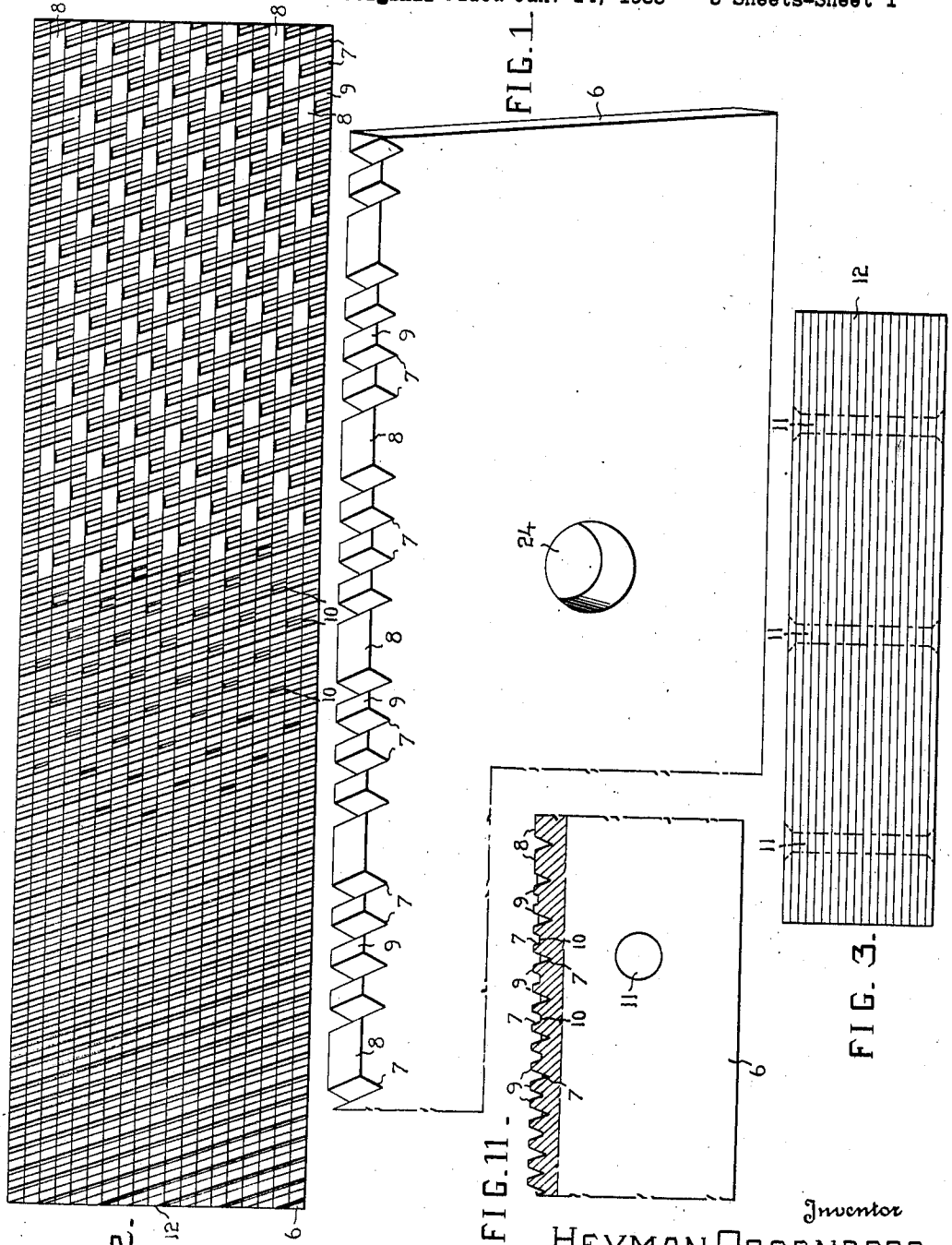
July 4, 1939. H. ROSENBERG 2,165,008

DIE

Original Filed Jan. 14, 1933 3 Sheets-Sheet 1



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Original Filed Jan. 14, 1933 3 Sheets-Sheet 2

