

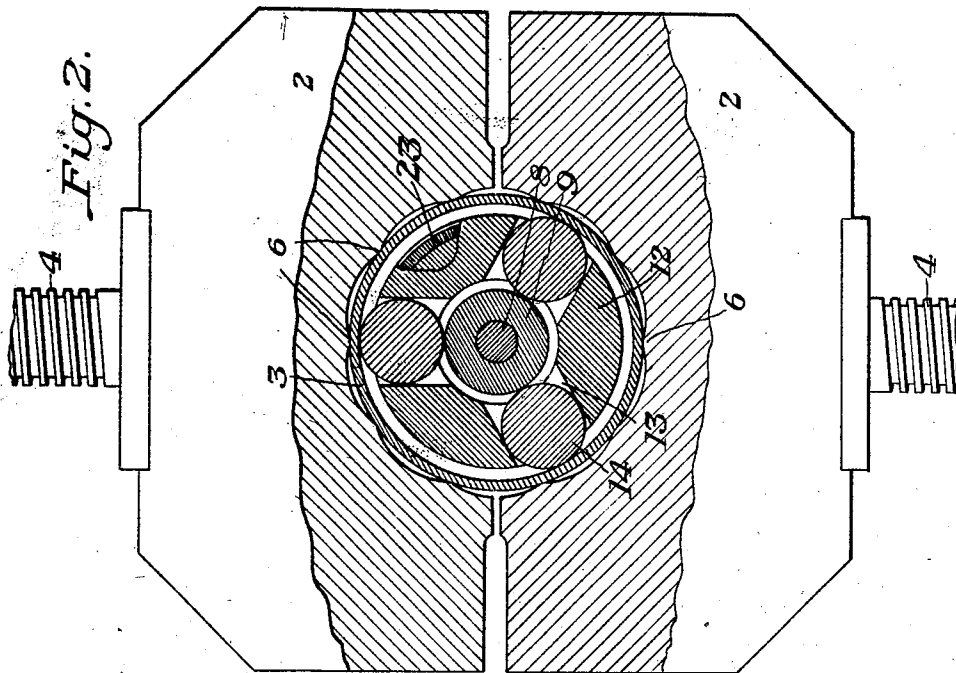
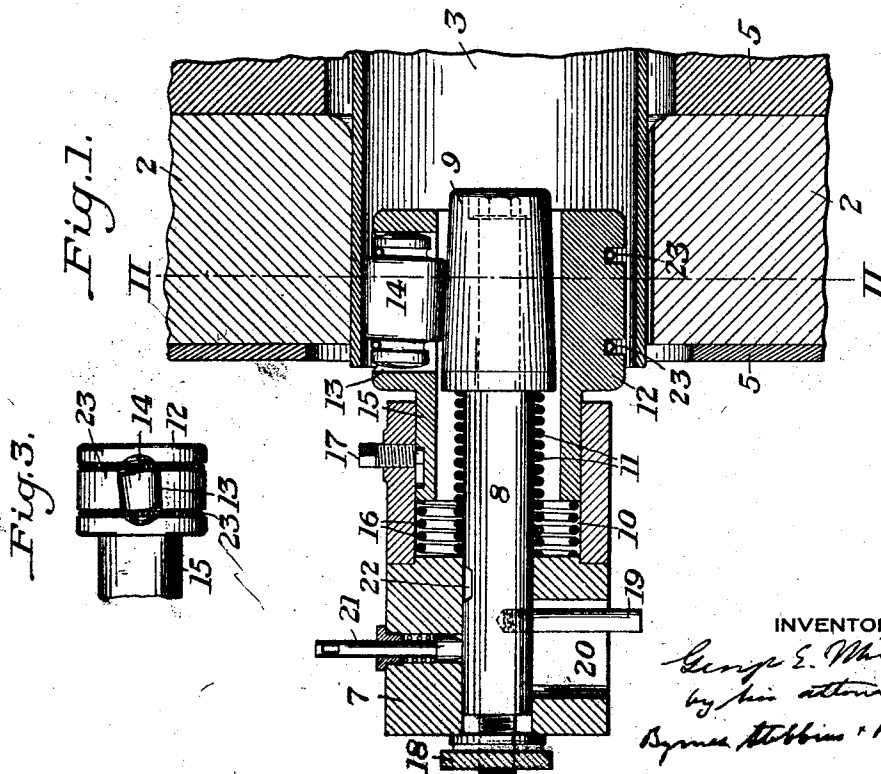
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G. E. MIRFIELD

METHOD AND APPARATUS FOR ROUNDING

Filed July 11, 1922



INVENTOR

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# UNITED STATES PATENT OFFICE.

GEORGE E. MIRFIELD, OF YOUNGSTOWN, OHIO.

