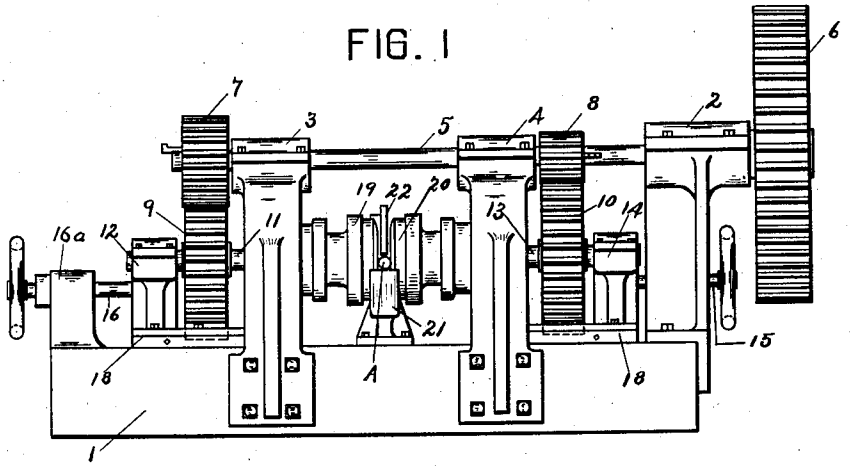
May 24, 1927. 1,629,759

G. A. WISE

STRAIGHTENING MACHINE

Filed Dec. 9, 1925 3 Sheets-Sheet 1

FIG. 1



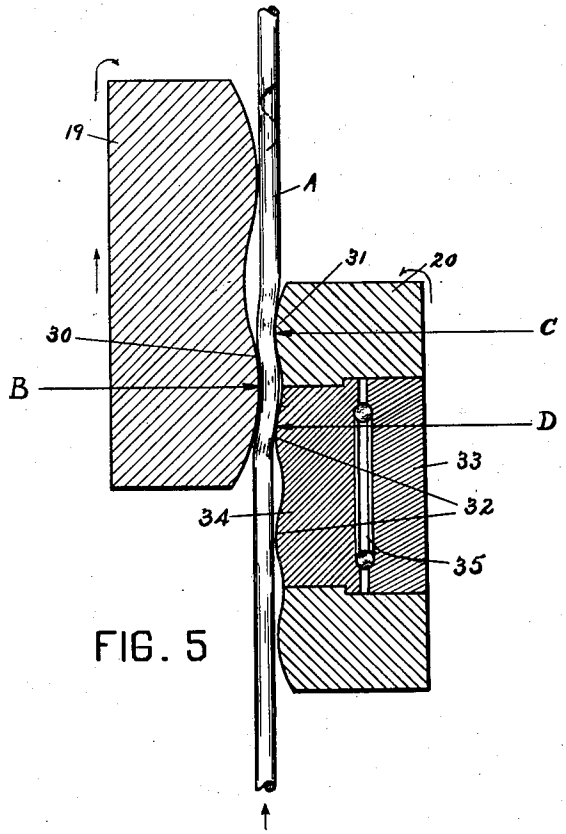


FIG. 5

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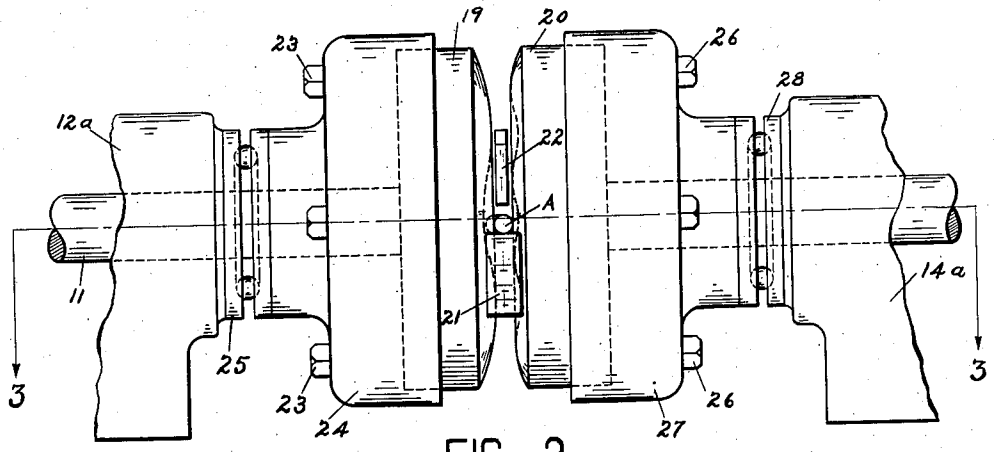