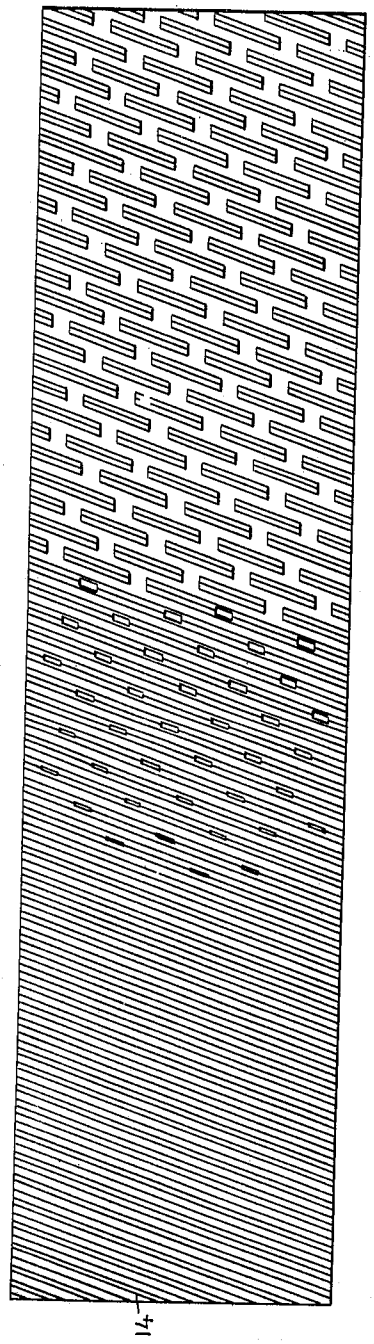


FIG. 5.

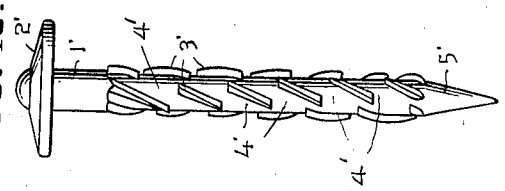


FIG. 10.

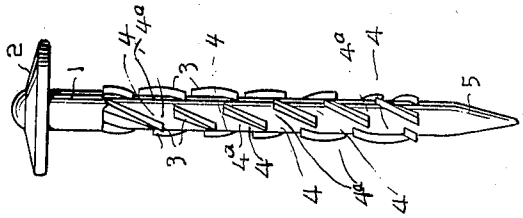


FIG. 9.

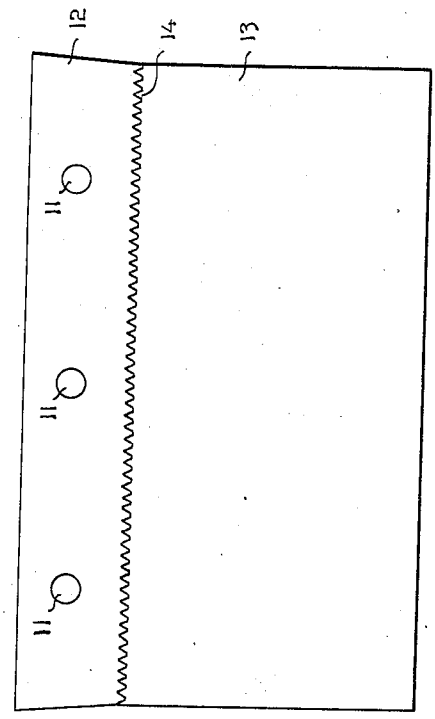


FIG. 4.

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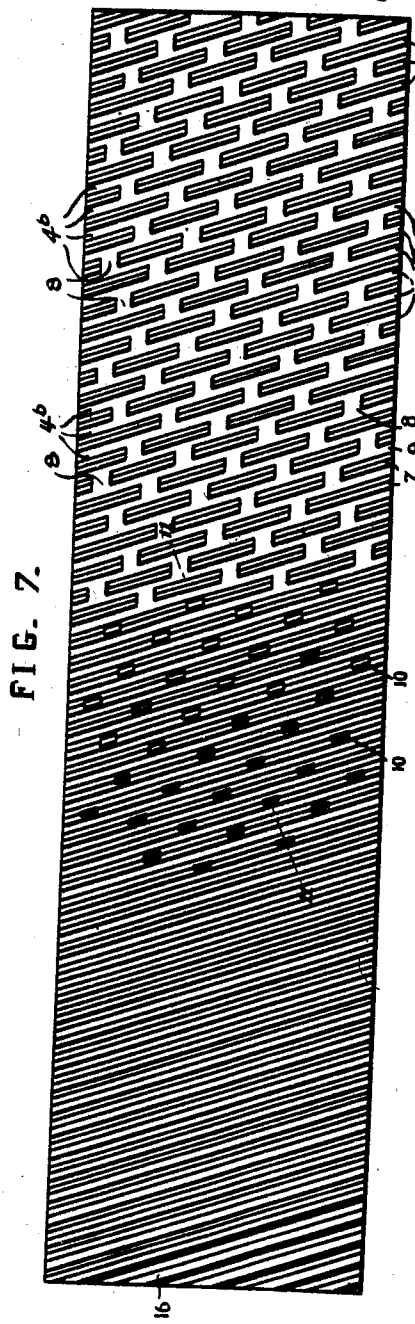


FIG. 7.

