No. 885,508. PATENTED APR. 21, 1908.

W. McKEE.

ROLLING.

APPLICATION FILED MAY 24, 1907.

FIG. 5.

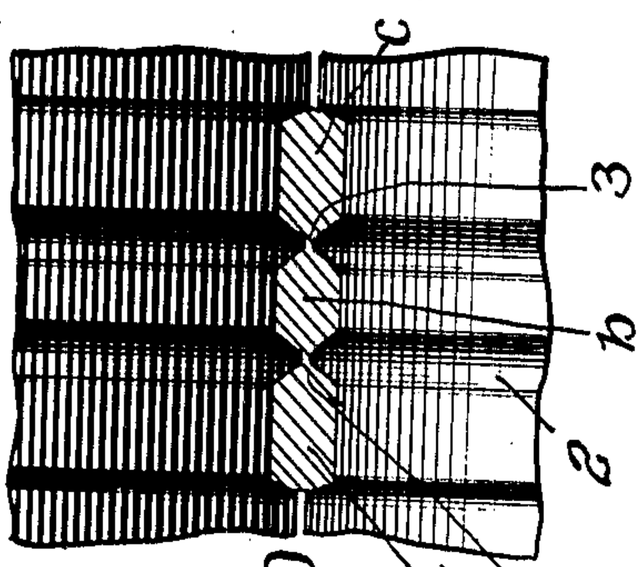


FIG. 4.

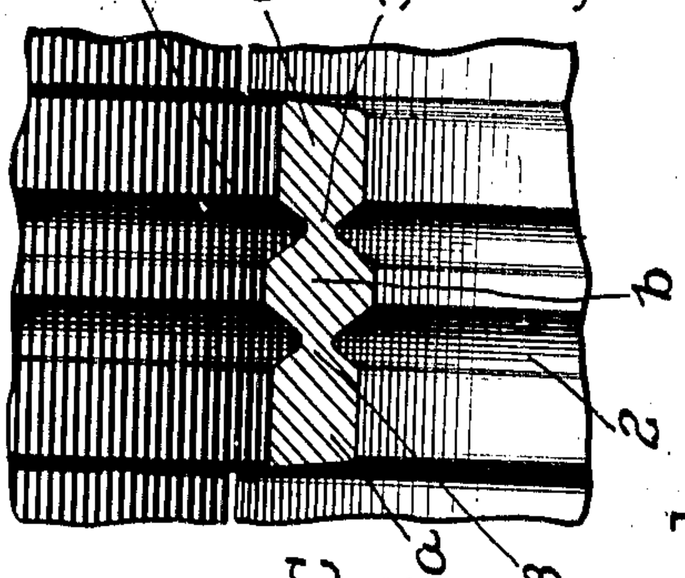


FIG. 3.

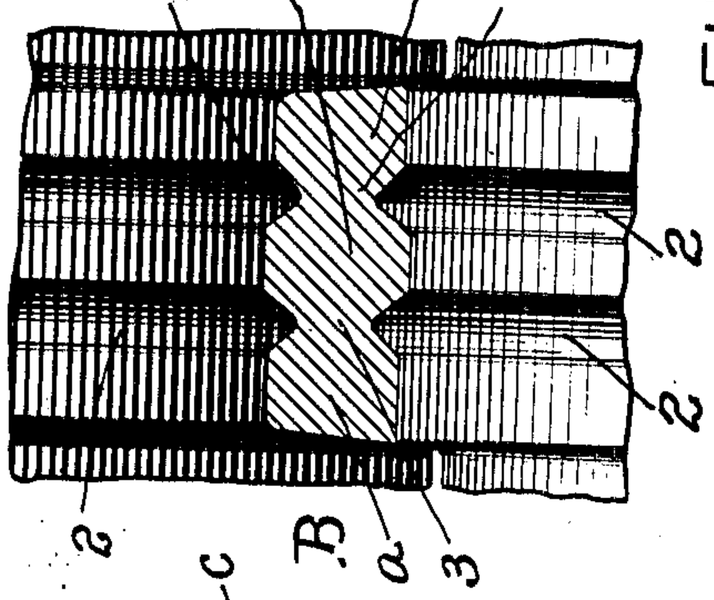


FIG. 2.

