L. C. SCHNEIDER.

METHOD OF COILING PIPE.

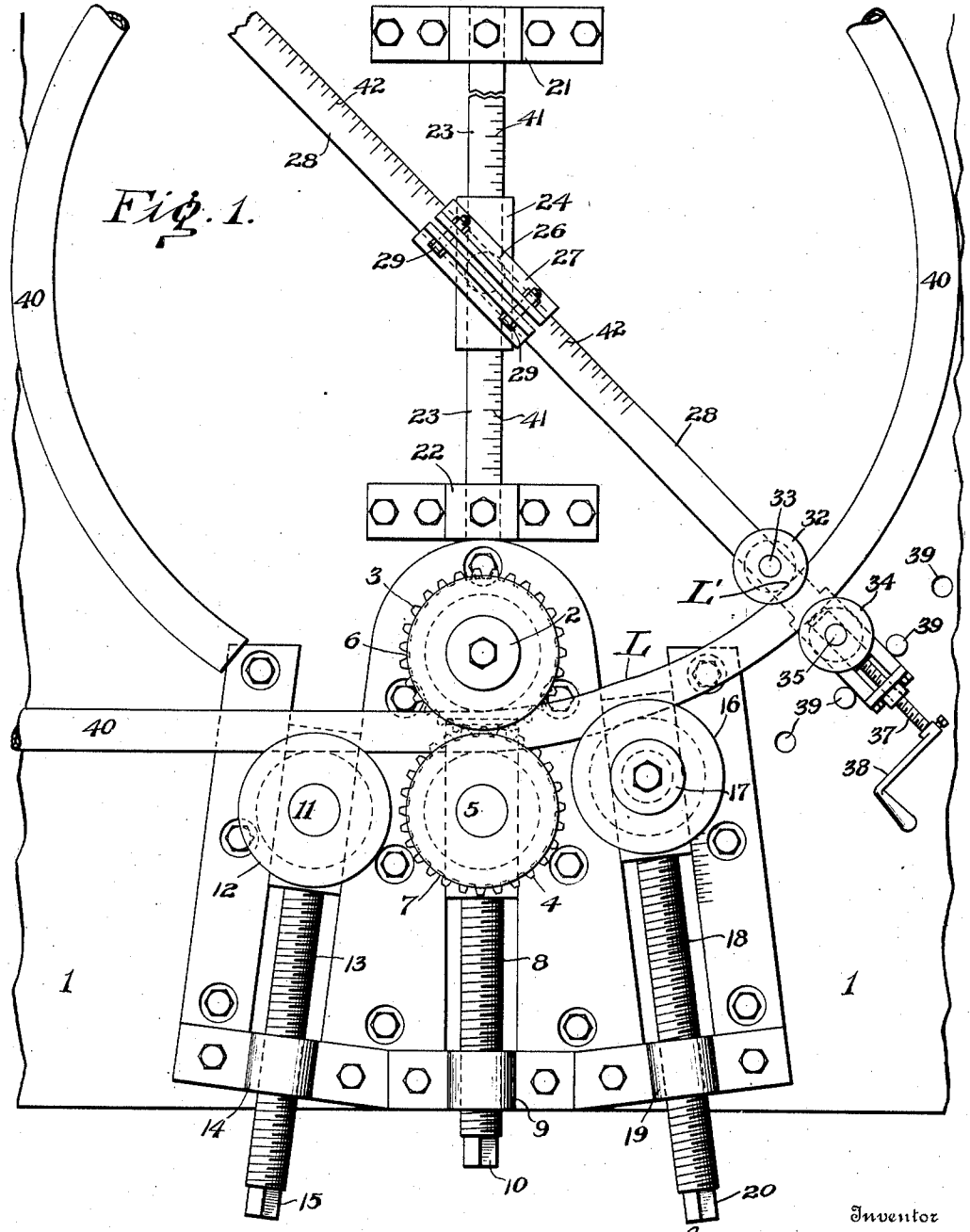
APPLICATION FILED AUG. 21, 1908.

928,073.

Patented July 13, 1909.

2 SHEETS—SHEET 1.

Fig. 1.




Witnesses

Daniel Webster, Jr.