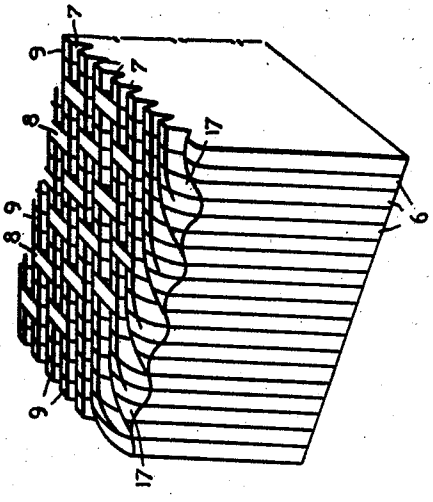


FIG. 8.

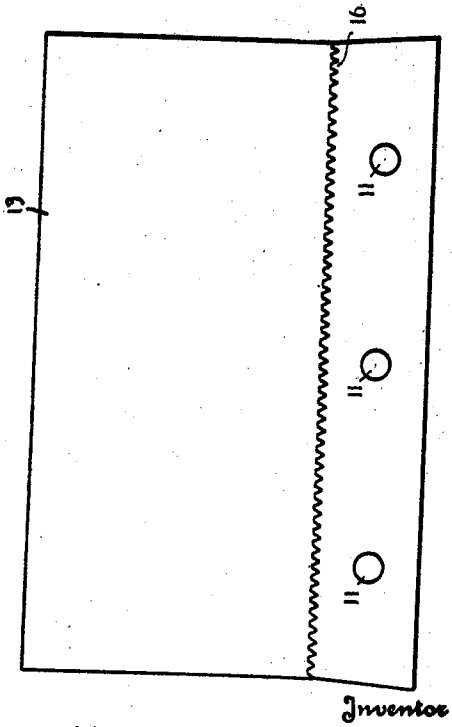


FIG. 6.

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UNITED STATES PATENT OFFICE

2,165,008

DIE

Heyman Rosenberg, New York, N. Y.

Original application January 14, 1933, Serial No. 651,783. Divided and this application June 2, 1933, Serial No. 674,087

24 Claims. (Cl. 80—9)

Previously known and used parts and operations are hereinafter mentioned as standard practice to differentiate from the present invention.

It is common in standard practice to roll threads and other ribs on fasteners such as wood screws and drive pins, but it has not been possible heretofore to roll a thread or other rib with an interruption or space between alined or otherwise disposed sections of the rib.

Also, it is standard practice to make rib-rolling dies by milling with a standard universal milling machine, and steel blocks thus milled to provide a die face are afterward hardened to enable the die face in each instance to stand up under the strain of thread or other rib rolling; but it is not feasible to produce by such milling operation a die face having obstructions in the rib-forming grooves of the die, and, of course, it is not possible to provide by such milling operation obstructions of different widths and heights or with abrupt ends; and it is further not feasible to roll a longitudinal rib of no pitch or of relatively high pitch on a fastener blank except by insuring such gripping action between the blank and die as to insure rotation of the blank with the relative movement of one die with respect to the other, and such gripping action is in standard practice assured by providing nicks in the ridges between rib-forming grooves in the dies, and of course by making the initial grooves full length, that is as long as the finished rib is to be. If an interruption or fill should be provided in the initial grooves, the resulting reduction in gripping action of the dies against the fastener blank would tend to cause slipping and failure of the blank to roll with the stroke of the movable die, and if the fill were of sufficient size such failure would surely occur.

One of the essential objects of the present invention is the forming of a die adapted for the rolling of a fastener and thereby forming thereon a rib, such as a thread or the like, outstanding from the body and having an interruption in its length, and in greater detail a further object is the production of such a die for forming on a fastener body a plurality of such ribs each with an interruption, and in still greater detail a still further object is production of such a die for the forming of such interruptions with the interruptions of one rib staggered relative to those of another.

A more specific and detailed object is the successful and commercial rolling of fasteners such for instance as disclosed in my Patent No. 1,686,468, dated October 2, 1928, and also such as shown in my Patent No. 1,545,471, dated July 7, 1925.

While the inventions of my said patents were conceived and practiced by me prior to the respective filing dates of the applications on which the patents issued, such practice was accomplished through hand operations, and though the fasteners of the said patents proved themselves of unusual merit in use both in metal and in wood, and of great value whether hardened or not, the cost of production by other means than rolling proved substantially prohibitive; that is to say, the fasteners produced otherwise than by rolling were so expensive as to cause consumers to prefer less efficient substitutes at less cost.

