Aug. 21, 1934. F. B. BELL 1,971,027

PROCESS OF ROLLING RINGS

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Fig. 1.

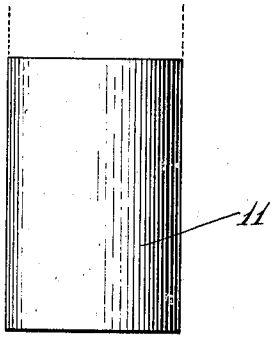


Fig. 2.

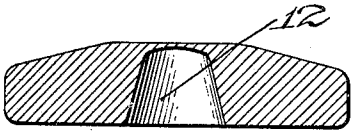


Fig. 3.

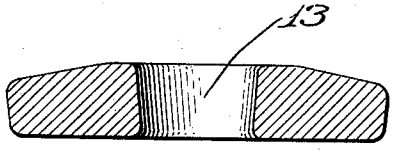
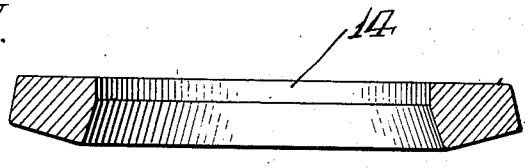


Fig. 4.



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Fig. 5.

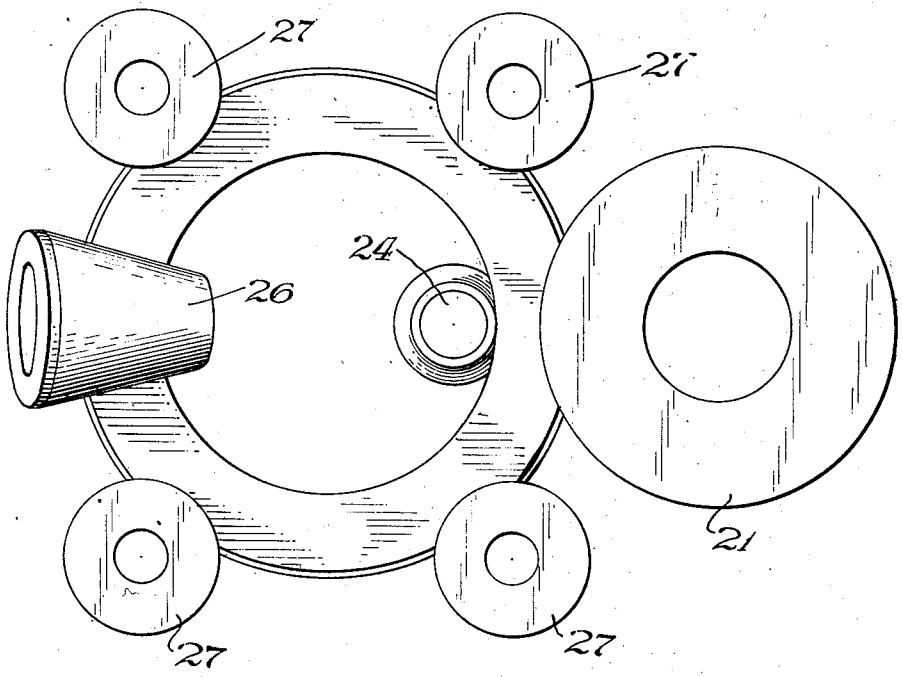
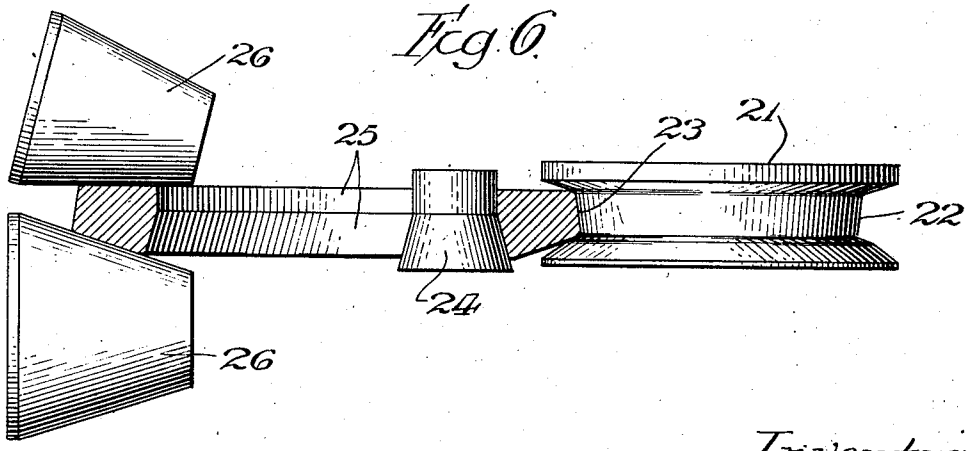


Fig. 6.