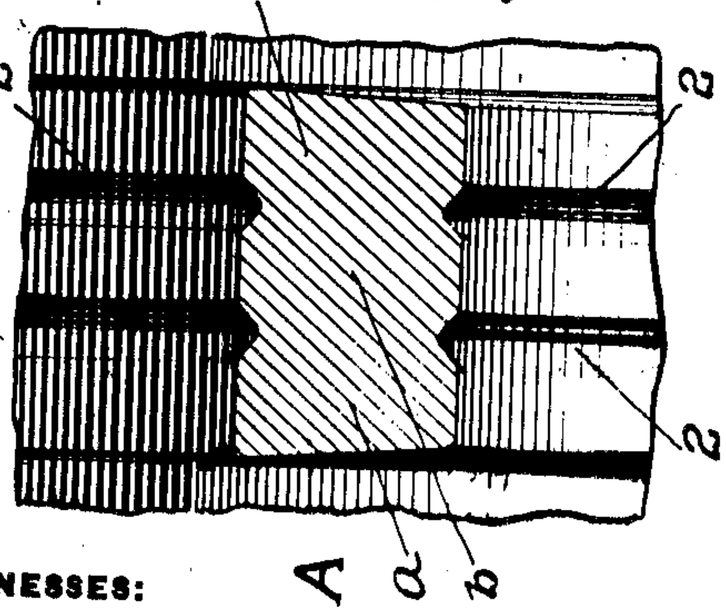


FIG. 1.

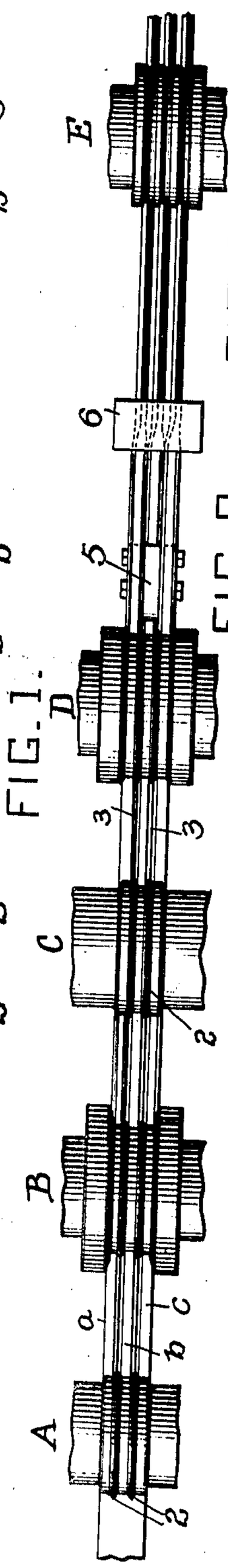


FIG. 6.

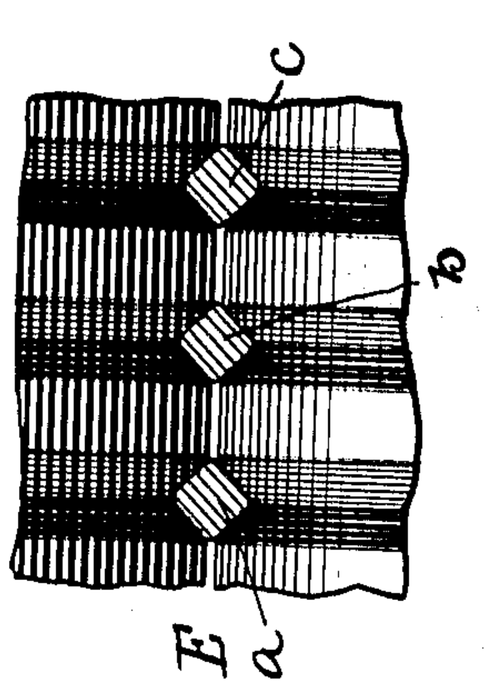


FIG. 9.

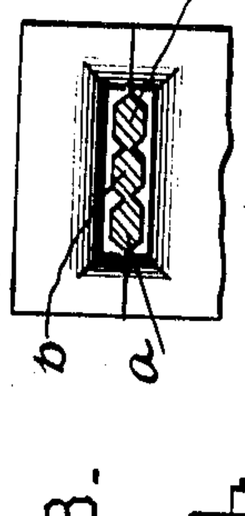


FIG. 10.

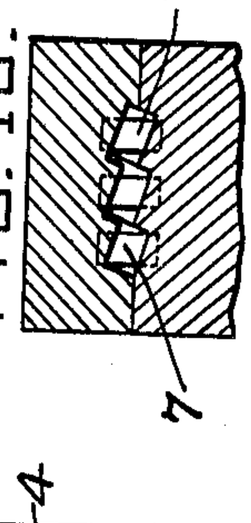


FIG. 8.