The use of the die of the present invention overcomes the difficulties to the rolling of the type of fastener referred to, and enables its production by a rolling process carried out in the operations of a standard thread-rolling machine.

Numerous, expensive, and carefully conducted tests from the time of my production of the invention of my said Patent No. 1,545,471, to the time of the production of the present invention have demonstrated that the rolling of such a fastener as shown in my said patent was previously utterly impossible, and this fact is generally known and recognized in the industry, but this impossibility is overcome by the present invention.

With the above indicated and other objects in view, as will in part hereinafter become apparent and in part be stated, the invention comprises a die for rolling fasteners having rib-forming grooves and an obstruction in one of the grooves.

The invention further comprises such a die in which a series of obstructions are arranged successively in a series of grooves, and the invention still further comprises such a die in which such obstructions are graduated in size until some of the grooves are filled at the places of the obstructions.

The invention still further comprises a standard-milling-operation-produced die for rolling a ribbed fastener and having an obstruction intermediate the ends of one of the rib-forming grooves.

The invention also comprises, in a die, certain other novel constructions, combinations, and arrangements of parts as subsequently specified and claimed.

In the accompanying drawings:

Figure 1 is a detailed, fragmentary perspective of one of the laminations of the initial die de-

tached, the view being a magnification of the customary or normal size of lamination for clearness of disclosure.

Figure 2 is a top plan of the completed initial or laminated die, the parts being shown in a reduced scale relative to Figure 1, but still substantially enlarged with respect to the ordinary, commercial die.

Figure 3 is a view similar to Figure 2 of the back face of the same parts, the parts being shown on a scale substantially that of normal, commercial working size.

Figure 4 is a diagrammatic showing of the formation of a hob from the die seen in Figure 2.

Figure 5 is a top plan view of a hob or negative of a die embodying the face formation of the parts seen in Figure 2.

Figure 6 is a view similar to Figure 4 showing the formation of a solid die from the hob.

Figure 7 is a face plan view of the die formed as indicated in Figure 6, and corresponding in enlarged showing to that of Figures 2 and 5.

Figure 8 is an enlarged, fragmentary perspective view of the discharge end of the stationary laminated die.

Figures 9 and 10 are elevations of fasteners made in accordance with the present invention.

Figure 11 is a detailed, fragmentary section taken diagonally of that part of the die having the reduced obstructions or flat portions leading toward the completed interruption-forming obstructions or flat portions, the section being taken approximately on line 11—11 of Figure 7.

It will be observed that the fasteners seen in Figures 9 and 10 correspond substantially to the fastener seen in my Patent No. 1,545,471, except that the structure seen in Figure 10 is ribbed or threaded to the tapering portion of the entering end, and it is obvious, of course, that the ribs or threads might extend to the very entering tip where such a construction is found desirable; whereas the structure seen in Figure 9 is provided with a pilot characterized by being of sufficiently greater length than the pilot shown in my said patent to insure the formation of a cylindrical burr from a sheet of metal, as distinguished from a mere flared or bell-shaped burr.

Referring to Figures 9 and 10 in detail, 1 indicates the body of a fastener which is shown as having a head 2 of the type commonly employed for engaging sheet metal, such as galvanized iron sheeting, but, of course, the fastener body 1 may have any desired shape of head or no head at all. Outstanding from and extending in the general direction of the length of the body are ribs or threads 3, 3, interrupted at 4, and so arranged that the uninterrupted portions of the threads or ribs overlap and are thus staggered with relation to the interruptions of adjacent threads or ribs. An advantage of this staggered relationship resides in the fact that, when the fastener is driven into wood or other supporting material, the ends of the thread sections afford a better anchorage by virtue of engaging spaced and different parts of the supporting material. Withdrawing stresses are greatly resisted by the fact that the ends of the thread sections, and particularly the outer or upper or last entering ends thereof at the places of the interruptions, are abrupt or squared off so as to present abrupt shoulders to overlying material which has sprung into the path of such shoulders, if the material be wood or the like, or has flowed into such path if the material be metal, such as soft iron or soft steel. When the fastener is to be used in metal, the ribs or threads 3 are preferably hardened, as by a case-hardening process, so that the said ribs or threads will be sufficiently hard to enter metal, such as soft iron or soft steel substantially without injury to such ribs or threads. The hardening operation may be that of the well known cyanide case-hardening, or any other appropriate or desirable tempering may be utilized.

The body 1 is preferably provided with rounded surfaces so as to be substantially cylindrical throughout the places where the threads or ribs do not appear, and thus to be rounded and cylindrical between and laterally of the thread or rib sections as well as in the spaces of interruption of such threads or ribs.

