Feb. 9, 1926. 1,572,343

W. P. WITHEROW

DIE ROLLED BLANK AND METHOD AND APPARATUS FOR MAKING THE SAME

Filed Jan. 5, 1922 4 Sheets-Sheet 1

Fig. 1.

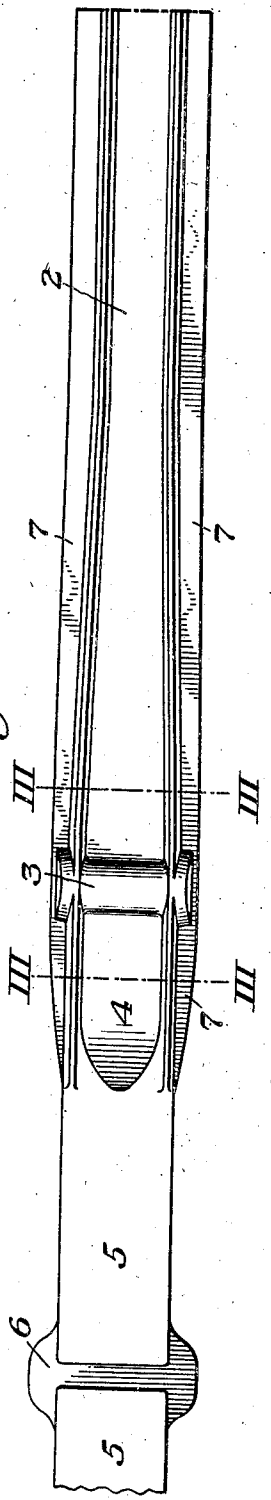


Fig. 2.

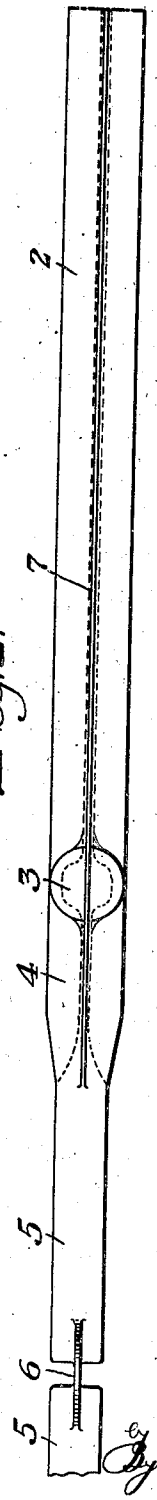
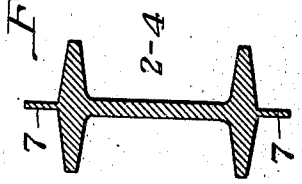


Fig. 3.



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W. P. WITHEROW

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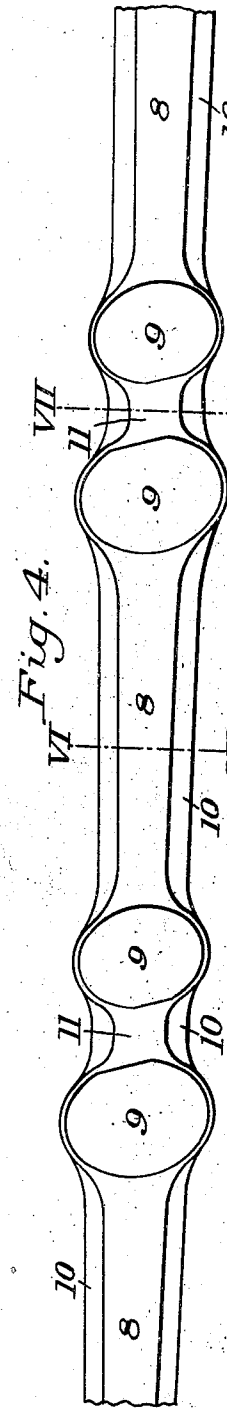


Fig. 4.