G. F. Dobson

Inventor

Leopold C. Schneider

By Cornelius D. Ehret

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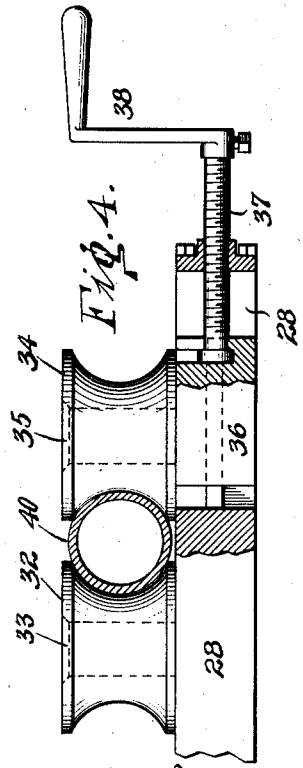



Fig. 4.

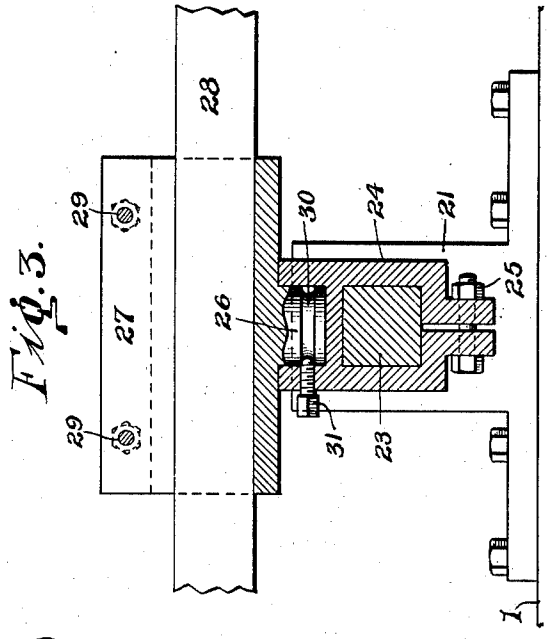



Fig. 3.

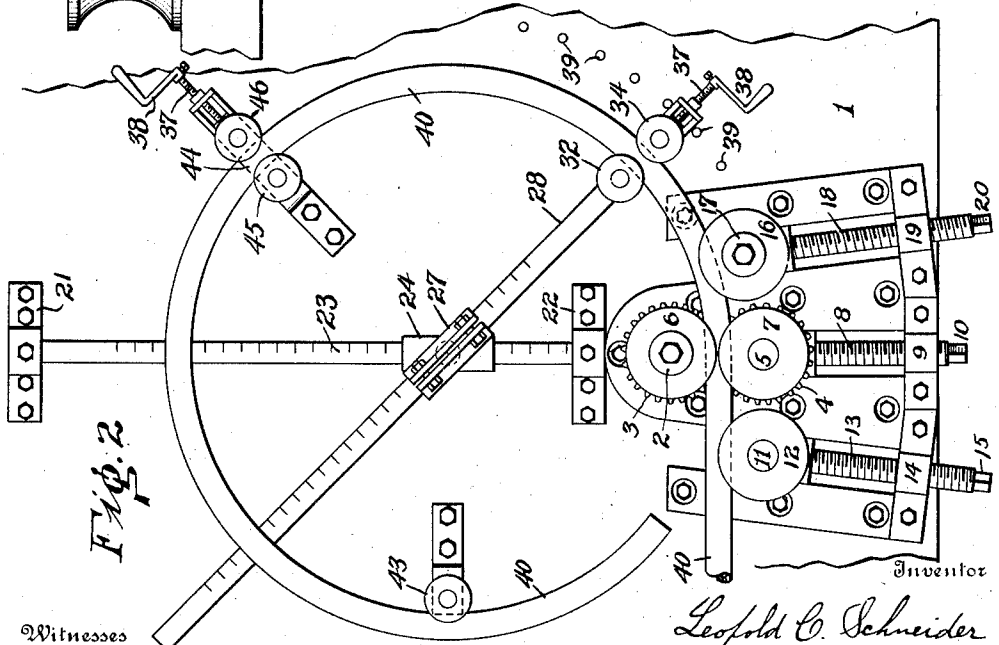



Fig. 2.