The entering end portion of the body 1 may assume any desired shape or contour, but is preferably pointed for facility of entry either in the "finding" of an opening in metal, or the easy entry into wood or the like. A pilot 5 may be provided when and as desired, according to the use to which the fastener is to be put. The pilot results from using fastener blanks of greater length than the width of the dies and properly locating the blanks in engaging the dies.

It should be borne in mind that the fastener such as seen in Figure 9, is formed with the ribs or threads rolled in place from the material of the original blank body, and that the term "rib" is utilized to include an outstanding ridge similar to a thread whether possessed of pitch or merely parallel to the longitudinal axis of the fastener body, while the term "thread" is intended to include some degree of pitch, variation in which may occur to any desired extent, as, for example, if a wood screw type of fastener is to be provided with interruptions in the thread, the pitch will be much lower than that seen in Figure 9, and the pitch shown in Figure 9 is indicated as preferable where the fastener is to be hammer-driven or otherwise inserted by direct axially-delivered force.

Thus, the term "rib" is employed as generically descriptive of various forms of ridges, while the term "thread" is specific to a ridge having pitch or inclination about the body of the fastener.

In Figure 10 the fastener 1' has the head 2', ribs or threads 3', interrupted at 4', and the entering end portion 5' which, as seen, is preferably without the pilot, the structure shown in Figure 10 being thus substantially identical with that seen in Figure 9, except for the absence of the pilot in the former.

It was readily recognized by me when producing the fastener in the first place, such as seen in Figure 9, that a die could not be produced for rolling the fastener by the usual milling operation, because of the interruptions in the die grooves necessary to produce the interruptions in the threads or ribs, and the fact that such interruptions must be abrupt, not rounded out, and must be staggered with respect to uninterrupted portions of adjacent ribs created a problem incapable of being overcome by a mere milling operation on an ordinary die blank.

Without attempting to review the extensive experimentations and efforts made by me to discover a means of successfully rolling the type of fastener illustrated in Figures 9 and 10, and in my above-identified patents, among other things I produced what for the sake of a descriptive term I call a laminated die. In other words, I divided the die face into as many parts, sections, fragments, or laminations as necessary to leave in any one part, section, or lamination only the char-

acter of depressions capable of being produced by a milling operation, with the result that I secured a series of plates or laminations 6, as seen in Figure 2, and one of which is seen in enlarged detail in Figure 1. Each of these laminations is formed with depressions or V-shaped grooves 7, 7, and with intervening obstructions or flat portions 8. It should be observed that the grooves 7 need not necessarily be V-shaped but will have that transverse contour corresponding to the form of the rib or thread to be rolled, and, since the edge type of rib or thread is illustratively selected and shown in Figures 9 and 10, the V-grooves 7 are necessarily required. As will be plain from Figure 2, some of the die fragments or laminations or plates 6 do not have the flat surfaces 8, such, for example, as the two marginal laminations of Figure 2, but each of the laminations does have flat areas 9, 9, between each two of the grooves 7 so that, during the rolling operation, the cylindrical form of the body of the fastener will be maintained cylindrical while material is flowed out into the grooves 7, and the flat portions 8 serve to finish off those portions of the body 1 cylindrical between the sections of the interrupted thread or rib. Thus, each lamination 6 must have its own peculiar contour to dispose the flat surfaces 8 in the right relation to the grooved portions 7 not only of the particular lamination, but relative to all the other laminations making up the entire die, whereby the flat portions 8 appear scattered and staggered over the face of the die properly to register relative to each other and to the final area of the root diameter or reduced body portion of the body after the rib or thread sections have been flowed out into place.

It is standard practice for rib rolling purposes, particularly where the rib is without pitch or is a high pitch thread, as with a drive screw or pin, that the initial end of each die, that is, the end beginning the rolling operation, or first engaging the blank, will have its ridges between grooves nicked or roughened to assure sufficient frictional engagement to insure rolling of the engaged pin blank or body. This practice is carried out with the present invention, though not illustrated to avoid confusion in the showing.

It is not practicable and probably not feasible to roll a rib to a completed condition with interruptions maintained from the first, and therefore, the grooves 7 in the initial development, that is at the starting end of each die, are full length and uninterrupted, so that in operating, ribs are rolled that are full length initially; but after the dies have gotten the rolling operation well under way, it has been found by me to be entirely possible to flow away parts of the initial rib to produce interruptions in its length. It is of course best, if not absolutely necessary for nicely finished work, that this suppression or flowing away of intermediate parts of an already developed rib should occur gradually, so that the metal will move either over into the retained sections of the rib or back into the body of the fastener smoothly and without too much resistance or causing roughness of finish.