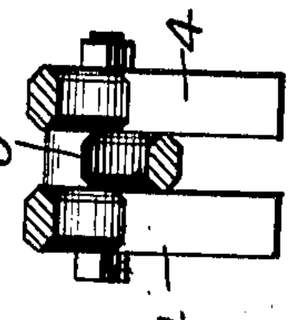
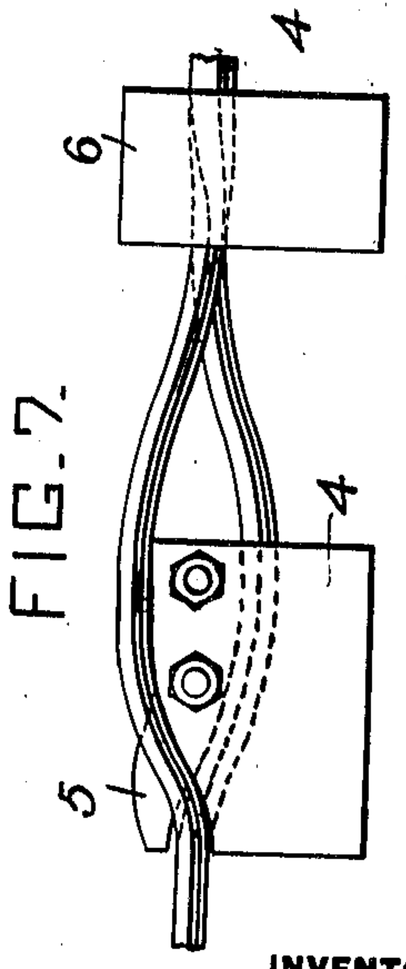


FIG. 7.



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UNITED STATES PATENT OFFICE.

WILLIS McKEE, OF ELYRIA, OHIO.

ROLLING.

No. 885,508. Specification of Letters Patent. Patented April 21, 1908.

Application filed May 24, 1907. Serial No. 375,547.

To all whom it may concern:

Be it known that I, WILLIS McKEE, residing at Elyria, in the county of Lorain and State of Ohio, a citizen of the United States, have invented or discovered certain new and useful Improvements in Rolling, of which improvements the following is a specification.

The invention described herein relates to certain improvements in the reduction of billets to bars, rods, etc., and has for its object the reduction of the billet to a form in which it is divided into longitudinal sections by deep grooves or channels, the portions between such channels having approximately the shape or contour and cross sectional dimensions of the finished article, and then separating these several sections and separately finishing the sections to the desired size and shape.

It has heretofore been customary to reduce a billet in the manner stated and after the several parts or sections of the billet have been brought to or approximately to the desired shape and size, to sever the sections one from the other by forcing the web connecting the several sections, against a cutting edge and then separately finishing the several parts. The severing of the sections has also been effected by passing them between rolls having sharp collars, which will cut the connecting web. These methods are objectionable as the maintenance of the cutting edges whether stationary or in the form of collars on rolls, in a proper condition to effect their purpose, is difficult and expensive.

The present invention has for its object to effect the separation of the sections by subjecting one of two adjacent parts or sections of the billet after it has been brought to or approximately to the desired shape or size in cross section to a greater reduction and consequent elongation than the other parts or sections whereby the connecting web is either ruptured or brought to such a condition that it may be readily ruptured by causing adjacent sections to diverge by means of suitable guides after passing through the rolls in which the difference of elongation is effected.

The invention is hereinafter more fully described and claimed.

In the accompanying drawing forming a part of this specification, Figure 1 is a plan view of an arrangement of rolls for the practice of my invention, the rolls being shown in tandem but not necessarily in continuous relation to each other; Figs. 2, 3, 4, & 5 show the forms of passes in the rolls suitable for reducing the billet approximately to the finish size and shape. Fig. 6 shows a form of finishing pass. Fig. 7 illustrates in side elevation forms of separating and turning guides. Fig. 8 is an end view of the separating guide; Figs. 9 & 10 are end sectional views illustrating a form of guides for effecting the separation by the turning or twisting of the sections.

In the practice of my invention a billet of suitable size say 4x4 in cross section, although billets differing in dimensions therefrom can be reduced as hereinafter described, is subjected to reduction in three or more passes, in pairs of rolls A, B, & C whereby it is reduced in thickness, increased in width somewhat and elongated. In these passes, grooves or channels one, two or more, are formed by suitable collars 2 on the rolls, such channels or grooves being gradually increased in depth, thereby dividing the billet longitudinally into a series of two or more parts or sections *a*, *b*, *c*, etc., connected by webs 3. As soon as the billet has been reduced to a point where the several sections have been brought nearly to the desired shape and size in cross section, it is put through another pass in rolls D. The portions of the rolls D operative on the different sections, are so constructed and proportioned in accordance with rules known in the art, that alternate sections, as for example the section *b*, is subjected to such rolling action or reduction, that it will be elongated to a greater extent than the elongation produced in other sections *a* and *c*. It will be understood of course, that in lieu of subjecting the section *b* to the greater elongation, the sections *a* and *c* may be elongated to a greater extent than

