May 6, 1924. 1,493,211

J. H. LINK

DIE FORGED ARTICLE AND PROCESS OF MAKING SAME

Filed Sept. 29, 1921

Fig. 1

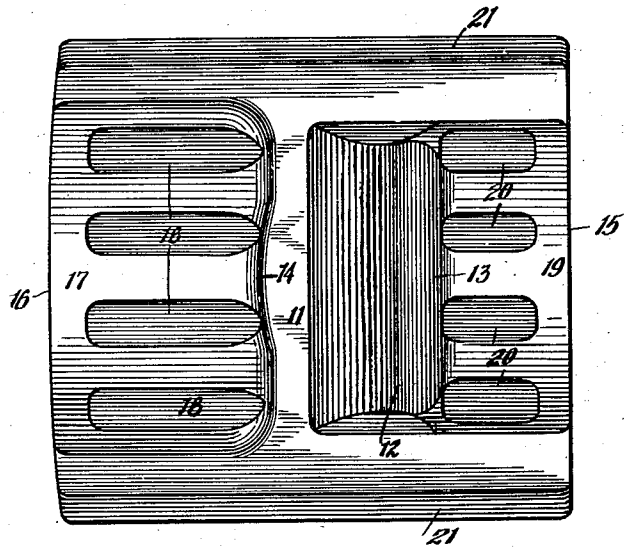


Fig. 2

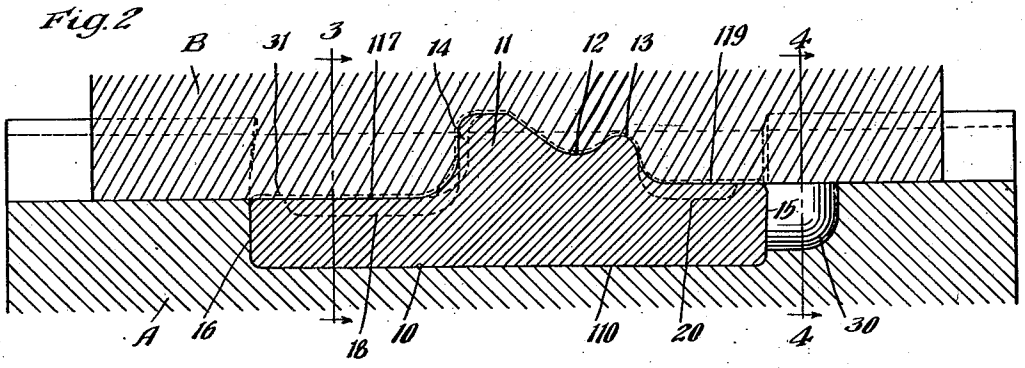
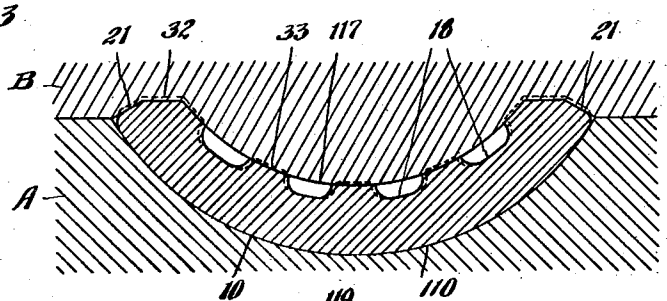


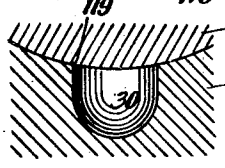
Fig. 3



Witnesses

Wm. Geiger

Fig. 4



Inventor

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By Geo. I. Haight

His Atty.

Patented May 6, 1924. 1,493,211

UNITED STATES PATENT OFFICE.

JOHN H. LINK, OF CHICAGO, ILLINOIS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO W. H. MINER, INC., A CORPORATION OF DELAWARE.

DIE-FORGED ARTICLE AND PROCESS OF MAKING SAME.

Application filed September 29, 1921. Serial No. 504,231.

To all whom it may concern:

Be it known that I, JOHN H. LINK, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Die-Forged Articles and Processes of Making Same, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

This invention relates to improvements in die forged articles and process of making same.

In the process of making drop forged or die forged articles from castings much difficulty has been experienced, due to the "flashings" or "fins" produced between the dies as the article is being forged. One such article, where this difficulty has been encountered and in connection with which my invention is specifically described, is a so-called "friction-shoe" used in friction shock absorbing mechanisms for railway draft riggings. In certain type of friction shock absorbing mechanisms used for railway draft riggings commonly known as a "Miner friction draft gear", the friction-shoes are of special shape, the same having a cylindrical outer finished wearing surface and a finished roller wedge seat on the inner side thereof. As an illustration of such a friction shoe and the friction shock absorbing mechanism of which it forms a part, reference may be had to the Bradley S. Johnson Patent 1,302,055 dated April 29, 1919.