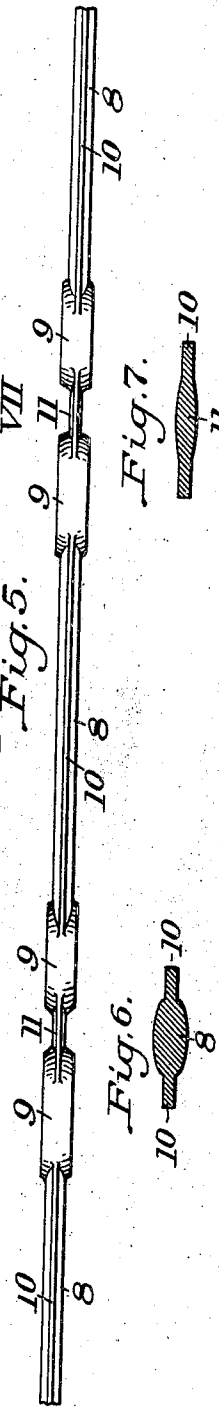


Fig. 5.

Fig. 7.

Fig. 6.

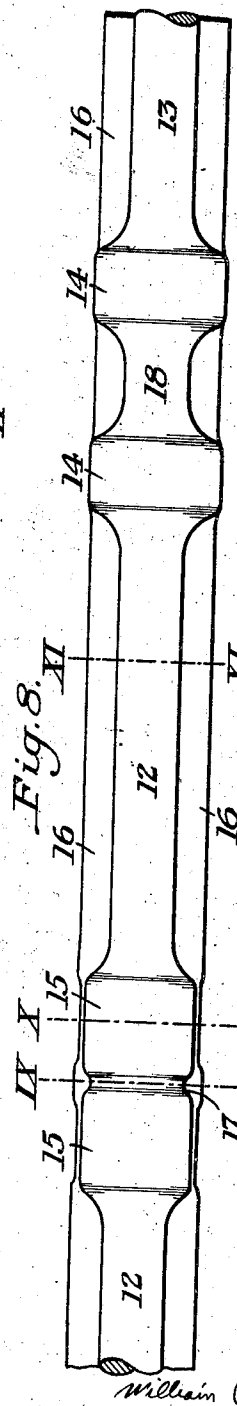


Fig. 8.

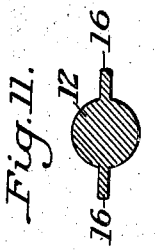


Fig. 11.

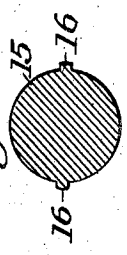


Fig. 10.

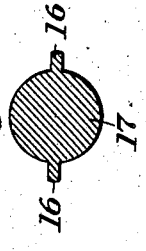


Fig. 9.

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W. P. WITHEROW

DIE ROLLED BLANK AND METHOD AND APPARATUS FOR MAKING THE SAME

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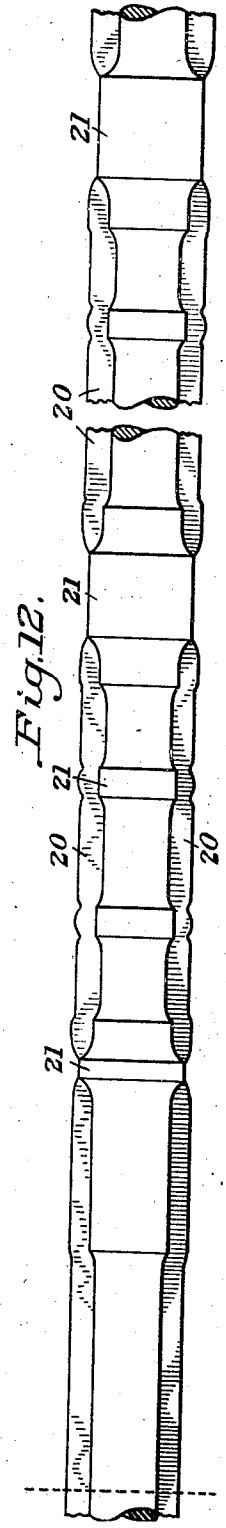


Fig. 12.