FIG. 2

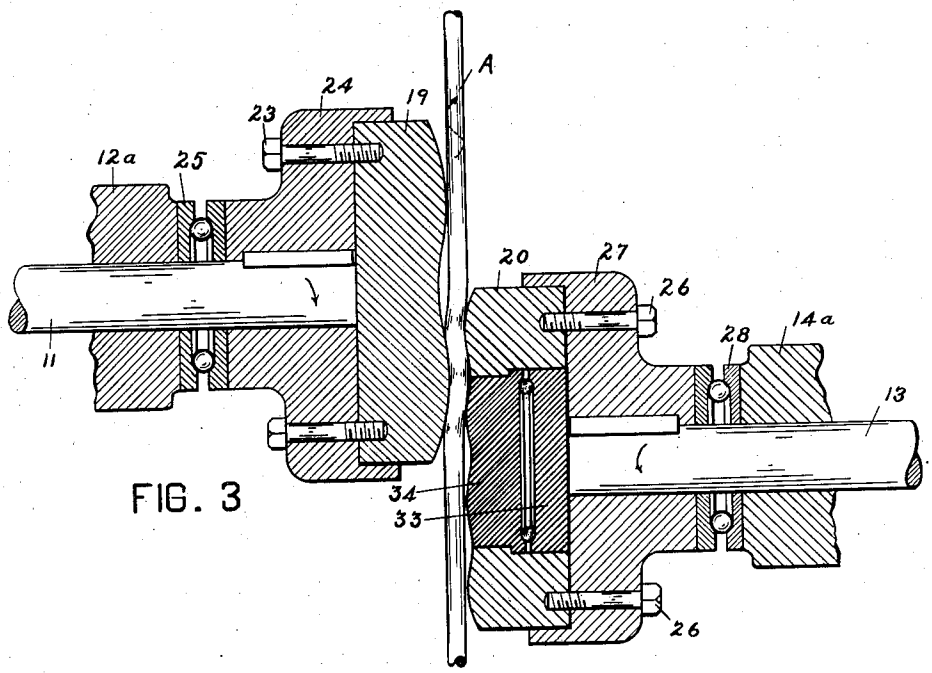


FIG. 3

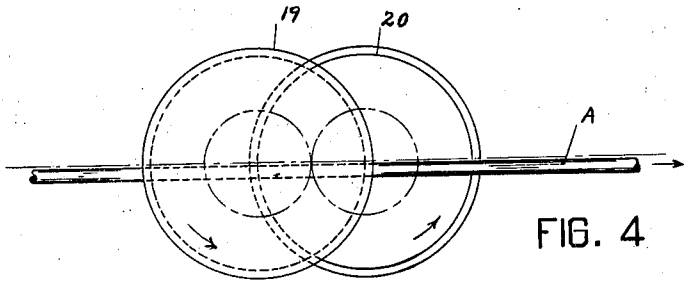


FIG. 4

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STRAIGHTENING MACHINE

Filed Dec. 9, 1925 3 Sheets-Sheet 3

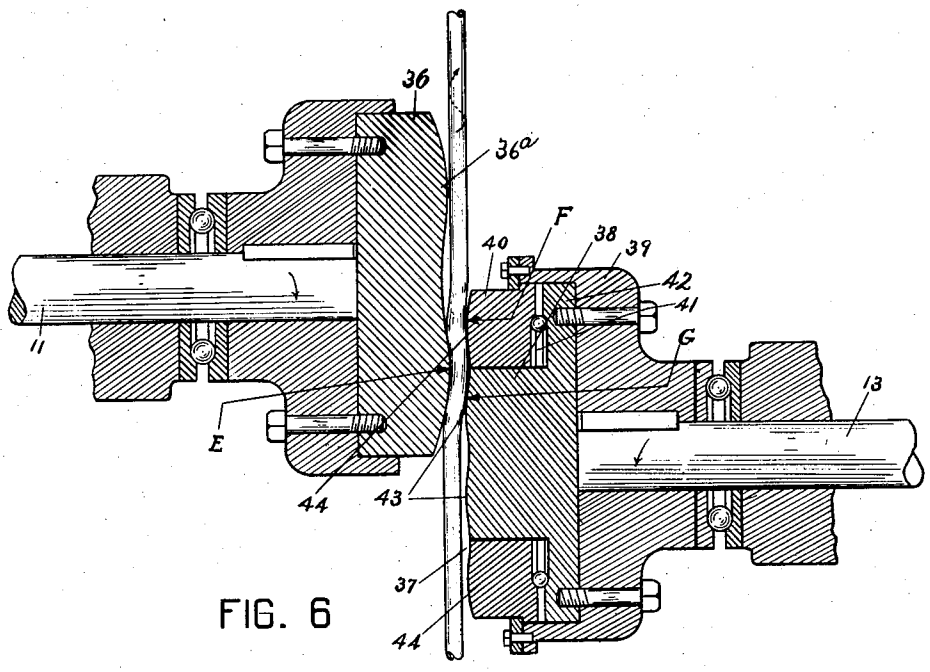


FIG. 6

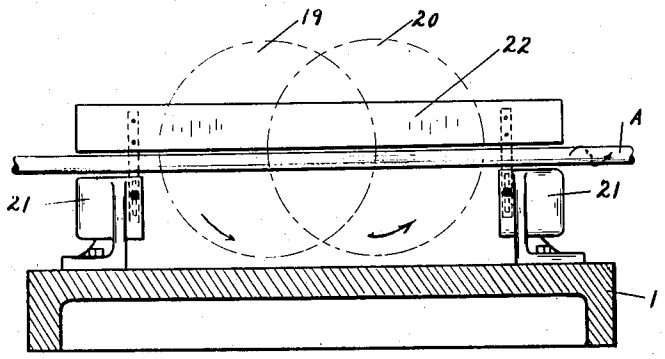


FIG. 7

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Patented May 24, 1927. 1,629,759

UNITED STATES PATENT OFFICE.

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STRAIGHTENING MACHINE.

Application filed December 9, 1925. Serial No. 74,320.

This invention relates to a disk type straightening machine. In disk type straighteners for stock such as rods, bars, or wires of a round or polygonal cross section it is desirable that the cooperating straightening disks together provide three areas for deflection, so that the bar is acted upon by three cooperating deflecting points during its passage between the disks. With a single deflecting area providing points of deflection on the contoured base of each of two cooperating disks, the linear speed of the disks at these two points of deflection may be made equal by a regulation of their angular velocity. With two fixed deflecting areas on the face of one of the disks, however, regulation of the relative angular velocity of the disks does not serve to equalize the linear speed at all three points of deflection.

The disadvantage of such inequality in linear speed at different points of deflection, is that it causes a drag on the bar, producing surface marking or even relatively deep scrolling of the stock.

One object of the invention is to provide a disk type straightening machine for stock such as rods, bars, or wires, in which the faces of the cooperating disks are so contoured as to provide areas giving three points of deflection for the stock.

Another object of the invention is to provide a straightening machine in which the contoured faces of the cooperating disks are so arranged that the linear speed at all three points of deflection may be equalized.

More generally stated, the object of the invention is to provide a disk type straightening machine which will act on stock such as rods, bars, or wires, to straighten the same, without producing scrolling or any surface marking of the stock.

In the accompanying drawings Figure 1 is a side elevation of the completed straightening machine of the present invention; Figure 2 is a fragmentary side elevation of the straightening disks, their housings, and associated parts of the mechanism; Figure 3 is a horizontal sectional view on the line 3—3 Figure 2; Figure 4 is a diagrammatic view illustrating the relative position of the disks and the direction of their rotation; Figure 5 is a fragmentary horizontal sectional view through the cooperating face of the disks, illustrating the passage of the stock therethrough, and indicating specifically the various points of deflection; Figure 6 is a horizontal sectional view illustrating a modified form of one of the disks; and Figure 7 is a detail elevation of the means for supporting and guiding the stock in its passage through the machine.