The general practice in producing friction shoes of the character above referred to, heretofore, has been to first make a blank casting of soft steel approximating the desired finished size and shape with an outer cylindrical surface, a radial enlargement on the inner side to provide the roller wedge seat and inner cylindrical surfaces on each side of said enlargement, said inner cylindrical surfaces being made concentric with the outer cylindrical surface. After the surfaces of the blank have been carbonized, the blank is then drop-forged or die-forged in the usual manner to reduce the blank casting to the proper contour and desired thickness between the concentric inner and outer cylindrical surfaces and to form the roller wedge seat, the excess of metal being forced out between the dies in the form of "flashings" or "fins". The shoe is finally hardened by quenching.

In the foregoing process, much difficulty has been experienced on account of the flashings or fins which are forced out between the meeting faces of the dies. Such fins or flashings being relatively thin, cool quickly, become comparatively hard, and prevent the dies from coming together properly unless the fins or flashings are broken or sheared off, thereby increasing the difficulty in obtaining a true sized finished product, and cause rapid deterioration of the dies with consequent excessive cost in maintenance.

One object of my invention is to provide a new process by which the difficulties heretofore encountered on account of the flashings or fins are eliminated in the manufacture of a die forged article.

Another object of my invention is to provide a new article of manufacture of such design that it will easily and effectively allow of the carrying out of the process above referred to.

More specifically, the object of my invention, is to provide as a new article of manufacture, a friction-shoe for a shock absorbing mechanism and process of making the same.

In carrying out my invention, I make use of a portion or portions of the finished article which are not active or subject to use in service and which, consequently, do not require accurate finishing or gauging, such unused portions of the finished article being utilized in accommodating the excess portions of the blank during the forging step.

In the drawing in which I illustrate one specific embodiment of a finished article and process of making the same, in accordance with my invention, Figure 1 is an elevational view of the inside of a friction shoe, in its finished form, such as is employed in a so-called "Miner friction draft gear" of the character illustrated in said Patent 1,302,055. Fig. 2 is a vertical sectional view taken longitudinally of the friction-shoe at the center thereof as it appears in the forging dies and illustrating the contour of the blank before the dies come together and after the dies come together. Fig. 3 is a vertical sectional view at right

angles to the sectional view of Fig. 2 and corresponding substantially to the line 3—3 of Fig. 2. And Fig. 4 is a detailed sectional view corresponding substantially to the line 4—4 of Fig. 2 to illustrate a certain feature of the dies.

The finished friction-shoe, as shown, is provided with an outer cylindrical finished friction wearing surface 10 adapted to cooperate with a corresponding interior cylindrical surface of a shell; a radially inwardly extended enlargement 11 formed with a transversely extending flat roller wedge seat 12, roller stop lip 13 and convex shoulder 14; a flat edge 15 at that end of the shoe which is outermost when assembled in the friction shock absorbing mechanism; a convex inner edge 16; an interior cylindrical surface 17 on one side of the enlargement 11, said surface being provided with a plurality of depressions 18—18; and another inner cylindrical surface 19 on the opposite side of the enlargement 11, said surface 19 being provided also with a series of depressions 20—20. The shoe is also provided with longitudinally extending side edges as indicated at 21—21.

In actual practice, the portions of the shoe which require accurate finishing and gauging on account of the cooperation thereof with other parts of the shock absorbing mechanism are the outer cylindrical friction surface 10 and the roller wedge seat 12, the former cooperating with a cylindrical surface and the latter providing a bearing for an anti-friction roller. It will also, of course, be understood that the length of the shoe and the contour of the edge 16 and of the convex shoulder 14 must also be reasonably accurate. As will be apparent from an examination of the assembly view of the Patent 1,302,055 the surface portions 17 and 19 of the shoe are inactive so far as engagement or cooperation with any other element of the mechanism is concerned.

Referring to Figs. 2, 3 and 4. A represents a lower fixed die and B the upper movable die. Said dies are recessed to accord with the desired finished contour of the friction shoe. As shown, the lower die has a concave recess 110 and the upper die cylindrical or convexed surfaces 117 and 119 corresponding to the unused or inactive portions 17 and 19 of the finished shoe. It will also be understood that the upper die B is suitably recessed to conform to the contour of the wedge enlargement 11. The lower die A is formed with a small recess 30 at one end opposite the shoulder 14 of the shoe so that the shoe may readily be picked out from the lower die after it has been forged by means of tongs which engage the shoe at its edge 15 and at the shoulder 14.