Accordingly the obstructions or flat portions 8 are developed in the length of the die face at a substantial distance from the beginning or initial end of the die, and the development of these flat portions 8 is accomplished by graduated steps or in gradual manner, by providing obstructions or flat portions 10 in grooves 7 (see Figures 7 and 11) which start a substantial distance from the initial end of the die as very low flat portions, and gradually increase in height until graduating into the full height flat portions 8. Naturally, flat portions 10 widen as they increase in height so as to transversely fill the respective grooves 7 at the place of their location, so that each groove 7 at each place where a flat portion 10 exists is of a different depth from, that is of a less depth than, the other portions of the groove. Each flat portion 10 from the very beginning is of a length the same as a flat portion 8, whereby a straight shoulder is developed for each flat portion 8, and the ends of the preserved sections of rib at the interruptions are correspondingly flat and outstand straight so as to present abrupt shoulders.

Thus, in the actual rolling operation, the ribs or threads as they are formed in the initial end portion of the die, seen at the left hand side of Figure 2, are actually full length without interruption in their initial form, but are first slightly interrupted by the first of the reduced obstructions or flat portions 10 and then by the graduation of said reduced portions 10 the interruptions are step by step enlarged in width and depth to the size of the obstructions or flat portions 8. Thus, each fragment, section, or lamination 6 has its initial grooves 7 varied according to variation to be caused in the flowed rib, whereby certain parts are flowed out to rib form and then back on being engaged by the flat portions 10 and 8 until certain parts of the initially formed threads are restored to the body of the fastener 1 or flowed into the retained rib sections.

Naturally, the fragments or pieces or laminations 6 can best be accurately produced by a carefully-prepared diagram to be followed both in the forming of the laminations as to thickness and edge contour so that the edge contour of each coordinates with that of the other laminations to be used. When all of the laminations have been completed accurately, as from following a diagram, they are ready to be assembled. By dividing up the die into such fragments or laminations, the milling operation can be carried out on an ordinary standard universal milling machine, and when the several laminations or fragments are ready they are brought together to correspond with the provisions of the guiding diagram and are fastened together, as by rivets 11, 11, seen in dotted lines in Figure 3 to produce the completed, laminated die 12. Laminations 6 are preferably formed with registering apertures 24 to receive the rivets 11. Of course, each lamination 6 is preferably of soft steel or the like while being milled, and is effectively tempered and hardened before being assembled and secured together by the rivets 11. Also, other means of attaching the laminations together, such as welding, may be utilized, but if welding be employed, the tempering operation must either be carried out after the die is assembled or the temper restored so far as varied by the heat of the welding.

In actual practice, however, I find that this laminated die does not completely solve the problem of rolling interrupted threads. Those familiar with thread rolling will be familiar with the fact that in the use of such machines it is customary to carefully block and clamp in the two cooperating dies which are to produce the ribbed product. This blocking in and clamping operation is accomplished with the greatest available facility for holding the dies as rigid as possible and allowing no relative movement whatever thereof, since even the slightest movement

would destroy the satisfactory condition of the finished rib, or render the rib defective. However, notwithstanding most careful efforts to block and clamp the laminated dies against the slightest movement, the several laminations do actually move relative to each other under the strain of rolling fasteners, and thus produce defective fasteners of a character undesirable for marketing purposes.

Without detailing the further experiments conducted by me, except to say that no method of fastening the laminations together satisfactorily overcame their tendency to and capacity of individual movement, I eventually found that such a die as seen in Figures 2 and 3 made up of laminations or fragments secured together while incapable of successful use for direct rolling purposes was, under proper conditions, capable of use for the forming of a die hob. Die hobs are, as is known in the art, the negatives of dies, and are customarily produced by being pressed against the die face with sufficient pressure to cause the metal of the hob to assume the negative contour coinciding with the positive contour of the die. Standard practice includes use of such enormous pressure for this work as one hundred tons per square inch, and even then repeated impressions with interspersed annealing of the die being formed are necessary to produce a completed die face from a die hob. Standard practice was followed by me to produce a hob from the laminated die after the manner indicated in Figure 4.

When the hob block 13 has its negative die face 14 completed, the block is carefully hardened, and then according to standard practice dies 16 are made therefrom, as from die blocks 15. When the die 16 is completed, the block 15 being integral is free from possibility of any portion of it giving or moving relative to any other portion thereof. The die face 16 is, of course, identical with the die face of die 12 except that the lamination lines do not exist, and, therefore, the same reference numerals have been applied to the die 16 and the same description will apply.

