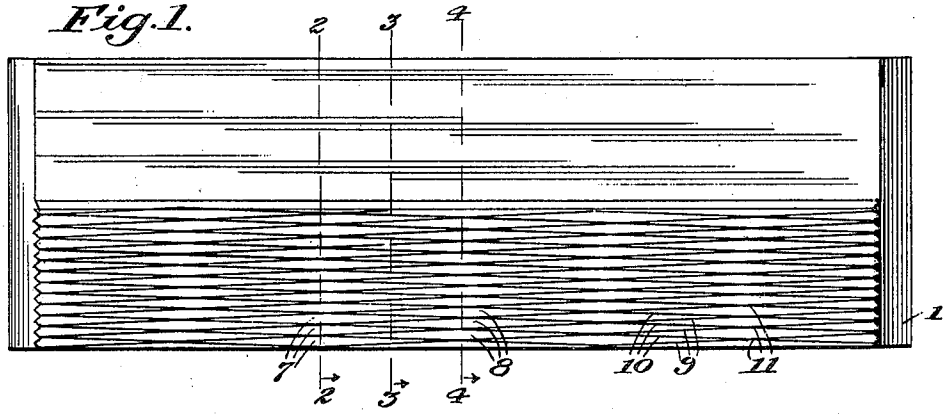


Fig. 2.

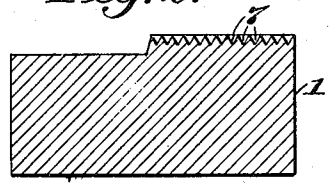


Fig. 3.

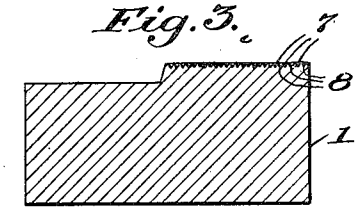


Fig. 4.

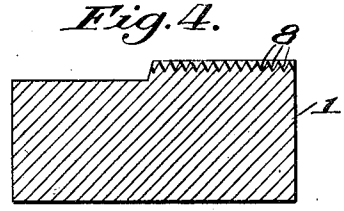


Fig. 5.

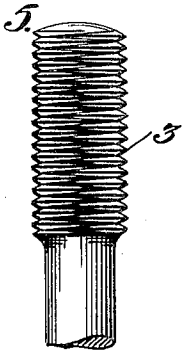


Fig. 6.

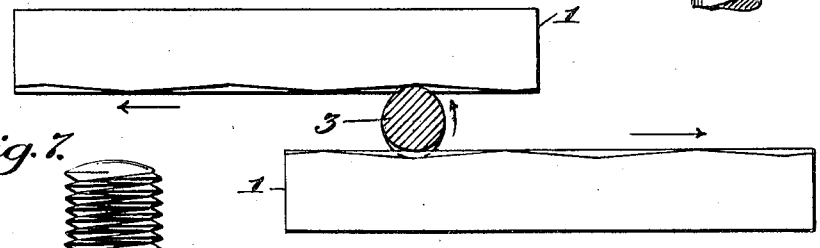
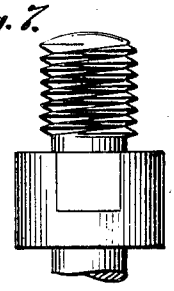


Fig. 7.



Inventor:
James H. Graham,
by Geo. H. Graham
Atty.

Patented Apr. 6, 1926.

1,579,308

UNITED STATES PATENT OFFICE.

JAMES H. GRAHAM, OF TORRINGTON, CONNECTICUT.

THREAD-ROLLING DIES AND METHOD OF PRODUCING SAME.

Application filed March 3, 1925. Serial No. 12,841.

To all whom it may concern:

Be it known that I, JAMES H. GRAHAM, a citizen of the United States, residing at Torrington, in the county of Litchfield and State of Connecticut, have invented certain new and useful Improvements in Thread-Rolling Dies and Methods of Producing Same, of which the following is a specification.

This invention relates to a process of producing right and left intersecting thread rolling dies and to the dies resulting therefrom.

It has heretofore been possible to produce a single-cut thread, either right or left, by the use of a pair of dies with diagonal grooves and ribs of predetermined size and direction. This known process consists in giving these dies a relative endwise movement with the rotating cylindrical work blank between them; the metal of the blank is caused to flow and the metal forced from the valleys or grooves on the blank forms the adjacent ridges or threads.

This old process has also been applied to the knurling of spindles by using dies having two series of grooves cut at angles to each other.

In both of these old cases the dies can be easily produced with a milling cutter having the counterpart profile of the groove to be cut, and by traversing this cutter along the face of the blank at the proper angle or angles.

It has been found desirable to use right and left intersecting threads for the spindles of bicycle pedals, etc.; but the cost of cutting such threads on the spindles individually on a lathe would render the same prohibitive. For cheapness and quantity production it is, therefore, desirable to employ a process such as the thread rolling above referred to. It is found that the necessary dies for such work cannot be produced by the usual tool room methods. They cannot be milled out, since upon the completion of one set of threads the cutter would in cutting the other set of threads cut through and ruin the first set so cut.