## METHOD AND APPARATUS FOR ROUNDING.

Application filed July 11, 1922. Serial No. 574,184.

*To all whom it may concern:*

Be it known that I, GEORGE E. MIRFIELD, a citizen of the United States, and residing at Youngstown, county of Mahoning, and State of Ohio, have invented a new and useful Improvement in Method and Apparatus for Rounding, of which the following is a full, clear, and exact description.

The present invention relates broadly to metal bending, and more particularly to a method and apparatus for rounding circular objects, such as pipes and the like.

It has heretofore been customary in the art to which the present invention relates to expand and round pipes and similar objects by supporting the same between members adapted to encircle and engage the major portion of the periphery thereof and then subject the interior of the pipe to an expanding operation. This is in the nature of a spinning operation, but has not proven altogether satisfactory due to the difficulty of producing an accurately rounded finished product.

I have discovered that the difficulties which have heretofore been encountered in this particular art may be obviated by modifying the construction of the supporting members in such manner as to permit flexing of the walls of the pipe during the rounding operation.

In the accompanying drawings, there is shown for purposes of illustration only one embodiment of my invention, it being understood that the drawings do not define the limits of my invention and that changes may be made in the construction and operation disclosed herein without departing from the spirit of my invention or scope of my broader claims. In the drawings,

Figure 1 is a longitudinal sectional view through a portion of a pipe to be rounded, the supporting members and the expander;

Figure 2 is a transverse sectional view on the line II—II of Figure 1, and

Figure 3 is a top plan view of the expander.

In the illustrated embodiment of my invention, there is disclosed a pair of opposed supporting members 2 adapted to engage and extend around substantially the entire circumference of the object to be rounded. These supporting members may conveniently be moved toward and away from the surface of the pipe 3 to be rounded by screw downs 4 of any well known construc-

tion, and the members may be guided by providing suitable plates 5 between which they are movable.

It has heretofore been customary to provide such supporting members with a uniformly curved supporting surface having a curvature either corresponding to or slightly greater than the curvature of the outer surface of the article to be rounded. In accordance with the present invention, however, the supporting surfaces of the members 2 are each provided with a series of spaced engaging portions 6, preferably providing line contacts, whereby the pipe or other article being operated upon will be gripped at a plurality of circumferentially spaced points, thereby permitting flexing of the walls of the article between the points of support.

For exerting an expanding action on the article being rounded 1 I may provide a rotary traveling expanding device comprising a head 7 having extending therethrough a stem 8 carrying at its outer end the tapered mandrel 9. The head 7 may be formed in any convenient manner to provide a recess 10 within which may be mounted a compression spring 11 tending at all times to move the mandrel 9 to the right as viewed in Figure 1.

Cooperating with the mandrel 9 and extending therearound is a carrier 12 having formed therein a series of radially extending openings 13 each adapted to receive an expanding roller 14. The longitudinal axes of the openings 13 preferably extend at an angle to the longitudinal axis of the stem 8, as clearly shown in Figure 3. Due to this construction, it will be apparent that the rollers 14 also extend at a similar angle. The carrier 12 may be formed with a reduced hub portion 15 adapted to extend into the recess 10 and be engaged by a second compression spring 16 located therein. The carrier may be held against removal by providing a set screw or other similar means 17 for engaging the hub portion thereof.

The amount of movement imparted to the mandrel 9 by the action of the spring 11 may be regulated by providing a suitable adjusting nut 18 on the stem 8. For withdrawing the mandrel against the action of the spring 11 there may be provided an operating pin 19 extending through a slot 20 in the head and permitting the stem and mandrel to be bodily moved longitudinally

with respect to the head. The parts may be held in this restricted position by providing a suitable latch 21 adapted to engage a recess 22 in the stem.

5 In operation, after the rollers 14 have been inserted in position within the carrier 12 they may be held therein by means of circumferentially extending elastic tension devices 23. The entire expander may then  
10 be longitudinally moved into the end of the pipe or other article to be rounded and relative rotation between the expander and said article may be produced in any desired manner. In some cases it will be apparent  
15 that it will be desirable to rotate the supporting members and the article 3 relatively to the expander while in other cases it will be desirable to maintain the supporting members stationary and rotate the expander  
20 within the article being operated upon. In either of these cases, the rollers 14 will tend to move into the end of the article due to the angular extension of their axes, and will exert a gradually increasing and de-  
25 creasing pressure successively on successive portions of the article being rounded. During this operation, the rollers will also be expanded outwardly against the inner surface of the article by the action of the  
30 tapered mandrel 9, and during the relative rotation will tend to flex the walls of the article between the spaced points of support. This provides for the requisite movement of said walls and enables an accurately  
35 ly rounded product to be formed.