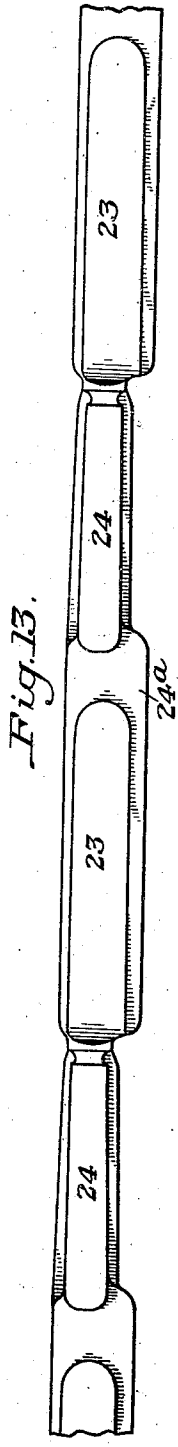


Fig. 13.

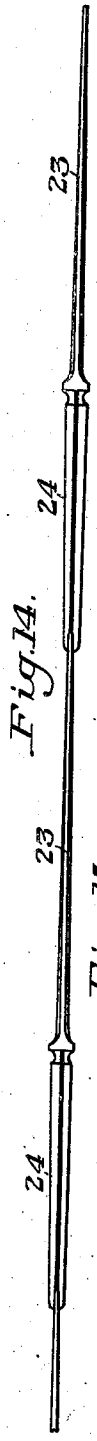


Fig. 14.

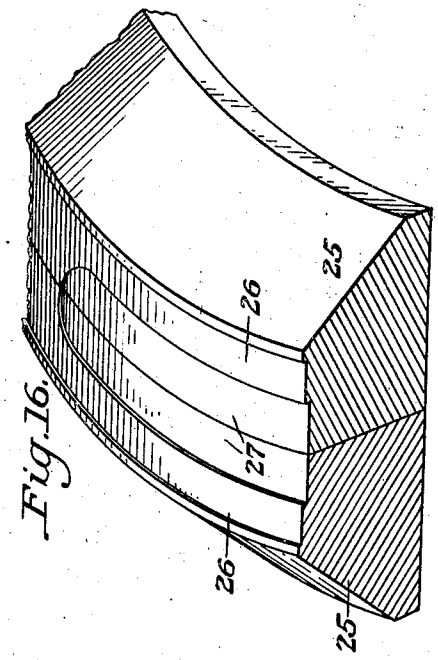


Fig. 16.

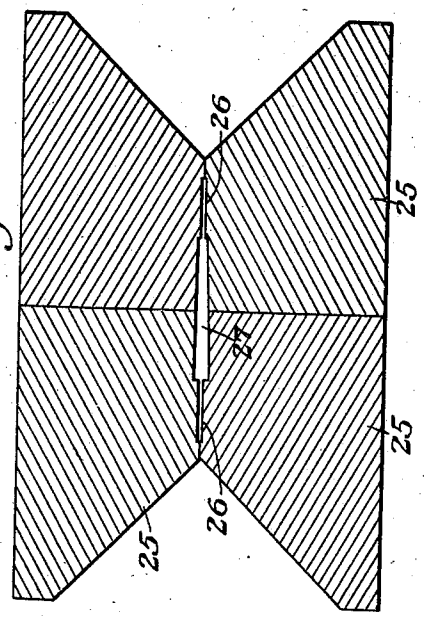


Fig. 15.