The drive screw or ribbed fastener produced by the die 16 as seen in Figure 9 (and, of course, Figure 10) is characterized by having a series of spiral ribs or threads each of which would be continuous except for the interruptions 4, and these interruptions are produced by the flat portions 8 and their predecessors 18 of the die 16. Between each two of these ribs or threads the body of the fastener is exposed in the form of the base of the valley between said ribs or threads, which valley is indicated on Figure 9 at 4a, 4a, the said valleys 4a being formed by the flat face portions 4b of the die 16. It should, of course, be understood that an important feature of the die construction is its capacity not only to produce the interruptions 4 in each of the several ribs or threads, but to produce them in their staggered relation with respect to adjacent ribs or threads such that wherever an interruption 4 appears the two threads or ribs arranged adjacent to the interrupted thread are not interrupted in the length of the fastener for the length of the particular interruption 4. Thus, any cross section taken through a fastener at a place where an interruption 4 occurs will show the two adjacent ribs 3 in cross section and the rib where the interruption 4 occurs in end view. Likewise, any cross section through the fastener taken near one of the interruptions 4 will show the three ribs or threads in cross section incident to the fact of the staggering and overlapping of the retained sections of ribs.

As will be readily recognized by those familiar with the art, the laminated die seen in Figure 2 is the reciprocating one when considered in its relationship to the thread-rolling machine, and the stationary die, considered with respect to the thread-rolling machine, will be identically the same in contour and manner of construction except that, as seen in Figure 8, the discharge end of the laminated die is rounded off, as at 17, as by being filed off before hardening, so that the stationary, completed die corresponding to the die 16, has its discharge end rounded off, so that the discharging fasteners will not have their ribs or threads injured by being forced across an abrupt angle.

Each of the rib-forming grooves 7 of the completed die would be a continuous groove extending from one edge of the die to the other but for the fact that it is interrupted at several places by webs or ungrooved portions of the die body which divide the groove into spaced sections, and each web or ungrooved portion that produces a division provides ends to each section with the walls of the ends presenting abrupt clearly-defined angles to the walls or sides of the respective groove sections. Thus the completed die in operating on a pin-like blank and rotating the blank about its axis (as is common practice in the rolling of screws and like threaded fasteners) first develops the thread ribs and then depresses sections of the ribs to leave outstanding rib sections having their ends in the form of faces at clearly defined and abrupt angles to the sides faces of the respective rib, all as is clear from the product obtainable from the die as seen in Figures 9 and 10 of the drawings.

This application is a division of my co-pending application Serial No. 651,783, filed January 14, 1933, for improvements in the Art of forming interrupted-rib fasteners.

What is claimed is:

1. A die for forming interrupted-rib fasteners comprising a die body with a die face having a milled rib-forming groove divided into spaced sections, and an intermediate ungrooved portion of the die face in the line of and between the groove sections, presenting an abrupt wall at a clearly defined angle to the sides or walls of the groove.

2. A die for forming interrupted-rib fasteners comprising a die body with a die face having a milled rib-forming groove divided into spaced sections, and an intermediate ungrooved portion of the die face in the line of and between the groove sections, the groove sections meeting the ungrooved portion in abrupt shoulders.

3. A die for forming interrupted-rib fasteners comprising a die body with a die face having a milled rib-forming groove with a part of the groove of a different depth from another part thereof, and the wall provided by the less depth part being flat and clearly defined at an angle to the confluent walls of those portions of the groove of greater depth.

4. A die for forming interrupted-rib fasteners comprising a die body with a die face having a rib-forming groove with a part of the groove of a different depth from another part thereof, and the different depths of the groove meeting in an abrupt shoulder, and the wall provided by the less depth part being flat and clearly defined

at an angle to the confluent walls of the portions of the groove of greater depth.

5. A die for forming interrupted-rib fasteners comprising a die body with a die face having a rib-forming groove divided into spaced sections and an intermediate ungrooved portion of the die face in the line of and between the sections, and the ungrooved portion having flat faces clearly defined at an angle to and meeting the faces of the respective groove sections, and the die face also having a rib-forming groove with a part of the groove of a different depth from another part.

6. A die for forming interrupted-rib fasteners comprising a die body with a die face having a rib-forming groove divided into spaced sections, and an intermediate ungrooved portion of the die face in the line of and between the groove sections, the groove sections meeting the ungrooved portion in abrupt shoulders, and the ungrooved portion having flat faces clearly defined at an angle to and meeting the faces of the respective groove sections, and the die face also having a rib-forming groove with a part of the groove of a different depth from another part thereof, and the different depths of the groove meeting in an abrupt shoulder.

7. A die as claimed in claim 5 wherein the die face is provided with a series of such grooves made up of spaced groove sections and interposed ungrooved portions, and the die face is also provided with a series of the grooves having different depths, and the die face is also provided with a series of full length full depth rib-forming grooves.