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UNITED STATES PATENT OFFICE

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PROCESS OF ROLLING RINGS

Frank B. Bell, Pittsburgh, Pa., assignor to Edgewater Steel Company, Pittsburgh, Pa., a corporation of Pennsylvania

Application February 29, 1932, Serial No. 595,717

1 Claim. (Cl. 29—156)

This invention relates to the production of steel rings and has for its object broadly the provision of an improved process of producing rolled steel rings, such for example as are used in the manufacture of ring gears, automobile brake drums, etc.

The principal object of the invention is the production of steel rings of the character described, which will have uniform texture and physical characteristics throughout the entire circumferences and throughout presented faces.

Prior to this invention rings of the character described have usually been produced either by bending a bar of iron of desired length and cross sectional form to circular shape and welding the ends together, or by slitting a bar or billet from its center toward its ends and widening the slit to permit the rolling of the material into final form. In each instance, of course, the metal is hot rolled to its final form, and in each method described different structural characteristics inherently occur at different points in the circumferences of the finished product.

This invention contemplates the production of rings of the character described and for the process mentioned, of uniform physical characteristics throughout the entire circumferences. To accomplish this a bar or billet of metal is first produced and is sheared to desired lengths. The resulting sections are then individually compressed to provide a flattened disc which is perforated at its center to receive an internal roll. The blank thus formed is then circumferentially rolled to enlarge its diameter and bring it to desired final size and sectional configuration. Thus made it will be apparent that all faces of the ring have uniform physical characteristics throughout these several circumferences. All parts of such ring have been compacted or compressed equally.

Numerous other objects and advantages of the invention will be apparent as it is better understood from the following description, which, when taken in connection with the accompanying drawings, illustrates a preferred embodiment thereof.

Referring to the drawings,

Figure 1 is a side elevation of a section of bar or billet stock sheared to a length providing the bulk of metal required in a finished ring;

Fig. 2 is a sectional view of the same after it has been upset or compressed axially and partially perforated from one side at its center;

Fig. 3 is a similar view after the perforation has been completed and the opening spread;

Fig. 4 is a section through the same after the rolling operation;

Fig. 5 is a schematic plan view of a roll organization adapted to convert the blank of Fig. 3 into the ring of Fig. 4; and

Fig. 6 is a transverse view through the organization of Fig. 5, the ring being shown in section and the rolls in elevation.

In accordance with the preferred practice or embodiment of the instant invention, a bar or billet of steel is sheared transversely into sections, typically illustrated at 11 in Figure 1. Each of these sections is then compressed axially to enlarge its diameter (as indicated in Fig. 2) and is partially perforated at 12 at the center. This perforation is then completed and the hole enlarged (as indicated at 13 in Fig. 3) to permit insertion of a central or inner roll. Thereafter the blank is rolled circumferentially to provide the finished ring illustrated at 14 in Fig. 4.

This rolling may be accomplished in a mill provided with rolls adapted to confine and define the bounding faces. An organization of rolls suitable for this purpose is illustrated in Fig. 5, in which reference character 21 indicates a master roll mounted upon a fixed axis and having a roll forming face 22 adapted to engage and define the external circumferential face 23 of the ring. Reference character 24 indicates a companion inner follower roll which defines the internal faces 25 of the ring, and which in the rolling of the ring is moved by suitable power toward the roll 22, this roll providing the pressure to reduce the diametric cross section of the blank. The upper and lower faces of the ring are determined as the rolling progresses by upper and lower rolls 26 mounted upon inclined axes, and which compress the blank between them and move away from the main roll 22 as the rolling progresses. Guide rolls 27 are provided to preserve the circular contour of the ring and these rolls move outwardly as the blank is enlarged by the progressive rolling into the finished ring.

The steel is preferably worked at forging temperature and in cooling after rolling it will be apparent that all parts of all of its surfaces contract equally and have like characteristics in the finished product.

It is thought that the invention and many of its attendant advantages will be understood from the foregoing description and it will be apparent that various changes may be made in the steps and their order of accomplishment of the process described without departing from the spirit

and scope of the invention or sacrificing all of its material advantages, the process hereinbefore described being merely a preferred embodiment thereof.

I claim:

The process of fabricating blanks for ring gears and the like having a uniformly dense molecular structure circumferentially which comprises compressing a circular section of a bar of steel axially to form a disk, partially perforating the same by displacing the metal radially outwardly, completing the perforation and enlarging the same by spreading the metal radially to form an annulus, rolling the internal and external circumferential surfaces of the annulus, and simultaneously rolling the opposed lateral surfaces of the annulus at a point circumferentially spaced from the point where the circumferential surfaces of the annulus are rolled, thus preserving substantially uniform stresses throughout the sectional area of the annulus and compressing the same to obtain a relatively dense molecular arrangement adapted to resist shearing strains exerted on the teeth of a gear fabricated from said blank.

FRANK B. BELL.