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W. P. WITHEROW

DIE ROLLED BLANK AND METHOD AND APPARATUS FOR MAKING THE SAME

Filed Jan. 5, 1922 4 Sheets-Sheet 4

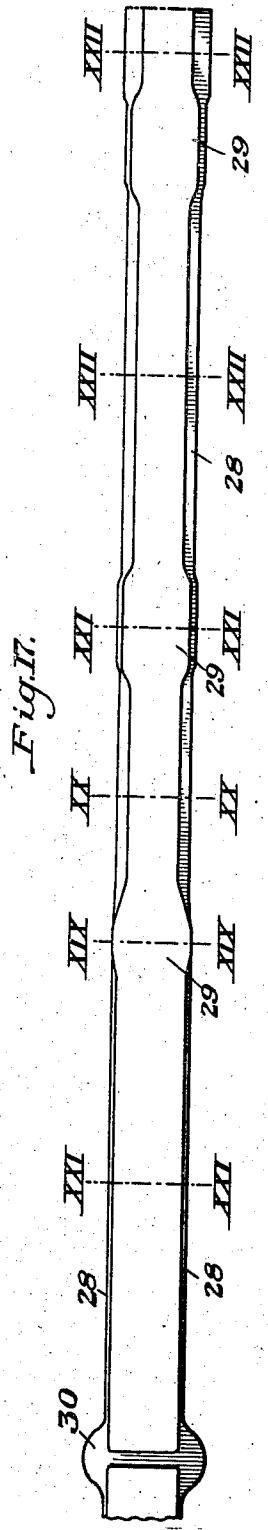


Fig. 17.

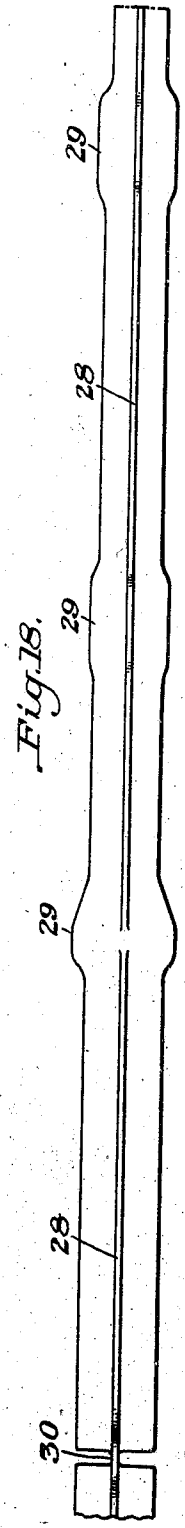


Fig. 18.

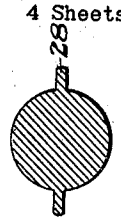


Fig. 23.



Fig. 22.

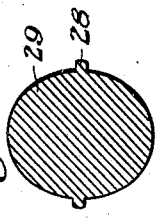


Fig. 21.



Fig. 20.

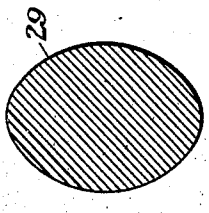


Fig. 19.

William P. Witherow, INVENTOR

by Byrnes, Galvani, Burgess & Parmelee, his attys.

Patented Feb. 9, 1926. 1,572,343

UNITED STATES PATENT OFFICE.

WILLIAM P. WITHEROW, OF PITTSBURGH, PENNSYLVANIA, ASSIGNOR TO WITHEROW STEEL COMPANY, A CORPORATION OF PENNSYLVANIA.

DIE-ROLLED BLANK AND METHOD AND APPARATUS FOR MAKING THE SAME.

Application filed January 5, 1922. Serial No. 527,202.

To all whom it may concern:

Be it known that I, WILLIAM P. WITHEROW, a citizen of the United States, residing at Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Die-Rolled Blanks and Methods and Apparatus for Making the Same, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, in which—

Figure 1 is a side elevation of portions of two connected axle blanks as they come from the die rolls;

Figure 2 is a top plan view of the blanks illustrated in Figure 1;

Figure 3 is a transverse sectional view on the lines III—III of Figure 1;

Figure 4 is a top plan view of a series of wrench blanks as they come from the rolls;

Figure 5 is a side elevation of the blanks of Figure 4;

Figure 6 is a transverse sectional view on the line VI—VI of Figure 4;

Figure 7 is a similar view on the line VII—VII of Figure 4;

Figure 8 is a side elevation of part of a series of connecting rods as produced by the present invention;