Witnesses

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# UNITED STATES PATENT OFFICE.

LEOPOLD C. SCHNEIDER, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO THE PHILADELPHIA PIPE BENDING COMPANY, A CORPORATION OF NEW JERSEY.

## METHOD OF COILING PIPE.

No. 928,073. Specification of Letters Patent. Patented July 13, 1909.

Application filed August 21, 1908. Serial No. 449,626.

*To all whom it may concern:*

Be it known that I, LEOPOLD C. SCHNEIDER, a citizen of the United States, residing in the city and county of Philadelphia, State of Pennsylvania, have invented new and useful Improvements in Methods of Coiling Pipe, of which the following is a specification.

My invention relates to improvements in a method for coiling or bending pipes or rods, composed of metal such as wrought iron or other materials, and particularly to cold bending or coiling.

Pipes, rods or other articles of wrought iron or other material are ununiform, as bought in the open market, in hardness, thickness, or in other regards, and in coiling them in the old way and by the old apparatus, uniformity of bending, coiling, etc. is not attained because of this lack of uniformity in the stock material.

It is the object of my invention to produce bends or coils uniform in curvature or shape irrespective of this lack of uniformity in the material to be bent or coiled.

I have found that by operating upon the pipes or rods in such manner as to cause them to tend to form a coil of a diameter less than the desired finished diameter, and then in the same operation continuously operating upon them in opposite direction to cause them to form a coil of desired diameter, the coil of desired diameter when so formed is perfectly uniform irrespective of the lack of uniformity in the stock material.

My invention resides, therefore, in the method which consists in overbending the rods or pipes and then bending them back to the desired shape or curvature.

My invention resides also in other features hereinafter described and claimed.

For an explanation of my method and for an illustration of one of the forms my apparatus may take for carrying out my method, reference is to be had to the accompanying drawings in which:

Figure 1 is a fragmentary plan view of a bending or coiling machine. Fig. 2 is a fragmentary plan view of my improved coiling or bending machine showing further attachments. Fig. 3 is a view partly in elevation, partly in section, showing the means for adjusting and holding the auxiliary back bending means. Fig. 4 is a vertical elevation, partly in section, of the back bending means.

Referring to the drawings: A base plate 1, of iron or other suitable material, has mounted thereon a vertical spindle 2 driven by an electric motor, belt or other suitable source of power. Secured to this spindle 2 is the gear 3 which meshes with and drives the gear 4 mounted upon the spindle 5. Carried by the spindles 2 and 5 respectively are the rollers 6 and 7 having concave rims to receive the pipe, rod, or other stock, as well understood in the art. The gear 4 and roller 7, mounted upon the spindle 5, are adjustable toward and away from the gear 3 and roller 6 by the screw 8 operating in the bracket 9, and square-headed at 10 to receive a wrench or the like. Upon the spindle 11 is mounted a roller 12, also of concave rim and slidable inwardly and outwardly under the control of the adjusting screw 13 operating in bracket 14 and having the squared head 15, and on the other side of the rollers 6 and 7 is a roller 16, also having a concave rim, mounted upon the spindle 17 and adjustable inwardly and outwardly by the screw 18 operating in bracket 19 and square-headed at 20.

The brackets 21 and 22, bolted to the base plate 1, are alined with each other and support and secure the bar 23 which may be of square or other suitable cross section. Movable along the bar 23 is the clamp 24 which may be clamped securely to the bar 23 at any desirable position. As seen in Fig. 3, the clamp 24 embraces the bar 23 and may be clamped snugly thereto by tightening the bolt 25. The top of the clamp 24 is recessed to receive the cylindrical pin or pivot 26 secured to or integral with the clamp 27 which embraces the bar 28 which may be snugly clamped thereto by the bolts 29. The pivot 26 has an annular groove 30 in which may engage the end of the screw 31 threaded in the bracket 24, thus preventing the clamp 27 from lifting out of or away from the clamp 24. By this pivotal connection between the clamps they may each be adjusted to different positions with respect to their respective bars 23 and 28 and the bar 28 may be adjusted to dif-

ferent angular positions with respect to the bar 23.