Furthermore, if it be attempted to roll double threads in the ordinary rolling machine by the use of one right and one left die, the right-hand die will be gashing across the line of flow of metal under the left-hand die, and vice versa, and there will be no resultant thread.

The present invention presents a method of producing dies for the manufacture of articles having right and left intersecting threads by the rolling process. This method may be outlined as consisting in the producing of an accurate original or pattern; in forcing this pattern into die blanks to produce the die surface; and in properly hardening the dies thus produced. The pair of dies thus made are identical and co-operate in the quantity production of right and left intersecting threads.

On the accompanying drawings:

Fig. 1 is a face view of the die.

Fig. 2 is a section on line 2—2 of Fig. 1.

Fig. 3 is a section on line 3—3 of Fig. 1.

Fig. 4 is a section on line 4—4 of Fig. 1.

Fig. 5 shows in perspective the original or master plug or mandrel.

Fig. 6 shows the method of forming the rolling dies from the master plug or mandrel.

Fig. 7 shows an elevation of the threaded article produced.

The body 1 of the die blank is made of soft steel and of the proper size for use in the rolling machine.

3 is the pattern or master plug or mandrel, which is produced by cutting two oppositely directed threads thereon. In particular, extreme care must be taken that the two threads start at exactly the proper point, at the end of this master plug or mandrel, as otherwise the final article would not properly and immediately "take" the nuts presented to it, or properly engage either a right or left threaded bore in a right or left crank hanger, for instance.

This master plug 3 is then placed between the opposite ends of two soft steel die blanks which are inserted in the die clamps of a thread rolling machine. The die blanks are then moved back and forth under pressure over the master plug, which rotates with them, until the pattern of the master plug has been impressed into the blanks, and the latter present the required cross section.

Since the two threads start at the proper point of the periphery of the master plug, the die blank will have impressed therein a series of regular depressions or indentations which may be described as being of lozenge

shape and having a length closely approximating one-half the circumference of the master plug.

The ridges bounding or defining such lozenge-shaped depressions or indentations are straight lines which are continuous and uninterrupted throughout their entire lengths, and comprise two series 9, 10, each series having its individual ridges mutually parallel and the two series intersecting at an angle substantially twice the pitch angle. These two series of ridges intersect and have their tops substantially in a plane. It will, furthermore, be noted that the point of intersection 11 between any two ridges (one right and one left) is a part of the die which simultaneously forms a part of the grooves in the finished work which pertain co-extensively to the right and the left threads.

It will be noted from Figs. 2, 3 and 4 that the indentations or depressions 7, 7 in Fig. 2 pass by a regular change of cross section to one-half the width in Fig. 3, and finally disappear in Fig. 4; while the next series of depressions 8, 8, which were nonexistent in Fig. 2, have reached a half-size in Fig. 3 and full depth and width in Fig. 4. In the example set forth, which illustrates, say, a twenty-thread die, the distance from ridge to ridge in Figs. 2 and 4 is one-twentieth of an inch, and in Fig. 3 one-fortieth of an inch.

To further distinguish this type of die from the one used in rolling single threads it may be said that if the latter were used as a printing block the impression would be of a series of parallel lines. If a knurling die were similarly employed, the impression would be a series of isolated spots. If the present die be used, the impression is a series of intersecting unbroken lines forming lozenges or rhombuses, each of which has a major diagonal substantially equal to half the circumference of the master plug or mandrel.

The formed working dies may now be heat-treated to render them resistent to the strains and wear occurring during the rolling process.

The result of employing these dies is to produce the threaded article as shown in Fig. 7.

While I have described certain definite steps, I do not restrict myself thereto, as I believe that I am the first to produce operative intersecting right and left threads upon a blank by the rolling process, whatever form of die may be used.

What I claim is:

1. A right-and-left intersecting thread rolling die having a right and a left series of ridges thereon, each of said series comprising continuous and uninterrupted individual ridges extending in parallel straight lines, said series of ridges defining and bounding a plurality of identical and symmetrical depressions of cross sections increasing regularly from end to center and decreasing regularly from center to end.

2. A right-and-left intersecting thread rolling die having a right and a left series of ridges thereon, each of said series comprising continuous and uninterrupted individual ridges extending in parallel straight lines, the individual ridges of each of said series intersecting those of the other series, and the tops of all of said individual ridges lying substantially in a plane.

3. The method of producing rolling dies for right-and-left intersecting threads which consists in preparing upon a master plug the threaded form to be reproduced in the finished article, and rolling said plug in contact with a blank die under pressure to form upon said die the counterpart of the master spindle.

4. The method of producing a pair of identical rolling dies for rolling right-and-left intersecting threads which consists in making upon a master plug the thread form to be reproduced in the finished article, and rolling said spindle in contact with them between a pair of blank dies under pressure to form upon the said blanks the counterpart of the master plug.

5. The method of producing rolling dies having counterparts of right-and-left threaded spindles thereon which consists in producing upon a master plug the thread form to be reproduced in the finished article, and moving the die blanks in contact with the opposite faces of said rolling master plug.

6. The method of producing rolling dies for forming right-and-left intersecting threads which consists in producing a master plug having regular intersecting grooves, and moving the die blanks in contact with the rolling master plug under pressure to obtain an impression of the master plug in the die blank.

In testimony whereof I affix my signature.

JAMES H. GRAHAM.