Figures 9, 10 and 11 are transverse sectional views on the lines IX—IX, X—X, and XI—XI, respectively, of Figure 8;

Figure 12 is a view corresponding to Figure 8, illustrating portions of connected cam shafts produced by die rolling;

Figure 13 is a similar view illustrating a series of knife blanks;

Figure 14 is a side view of the blank shown in Figure 13;

Figure 15 is a sectional view through dies adapted to be utilized in accordance with my invention;

Figure 16 is a sectional perspective view of one of the sectional dies;

Figure 17 is a view similar to Figures 1, 4, 8, 12 and 13, illustrating parts of connected blanks for windshield stanchions;

Figure 18 is a side view of the blanks of Figure 17; and

Figures 19 to 23 are sectional views on the section lines XIX—XIX, XX—XX, XXI—XXI, XXII—XXII, and XXIII—XXIII, respectively, of Figure 17.

Heretofore, it has been proposed to die-roll a plurality of different finished articles or blanks such as nails, spikes, harrow teeth, coupling pins, links, knives, forks, nuts, tie plates, and the like, either as individual units or as an integrally connected series produced by die rolling with rolls having a recurrent pattern. Several difficulties have been encountered in connection with such operations, such as non-uniformity of product, the amount of rolled material having to be scrapped, and the difficulty and expense of keeping the die rolls properly dressed. All of these problems have prevented the commercial introduction of such methods generally, and particularly in connection with large tonnage production of axles, shafts and the like where accuracy is an important factor.

For example, the patent to Anderson, No. 488,048 of Dec. 13, 1892, relating particularly to the rolling of cutlery blanks, such as knife and fork blanks, states one of the difficulties. This is the natural tendency of the rolls to spring apart, thereby impairing the accuracy of the rolling, particularly where thin bodies or blanks are being produced. This problem has been recognized, and allowance has been made for such springing apart, but no attempt has been made to minimize such spring and increase the accuracy and uniformity of product. The same problems were undoubtedly encountered by the parties interested in the patent to Hallus et al. No. 193,115 of July 17, 1877, and account for the failure to commercially introduce such methods. According to one form of my invention, this difficulty is largely, if not entirely, overcome.

This tendency of the rolls to spring also has another objection, which the patent to Richardson, No. 136,620 of Mar. 11, 1873, attempted to overcome. The spring results in an "over-fill," which in subsequent operations produces a "cold shut" or lap. In Richardson, special provision is made for the overfill with the view of working it back into the body of the stock. According to one form of my invention, I provide for a definitely located flash adapted to be sheared away.

The present invention also contemplates rolling a wide variety of objects, the sizes of which may vary considerably, and in many instances rolling parts to finished dimensions, or from center to center with suc-

cessive blanks directly connected end to end or by a suitable gating. By the expression from "center to center" I mean from a given point on one blank to a corresponding point on an adjacent blank, or with a given distance between definite points on the same blank. It is intended by the present invention to produce blanks having parts thereof adapted to be forged and machined, or machined only.

In Figures 1 to 3, there are illustrated portions of a die rolled series of axle blanks of the type having a central body portion 2 of general I-beam across section which may, if desired, be of varying depth throughout all or part of its length, as illustrated. This body portion adjacent each end gradually merges into enlargements or bosses 3 from which spring seats may be formed by a suitable machining operation. Beyond the bosses 3, there is a short section 4 of I-beam cross section merging gradually into a solid end portion 5 of general rectangular cross section. Connecting the portion 5 with the corresponding portion of the adjacent beam may be a gating 6. This gating, when provided, serves a double purpose. It indicates the exact points of separation of adjacent blanks, and prevents slipping between the rolls and the blanks during the rolling of the rectangular end portions on which the rolls would otherwise have a relatively poor bite, and is very efficient when rolling from center to center. The solid portions 5 are adapted to be subsequently split, forged and machined in forming axles having a yoke thereon, or forged and machined in forming axles having bosses thereon. Preferably, although not necessarily, blanks of this general nature are rolled from leaders having a uniform cross section or rudimentary shape corresponding generally to the shape of a finished portion of the axle. In the example given, the blank would be of rudimentary I-beam shape in cross section. It will be noted that the blanks as they come from the rolls are provided with a flash 7, the width of which varies generally in accordance with the reduction and deforming produced by the die rolls on the leader. This flash is easily trimmed away either before or after performing the finishing operations on the blank.