b. In this pass the various sections are brought approximately to the final desired shape and dimensions in cross section, and by reason of the different elongation to which adjacent sections are subjected, the connecting webs 3 are ruptured or their strength reduced to such an extent that a divergence of the sections after passing from between the rolls will easily cause a separation of the sections. On the delivery side of the rolls D having this pass, I provide suitable guides whereby the relative positions of the sections as they come from the rolls are changed so as to insure by the strain put upon the web 3, a severance of the latter, in case a complete severance has not been effected by the elongation as stated. In the construction shown in Figs. 1, 7, & 8, these guides are provided with deflecting portions 4 and 5, so constructed and arranged that adjacent sections will be moved apart vertically, but it will be readily understood by those skilled in the art, that a lateral or axial movement may be imparted to the sections, thereby insuring a separation thereof. After being thus separated by the guides each section is passed separately through between suitably grooved rolls E etc., for bringing the article to the final or commercial shape. It will be generally necessary to subject the sections after separation to an edging pass. Hence twisting guides 6 are provided with means whereby the sections may be turned axially or on edge, such axial turning being in addition to the horizontal or vertical displacement of the sections.

In Figs. 9 and 10 a form of twisting guides is shown adapted to effect a separation of the sections by the axial movement thereof. This guide is provided with channels 7 which have their walls at the entering end, substantially parallel with the sides of the sections *a*, *b*, and *c*, as they come from the rolls D. These walls have a gradual twist toward the discharge end of the guides so that the sections will be turned through or approximately through an arc of ninety degrees, and in this turning the webs, weakened, if not ruptured in rolls D, will be completely severed.

It will be readily understood by those skilled in the art that the number of passes through which the sections are fed after separation will be dependent upon the transverse dimensions of the sections as they come from the rolls or passes D, and the transverse dimensions desired in the finished article.

I claim herein as my invention:

1. As an improvement in the art of rolling, the method herein described which consists in reducing or rolling down a billet or other large section, simultaneously forming two or more connected sections of smaller transverse dimensions, and finally causing an elongation of one of said smaller sections greater than that of adjacent sections and thereby partially or wholly rupturing the web between adjacent sections.

2. As an improvement in the art of rolling, the method herein described which consists in reducing or rolling down a billet or other large section and during such rolling progressively dividing the billet into two or more longitudinal, connected sections, causing a greater elongation to one of the sections than that of adjacent section and then causing adjacent sections to move transversely in respect to each other, and thereby rupturing the connection between adjacent sections.

3. As an improvement in the art of rolling, the method herein described which consists in reducing or rolling down a billet or other large section and during such rolling progressively dividing the billet into two or more longitudinal connected sections, causing a greater elongation to one of the sections than that of adjacent sections and then causing a separation of the sections transversely in respect to the line of feed of the billet, thereby rupturing such webs.

4. As an improvement in the art of rolling, the method herein described which consists in reducing or rolling down a billet or other large section, and during such rolling operation progressively dividing the billet into two or more longitudinal web-connected sections, causing an elongation of one of the sections greater than that imparted to adjacent section or sections, and then separating the sections by moving them transversely in respect to each other.

5. As an improvement in the art of rolling, the method herein described which consists in reducing or rolling down a billet or other large section, forming two or more web-connected sections and causing the metal of one or more of such sections to move longitudinally with reference to an adjacent section or sections, whereby the web connecting adjacent sections is wholly or partially ruptured.

6. As an improvement in the art of manufacturing bars, rods, etc., the method herein described which consists in partially dividing a billet or other section longitudinally and so rolling the billet as to cause the metal of one of the web connected sections to move longitudinally from point to point and progressively with reference to an adjacent section whereby the connecting web is wholly or partially ruptured.

7. As an improvement in the art of manufacturing bars, rods, etc., the method herein described which consists in partially dividing a billet or other section longitudinally, causing the metal of one of the web-connected sections to move longitudinally with refer-

ence to an adjacent section and then causing one of the sections to move transversely of the other section.

8. As an improvement in the art of rolling, the method herein described which consists in reducing or rolling a billet or other large section and during such reduction forming and progressively deepening a groove or grooves thereby dividing the billet into two or more web-connected sections arranged in a common plane, and tearing or rupturing such sections apart by causing them to move in diverging lines during their discharge from the last billet reducing pass.

In testimony whereof, I have hereunto set my hand.

WILLIS McKEE.

Witnesses:
L. J. BOOTHROYD,
HARRY W. RAY.