8. A die as claimed in claim 5 wherein the die face is provided with a series of the grooves made up of spaced groove sections and interposed ungrooved portions, and the die face is also provided with a series of the grooves having different depths, and the shallower portion of one of the grooves having different depths varying in depth with respect to the shallower portion of another of the grooves having different depths.

9. A die as claimed in claim 5 wherein the die face is provided with a series of the grooves made up of spaced groove sections and interposed ungrooved portions, and the die face is also provided with a series of the grooves having different depths, and the shallower portions of the grooves having different depths varying in depth with respect to each other and graduating in shallowness toward the grooves formed of spaced sections.

10. A die as claimed in claim 5 wherein the die face is provided with a series of the grooves made up of spaced groove sections and interposed ungrooved portions, and the die face is also provided with a series of the grooves having different depths, and the shallower portions of the grooves having different depths varying in depth with respect to each other and graduating in shallowness toward the grooves formed of spaced sections, the shallower portions being staggered in the length of the die.

11. A die for forming interrupted-rib fasteners comprising a die body with a die face having a series of milled rib-forming grooves each divided into spaced sections with ungrooved portions of the die face interposed between the groove sections, and said interposed ungrooved portions being staggered in the length of the die each ungrooved portion having a flat face clearly defined at an angle to and meeting the faces of the respective grooved portion.

12. A die for forming interrupted-rib fasteners comprising a die body with a die face having a series of milled rib-forming grooves each divided into spaced sections with ungrooved portions of the die face interposed between the groove sections, and said interposed ungrooved portions being staggered in the length of the die, the die face being also provided with a series of rib-forming grooves of different depths at different places, the shallower depths of the last-mentioned grooves being staggered in the length of the die to correspond with the staggering of the ungrooved portions between the sections of the first-mentioned grooves.

13. A die for forming interrupted-rib fasteners comprising a die body with a die face having rib-forming grooves each divided into spaced sections, and an intermediate ungrooved portion of the die face in the line of and between the groove sections, and the die face also having rib-forming grooves each with a part of the groove of a different depth from another part thereof, and the die face further having full length grooves of uniform depth, and the full length grooves being located at the beginning end portion of the die, followed by the grooves having different depths, and the latter followed by the grooves formed of groove sections spaced with alined ungrooved portions therebetween.

14. A die as claimed in claim 13 wherein the shallower portions of the grooves of different depths are alined in the length of the die to cooperate with the ungrooved portions between the sections of the first-mentioned grooves.

15. A die as claimed in claim 13 wherein the shallower portions of the grooves of different depths are alined in the length of the die to cooperate with the ungrooved portions between the sections of the first-mentioned grooves, and the said shallower portions being graduated in depth to be shallowest nearest the said first-mentioned grooves.

16. A die comprising a plurality of sections and each section having a portion of a die face coordinated with the others and together comprising a complete die face embodying configurations exceeding capacity for production by standard milling operations and including groove sections having flat side faces abruptly meeting flat terminal faces at clearly defined angles and each of said die sections having its portion of a die face limited to configurations such as a flat side face or faces of a groove or grooves or a flat end face or faces thereof with the configuration or configurations of each die section limited to being within the capacity for production by standard milling operations.

17. A die as claimed in claim 16 wherein some of the die sections present ungrooved portions lying across grooves of other of the die sections.

18. A die as claimed in claim 16 wherein some of the die sections present grooves of different depths from grooves of other sections with which they aline.

19. An integral die body having a die face developed on the die claimed in claim 16.

20. A die comprising fragments assembled to provide a die face, certain of the fragments having milled depressions or grooves forming parts of the die face, and other of the fragments having ungrooved portions forming parts of the die face and blockading some of the depressions, the ungrooved or blockading portions presenting flat faces abruptly and at clearly defined angles to the confluent faces of the grooves.

21. A die as claimed in claim 3 wherein the die face has another milled rib-forming groove par-

alleling the first and with a part of a different depth from another part and of a different depth from the first-mentioned part of the first-mentioned groove.

22. A die for rolling interrupted-rib fasteners of the type of screw-threaded fasteners comprising a die body or block of metal and a die face on said block having rib-forming grooves with material of the block disposed in the line of and intermediate the ends of the grooves to provide interruptions in the length of the grooves, each of the interruptions being such as to preclude a continuous milling cutter stroke in the production of the respective groove, and each interruption presenting faces clearly defined and abruptly at angles to the faces of the interrupted portions of the grooves.

23. A die as claimed in claim 22 wherein the material interrupting some of the grooves is sufficient in quantity to only partially fill the grooves and partially interrupt them, and wherein such quantity is graduated in the length of the die to the places where the interruptions of the grooves are complete.

24. A die as claimed in claim 22 wherein the material of the block disposed in the line of and interrupting the grooves extends from the plane of the base of the grooves upward toward the face of the die.

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