Figures 4 to 7 disclose a preferred method of producing wrench blanks according to the present invention. These blanks, also, come from the rolls in a connected series, each blank comprising a main body portion 8, of suitable shape, usually of flattened oval shape. Adjacent each end, the dies provide a head 9 in which the nut sockets are adapted to be subsequently formed by a suitable machining operation. The blanks are preferably provided with a flash 10 as they come from the rolls, and are connected by a gating 11, which is effective in substantially the same manner as before described.

In Figures 8 to 11 there is illustrated one shape which connecting rod blanks for internal combustion engines may have imparted to a suitably shaped leader during the die rolling. These blanks are preferably rolled in pairs, each pair comprising a partially finished connecting rod having a main body portion 12, while the first rod of the adjacent pair is indicated as having a similar body portion 13. Each blank has a head 14 adapted to be machined to receive a wrist pin, and a head 15 adapted to be similarly finished to cooperate with the crank shaft. Each of the rods has the flash 16, and adjacent rods of the same pair are connected by a short gating 17, which adjacent pairs are connected by a relatively longer gating 18. After the blanks are separated into pairs, the portions of the gating 18 may serve as tong holds if desired. By rolling in pairs, during the final forging operations, one blank serves as a hand hold while operating on the other blank of the pair. An important advantage of such blanks is the absolute uniformity, giving to the forger definite bodies of metal correctly located, thereby facilitating his work, increasing production, and insuring a standard product.

Figure 12 illustrates portions of adjacent rolled blanks from which cam shafts are produced. The blanks have the flash 20, and enlargements 21 suitably positioned to provide stock from which cams and bearings may be formed by suitable after operations. The dotted lines indicate points at which the adjacent blanks may be separated, and thereafter cut to length, or the points at which accurate cutting to length may be initially accomplished where the blanks are rolled from center to center. It will be obvious that a gating may be utilized with such blanks, as set forth in connection with the blanks heretofore described.

In Figures 13 and 14 there are illustrated two views of a connected series of knife blanks as they come from the rolls. The knife blades 23, and the handles 24 are indicated in solid line outline, practically entirely surrounded by a flash 24^a, the flash in this particular form of blank also forming the gating between adjacent blanks. These blanks may be easily pressed or sheared to remove the flash and provide bases to which the silver coating may be applied. The provision of the flash in rolling knife blanks is particularly advantageous as it enables accurate rolling. For example, the die sections 25 of Figures 15 and 16, embodying generally the features of construction of the patent to George Baehr, No. 1,289,602 of Dec. 31, 1918, may have formed therein flash gutters 26 at each side of the pattern 27 to

accommodate the excess metal without roll spring. This decreases roll neck friction, increases life of the rolls, and enables the blanks to be rolled to the proper thickness, all of the blanks being uniform.

In Figures 17 to 23, I have shown portions of adjacent blanks from which wind shield stanchions are adapted to be subsequently forged. Each of these blanks comprises a main body portion having the flash 28 and enlargements 29. These enlargements provide the necessary metal for forming sockets for the pivotal wind shield supports, by suitable forging and machining operations. One of the enlargements also provides the metal from which the shoulder for supporting the stanchion on the cowl may be formed. Adjacent blanks are illustrated as connected by a gating 30 serving the purposes before set forth.

It will be apparent that the series of blanks as formed in accordance with the present invention, each contains a number of uniform blanks, all requiring certain after operations. After the blanks are separated into single units, or into pairs, they may be sold as semi-finished articles of manufacture, or they may be completely finished at one factory and sold directly to the trade. In every case, the blanks possess certain characteristics in common in that definitely located bodies of metal are accurately and uniformly positioned and rolled with a minimum of roll spring and a minimum of roll slipping. This insures definite dimensions transversely and from center to center, as will be understood. These advantages constitute important features of the present invention.