Upon the bar 28 is mounted the roller 32, having a concave rim, and mounted upon the spindle 33 carried by the rod 28. Beyond the roller 32 is a similar roller 34, mounted upon a spindle or pin 35 carried by the block 36 which is slidable inwardly and outwardly on the bar 28 by means of the screw 39 provided with the hand crank 38, as seen in detail in Fig. 4.

In the base plate 1 are provided a plurality of holes as 39, in which may be placed a pin or pins to prevent the rod 28 from rotating about the pivot 26 during operation.

The operation is as follows: The pipe, rod or other stock 40 is fed in from the left, as viewed in Fig. 1, between the rollers 6 and 7, and lies against the roller 12. Due to friction and the power delivered through the spindle 2, the stock 40 is drawn toward the right and engages in the concave periphery of the roller 16. This roller is set in, by screw 18, a sufficient distance to cause the pipe to coil or bend, as well understood in the art. This preliminary coiling or bending is, in effect, local overbending or coiling, as indicated at L. Assuming that it is desired to produce a bend or coil of a diameter of say three feet, the roller 16 is set in far enough to overbend or overcoil the stock so as to tend to form a bend or coil of a diameter of less than three feet. The pipe or stock 40 is, however, guided between the rollers 32 and 34 which are set out far enough to determine a coil or bend of three feet diameter, the operation being a local bending back again after leaving roller 16 from the lesser diameter to the greater or finish diameter of three feet. This back bending or back coiling is accomplished locally in the region indicated by $L^1$. By this overbending and bending back again, the bend or coil will take the desired finish diameter and the diameter will be uniform, whereas, by merely setting the roller 16 in to a point to produce a three foot bend or coil, the finished bend or coil will not be uniformly of three feet diameter but will vary considerably due to the lack of uniformity in the properties and qualities of the stock.

It will be noted that by my method or process the overbending or overcoiling and the bending back or coiling back is accomplished within less than a complete turn or coil and, indeed, within a small fraction of a complete bend or coil, as the preferred method. Thus, the overbending or overcoiling is accomplished at roller 16 and immediately thereafter, within a fraction of a complete turn of the coil, at rollers 32 and 34, the bending back or coiling back is accomplished.

The bars 23 and 28 may have suitable graduations, such as 41 and 42, by which the position of the rolls 32 and 34 with respect to the other rolls may be accurately determined. Thus the distance of the center of the pin 26 from the axis of the stock 40 as it passes between the rolls 6 and 7 may be made the same or different from the distance between the center of the pin 26 and the axis of the stock 40 as it passes between the rolls 32 and 34.

From the foregoing description of the operation of my apparatus, my process is also understood. My improvement resides in overbending or overcoiling the stock and then bending it out again to the desired finish diameter, and as explained by this process a practically uniform bend or coil can be produced notwithstanding the lack of uniformity in the properties or qualities of the stock at various points throughout its length. I have found that by this method and apparatus, the capacity of the machine is very greatly increased, so that while a uniform bend or coil is produced it is made at far less cost than heretofore.

While I have shown two rollers 32 and 34 for the bending back operation, it is to be understood that the roller 34 may be omitted, though the presence of the second roller 34 is preferable.

In Fig. 2 the parts illustrated are the same as in Fig. 1 except that upon the base plate 1 there may be provided a single roll idler 43 or the double roll idler 44 having the two rolls 45 and 46, the latter adjustable by a screw 37 and hand crank 38. It is to be understood also that the idlers, whether single or double roll, may be multiplied in number.

While the advantages of my process and apparatus are available to the bending of stock in heated condition, it is particularly adaptable to the cold bending or coiling of pipes, rods and other stock.

What I claim is:

1. As an improvement in the art of coiling pipe while cold, the method which consists in continuously locally operating upon the pipe to cause the same to tend to take a diameter less than the desired finish diameter, and then continuously locally operating upon the pipe in opposite direction to cause the same to take the desired finish and uniform diameter.