In carrying out my process, I first provide a blank cast preferably from soft steel; the blank being of approximately the desired finished size and contour except that it is made slightly thicker than the thickness of the finished product to allow of the squeezing of the metal to fill the die recesses during the forging operation. The contour of the original blank is indicated by the bottom full lines of the shoe as shown in Figs. 2 and 3 and by the dotted line 31 in Fig. 2 and the dotted lines 32 and 33 in Fig. 3. The blank as originally cast is formed with, in the instance shown, a plurality of depressions 18—18 and 20—20 in those surfaces of the finished article which are not actively used, the bottoms of said recesses being disposed below the points reached by the corresponding surface of the upper die B.

In the manufacture of a friction shoe, the next step is the carbonization of the surface thereof in order to produce the necessary wearing qualities when in service. After the blank has been carbonized, it is then introduced between the dies and forged. During this forging step, the excess metal because of the thickness thereof, will be squeezed or flowed into the recesses 18 and 20, the action corresponding to that indicated best in Fig. 3 where the dotted lines indicate the original contour of the blank on the upper surface and the full lines the finished contour. Inasmuch as it is immaterial in the finished article, what is the contour or size of the recesses 18 and 20, it is evident that the excess metal flowed into such recesses will not affect the finish and gauge of those surfaces 10 and 12 of the finished article which are the critical surfaces. By providing the recesses 18 and 20 on the unfinished or inactive portions and allowing the excess metal of the blank to be squeezed thereinto, I have found that the formation of "fins" or "flashings" between the dies is successfully eliminated and hence that the friction shoes may be made more quickly, more accurately and with less deterioration of the dies than heretofore.

The final step of the process, in the case of the friction shoe, is to harden it by quenching.

I have herein shown and described what I now consider the preferred manner of carrying out the invention, as applied to one specific article by way of illustration only. All changes and modifications are contemplated which come within the scope of the claims appended hereto.

I claim:

1. As an article of manufacture a cast and die forged element, said element having a finished surface of predetermined contour on one side, a finished enlargement on the other side also of predetermined contour, and a surface on the last named side of the element which is unused in service, said un-

used surface having depressions therein below the die treated portions thereof.

2. The herein described process of manufacture which consists in: casting a blank of approximately the desired finished size and contour of article to be produced but of slightly excessive thickness and with an enlargement on one side thereof, a portion of the blank casting on the side of said enlargement having depressions therein; and then die forging the cast blank to accurately finish the portion of said enlargement and the surface on the opposite side of the article and flowing the excess metal, during the forging step, into said depressions.

3. As an article of manufacture, a cast and die forged friction shoe for a friction shock absorbing mechanism, said shoe having an outer friction wearing surface of predetermined contour; a wedge enlargement on the inner side of predetermined contour and an unfinished surface on the inner side which is unused in service, said unfinished surface of the shoe having depressions therein below the die-treated portions thereof.

4. The herein described process which consists in the following steps: casting a blank friction shoe of approximately the desired finished size and contour having a friction wearing surface on the outer side, a wedge enlargement on the inner side and a surface with depressions therein on the inner side which is unused in service; then die-forging said shoe blank to accurately finish said outer friction wearing surface and said wedge enlargement and simultaneously flowing the excess metal into said depressions.

5. As an article of manufacture, a friction shoe for shock absorbing mechanisms, said friction shoe having an outer cylindrical friction surface, transversely extending finished roller wedge seat on the inner side thereof, and an unfinished surface on the inner side of the shoe to one side of said wedge seat, said unfinished surface being unused in service and having a plurality of depressions therein.

6. The herein described process of making a friction shoe comprising the following steps: casting a friction shoe blank of approximately the desired finished size and contour and having an outer cylindrical surface, an inner transversely extending roller wedge seat enlargement and an inner surface to one side of said enlargement provided with a plurality of depressions therein; then die-forging said blank to finish said outer friction surface and roller wedge seat and simultaneously therewith flowing the excess metal into said depressions.

7. The herein described process which consists of the following steps: casting a soft steel blank of a size and contour corresponding approximately with a finished friction shoe having an outer cylindrical friction surface, an inner transversely extending roller wedge seat and an unused surface on the inner side thereof to one side of said wedge seat; carbonizing said blank; die-forging the blank to simultaneously finish said outer friction surface and roller wedge seat and flow the excess metal into said depressions; and finally hardening the blank by quenching.

8. The herein described process of making die forgings comprising the following steps: first casting a blank of approximately the desired finished size and contour and having a plurality of depressions therein; then die-forging said blank to finish the size and form and simultaneously therewith flowing the excess of metal into said depressions.

In witness that I claim the foregoing I have hereunto subscribed my name this 31st day of August 1921.

JOHN H. LINK.

Witnesses:
CARRIE GAILING,
ANN BAKER.