I claim:

1. A die roll having a pattern for the blank to be rolled and a flash gutter of substantially uniform depth cooperating therewith.

2. As an article of manufacture, a connected series of blanks rolled to provide uniform distances between corresponding points on adjacent blanks, each of said blanks having portions adapted to be forged, said blanks being connected by a gating, the gating betwen adjacent pairs of blanks being longer than the gating between adjacent blanks to serve as a tong-hold during the forging operations.

3. The method of die rolling, comprising passing a leader between die rolls to form a connected series of blanks each having flash on the opposite sides thereof, separating the blanks and trimming the flash, and thereafter forging at least certain portions of the blanks.

4. As an article of manufacture, a string of die rolled ferrous blanks reduced while hot throughout at least the major portion of each blank by the die rolling operation, said blanks having flash zones on opposite sides thereof, the string of blanks having accurately spaced apart portions of greater size than the desired size in a finished article to provide accurately positioned bodies of metal on blanks severed from the string, such portions being adapted for reworking.

5. As an article of manufacture, a string of die rolled ferrous blanks reduced while hot throughout at least the major portion of each blank by the die rolling operation, said blanks having flash zones on opposite sides thereof, the string of blanks having accurately spaced apart portions of greater size than the desired size in a finished article to provide accurately positioned bodies of metal on blanks severed from the string, such portions being adapted for reworking, and said blanks having other portions of substantially finished dimensions and contour.

6. As an article of manufacture, a string of die rolled ferrous blanks reduced while hot throughout at least the major portion of the length of each blank by the die rolling operation, said blanks having flash on diametrically opposite sides thereof in substantially the median plane of the string of blanks and having accurately spaced apart portions along the string of blanks providing portions on blanks severed from the string and adapted for reworking, said blanks also having other portions of substantially finished dimensions and contour.

7. As an article of manufacture, a string of die rolled ferrous blanks, each reduced while hot throughout at least the major portion of its length by the die rolling operation, said blanks being connected by gating defining the zone of separation and having flash on substantially diametrically opposite sides, the string of blanks having accurately spaced portions providing accurately positioned portions on blanks severed from the string and adapted for reworking, and having other portions die rolled to substantially finished dimensions and contour.

8. The method of producing die rolled articles comprising setting a pair of die rolls having matrix portions therein in peripheral contact with the line of contact of the rolls lying in substantially the median plane of the cavity defined by the matrices in the rolls, passing a hot leader between said rolls and reducing a major portion thereof in a single operation to produce a blank having flash on opposite sides thereof, and providing matrix portions in the rolls such as will produce recurring portions in the string of blanks, such portions being accurately spaced and providing at least one portion adapted for reworking in the several blanks and other portions of substantially finished dimensions and contour.

9. The method of forming metal articles, comprising passing a leader between die

rolls adapted to form a string of connected blanks, forming accurately spaced portions along the string adapted for reforging, permitting excess metal to flow sidewise in a substantially unrestricted manner to form flash integral with the blanks, separating the blanks and trimming the flash, and thereafter reheating and forging at least certain portions of the blanks.

10. The method of forming metal articles, comprising passing a leader between die rolls adapted to form a string of connected blanks, forming accurately spaced portions along the string adapted for a subsequent operation wherein a flow of metal is secured, permitting excess metal to flow sidewise in a substantially unrestricted manner to form flash integral with the blanks, separating the blanks and trimming the flash, and thereafter operating on the blanks to produce flow of the metal therein in at least certain portions of the blanks.

11. The method of forming metal articles, comprising passing a leader between die rolls adapted to form a string of connected blanks, forming accurately spaced portions along the string adapted for reworking, permitting excess metal to flow sidewise in a substantially unrestricted manner to form flash integral with the blanks, separating the blanks and trimming the flash, and thereafter reworking at least certain portions of the blanks.

In testimony whereof I have hereunto set my hand.

WILLIAM P. WITHEROW.