2. As an improvement in the art of coiling metal pipe or rod, the method which consists in first continuously bending the pipe or rod to a curvature tending to form a coil of diameter other than finish diameter, and then, before a complete coil convolution or turn is formed, continuously bending the pipe or rod to a different curvature to form a coil of desired diameter.

3. As an improvement in the art of cold

coiling pipe, the method which consists in continuously overbending the pipe to a curvature sharper than the desired finish curvature tending to form a coil of less diameter than the finish diameter, and then, before a coil is formed, bending the pipe in opposite direction to finish curvature and forming a coil of uniform curvature.

4. As an improvement in the art of coiling pipe while cold, the method which consists in continuously coiling the pipe to a curvature sharper than the finish curvature, and then, before the completion of a convolution or turn of the coil, continuously bending the pipe in opposite direction to cause the same to take desired uniform curvature.

5. As an improvement in the art of coiling rod or pipe while cold, the method which consists in continuously overbending the pipe or rod to cause the same to tend to form a coil, and then, before the completion of a convolution or turn of the coil, continuously bending the pipe or rod back again to form an uniform coil of desired curvature.

6. As an improvement in the art of coiling pipe or rod while cold, the method which consists in continuously feeding the pipe or rod and continuously overbending the same, tending to form a coil of less diameter than the desired finish diameter, and then, before the completion of a convolution or turn of the coil, continuously bending the pipe or rod in opposite direction to desired finish diameter while continuously fed to form an uniform coil.

7. As an improvement in the art of coiling pipe or rod while cold, the method which consists in continuously feeding the pipe or rod and continuously overbending the same tending to form a coil of a diameter less than the desired finish diameter, and then, during said continuous feeding and before a convolution is formed, continuously bending said pipe or rod in opposite direction to form an uniform coil.

8. As an improvement in the art of coiling pipe or rod while cold, the method which consists in continuously feeding the rod or pipe and continuously roller bending the same to a curvature sharper than the desired finish curvature, and then, while continuously fed, roller bending said pipe or rod back in opposite direction to form an uniform coil.

9. As an improvement in the art of coiling pipe or rod while cold, the method which consists in continuously feeding the pipe or rod and continuously roller bending the same tending to form a coil of a diameter less than the desired finish diameter, and then, before the completion of a convolution or turn of the coil, roller bending the pipe or rod in opposite direction to desired finish curvature to form an uniform coil.

10. As an improvement in the art of coiling pipe, the method which consists in continuously locally bending the pipe so that it tends to take a curvature sharper than the desired finish curvature, and then, before the completion of a convolution or turn of the coil, continuously locally bending the pipe in opposite direction to form an uniform coil of desired curvature.

11. As an improvement in the art of coiling pipe or rod while cold, the method which consists in continuously feeding the pipe or rod and continuously locally overbending the same, tending to form a coil of less diameter than the desired finish diameter, and then, before the completion of a convolution or turn of the coil, continuously locally bending the pipe or rod in opposite direction to form a coil of desired curvature.

12. As an improvement in the art of coiling pipe while cold, the method which consists in continuously feeding the pipe, continuously operating locally upon said pipe while continuously fed to cause the same to tend to take a curvature other than desired curvature, and then, while simultaneously continuously fed, continuously operating locally upon the pipe to cause the same to take another curvature to form an uniform coil.

13. As an improvement in the art of coiling pipe while cold, the method which consists in continuously feeding the pipe, continuously operating upon the pipe by roller bending action to cause the pipe to tend to form a coil of other than desired diameter, and then, while simultaneously continuously fed, continuously operating upon the pipe by roller bending action to cause the pipe to form a coil of desired and uniform diameter.

14. As an improvement in the art of coiling pipe while cold, the method which consists in continuously feeding the pipe, continuously operating upon the pipe to cause the same to tend to form a coil of less than desired diameter, and then, while continuously fed, operating upon the pipe in opposite direction to cause the same to form a coil of desired and uniform diameter, both said operations upon the pipe occurring within a relatively short length thereof.

In testimony whereof I have hereunto affixed my signature in the presence of the two subscribing witnesses.

LEOPOLD C. SCHNEIDER.

In the presence of—
T. G. PHINNY,
G. M. HARDEN.