It will be apparent to those skilled in the art that the present invention lends itself admirably to use with pipe cutting, rounding and threading machines of standard  
40 constructions and enables the ends of the pipes to be rounded before the threading operation occurs.

The advantages of the present invention arise from the provision of means for and  
45 the method of supporting the article to be rounded at a plurality of spaced points whereby flexing of the walls thereof may take place.

I claim:

50 1. In the method of rounding hollow articles, the steps consisting in initially holding the article at independent points, and then bending successive portions of the wall of the article in a radial direction be-  
55 tween said points to round the same, substantially as described.

2. In the method of rounding a hollow article, the steps consisting in providing a plurality of spaced line contacts with the  
60 surface of the article and then subjecting the wall of the article between the lines of support to a succession of substantially uniform bending pressures to round the same, substantially as described.

65 3. In the method of rounding a hollow

article, the steps consisting in initially holding the article at separated points of uniform characteristics to permit flexing of its walls between said points, and then flex-  
70 ing the walls of the article between the points at which it is held to round the article, substantially as described.

4. In the method of rounding a hollow metal article, the steps consisting in initial-  
75 ly holding the article at a plurality of spaced points and applying rounding pressure to flex the wall of the article between the points of support without causing it to conform to the contour of the holding means, substantially as described. 80

5. In the method of rounding a pipe, the steps consisting in supporting the pipe at a plurality of circumferentially spaced points, and subjecting the walls of the pipe  
85 between the points of support to a succession of substantially uniform bending pressures to round the same, substantially as described.

6. In the method of rounding a pipe, the steps consisting in initially holding the pipe  
90 at a plurality of circumferentially spaced points, applying a bending pressure to the walls of the article in opposition to the pressure of the holding points to flex the walls of the article between said points,  
95 and producing a relative rotational movement between the article and the pressure exerting means, substantially as described.

7. In the method of rounding a pipe, the steps consisting in initially holding the pipe  
100 at a plurality of circumferentially spaced points, and applying a succession of bending pressures to the walls of the article in opposition to the pressure of the holding points to flex the walls of the article be-  
105 tween said points, substantially as described.

8. In an apparatus for rounding metal articles, means for supporting the article to be rounded at a plurality of spaced points,  
110 and means for successively flexing the walls of the pipe intermediate the points of support to round the same, substantially as described.

9. In an apparatus for rounding metal articles, means for supporting the article at a plurality of points effective radially there-  
115 of, and means for gradually flexing the walls of the pipe to round the same by subjecting the walls to gradually increasing and decreasing pressures, substantially as described. 120

10. In an apparatus for rounding cylindrical articles, means for supporting the article in a plurality of radial planes, and  
125 means for successively flexing the walls of the article between different points of support, substantially as described.

11. In an apparatus for rounding cylindrical articles, means providing a plurality  
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of spaced line contacts for the article and means for successively flexing the wall of the article between different contacts, substantially as described.

5 12. In an apparatus for rounding pipe, means for supporting the pipe to permit flexing of the walls thereof, and means exerting a gradually increasing and then decreasing pressure in opposition to said supporting means for flexing said walls, substantially as described.

10 13. In an apparatus for rounding pipe, means providing a plurality of spaced pipe supporting portions permitting flexing of the walls of the pipe therebetween, and expanding means adapted to exert flexing pressure at separated points in opposition to said supporting means, and means for producing relative rotational movement between the pipe and said last mentioned means, substantially as described.

15 14. In an apparatus for rounding pipe, a plurality of pipe supporting members each having a plurality of spaced pipe engaging portions formed thereon, and means for successively flexing the walls of the pipe intermediate successive points of support, substantially as described.

20 15. A pipe supporting means comprising a supporting member having a plurality of supporting means sufficiently spaced to permit flexing therebetween of a wall of a pipe supported thereby and means gradually ef-

fective from one supporting means to the next for flexing the pipe walls, substantially as described.

16. Supporting means for articles to be rounded, comprising opposed supporting members each having a plurality of wall engaging means sufficiently spaced to permit flexing therebetween of a wall of a pipe supported thereby and means for successively engaging adjacent portions of a supported article, substantially as described.

17. In the method of rounding metal articles, the steps consisting of substantially uniformly supporting the article and then successively flexing different portions of the walls thereof, substantially as described.

18. In the method of rounding hollow articles, the steps consisting of substantially uniformly supporting the article and then successively and substantially uniformly flexing successive portions of the walls thereof, substantially as described.

19. In the method of rounding pipes, the steps consisting of supporting a pipe to permit flexing of portions of the wall of the pipe between definitely located supporting and pipe engaging means, and then successively flexing said portions, substantially as described.

In testimony whereof I have hereunto set my hand.

GEORGE E. MIRFIELD.