In the drawings the reference numeral 1 designates the bed of the machine, on which are a plurality of housings 2, 3, and 4, having therein bearings for the main shaft 5. The main shaft 5 carries a driving gear 6 for connection with any suitable source of power, and pinions 7 and 8 meshing respectively with gears 9 and 10. The gear 9 is mounted on a shaft 11, which has bearings in housing 12 and in a similar housing 12^a. The gear 10 is mounted on a shaft 13, which has bearings in the housing 14 and in a like housing 14^a. Passing through the endmost housing 2 is an adjusting screw 15, which engages with the small housing 14. Similarly, an adjusting screw 16 engages with the small housing 12 and bracket 16^a. Each small housing 12, 12^a, 14, and 14^a has a sliding engagement 18 with the bed 1 of the machine so it may be moved longitudinally thereon; the housings 12^a and 14^a being behind housings 2 and 3 in the view of Figure 1.

The cooperating straightening disks 19 and 20 are carried respectively by the shafts 11 and 13. The distance separating these disks may be regulated by means of the adjusting screws 15 and 16, which serve to adjust the longitudinal position of both disk assemblies. On the bed 1, adjacent the space between the faces of disks 19 and 20, are tables 21 for supporting the stock A in its passage between the disks. Extending into the space between the disks is a guide plate 22 for limiting upward movement of the stock.

Disk 19 is secured by suitable means such as bolts 23 in the disk holder 24 which is keyed to the shaft 11. A thrust bearing 25 is interposed between the disk holder 24 and the housing 12^a. Similarly disk 20 is secured by means of bolts 26 or the like to a

disk holder 27 keyed to the shaft 13. A thrust bearing 28 is interposed between disk holder 27 and the housing 14a.

In use of the machine the relative mutual position of the disk faces is regulated by means of the adjusting screws 15 and 16 in accordance with the diameter of the stock which is to be straightened, the machine is actuated, and the stock passed between the cooperating faces of the disks. During such passage the stock is positioned by the tables 21 and the guide plate 22.

It will be noted that the tables 21 and guide plate 22 are so positioned with respect to the faces of the disks that the longitudinal center line of the stock lies below the central point of the disks. The disk faces thus exert a thrust on the stock to produce longitudinal travel in the direction shown. If the longitudinal center line of the stock were disposed above the center line of the stock, the longitudinal thrust, and direction of longitudinal travel, would be opposite to that shown. If the longitudinal center line of the stock were to lie exactly along the central points of the disks, the stock would merely rotate on its own axis without being advanced in either direction.

As appears from Figures 1 and 2 of the drawings, the disks 19 and 20 are mounted in the same horizontal plane, but as shown in Figures 3, 4, and 5 of the drawings are mounted out of alignment therein. On the face of disk 19 is a single circular deflecting ridge or area 30, which provides a continuous line of deflecting points for the stock A. The face of the disk 20 is formed with such contour as to provide a circular ridge or deflecting area 31 giving a continuous line of deflecting points for the stock.

In Figure 5 of the drawings these deflecting points B and C are particularly indicated. It will be noted that the deflecting point C of the disk 19 is further from the axis of such disk than is the deflecting point B on the disk 19. The natural result of this arrangement is to produce a difference in linear speed between the areas 30 and 31, the linear speed at any point of deflection B being greater than at any point of deflection C. In order to compensate for this inherent discrepancy, the pinion 7 which drives the gear 19 actuating the shaft 11 on which the disk 19 is mounted is made smaller with respect to the gear 9 than is the pinion 8 with respect to the gear 10 on shaft 13 which carries the disk 20. The relative size of each cooperative pinion and gear, and the relative distance of each of the deflecting ridges from the axis of the disk on the face of which it occurs are mutually so proportioned as to produce an equal linear speed at these two deflecting points in use of the machine. That is, the angular velocity of the shaft 11 is sufficiently less than the angular velocity of the shaft 13 to compensate for the greater distance of deflecting ridge 31 from the axis of the disk 19 than the distance of the deflecting ridge 30 from the axis of the disk 20.

The face of disk 20 is also provided, however, with a second deflecting ridge 32 giving a line of points to contact the stock at the point D. If this deflecting ridge were formed on the face of an integral disk, it would be impossible to render the linear speed of this deflecting area at the point D equal to the linear speed of the deflecting areas 30 and 31 at the points B and C. For this purpose of the disk 20 is cored, and has in the rearward portion thereof a backing plate 33 and a freely rotatable central disk member 34, which has on its face the deflecting ridge 32 concentric with the deflecting ridge 31 on the face of the main disk member. Interposed between backing plate 33 and disk member 34 is a thrust bearing 35. Disk member 34 is thus free to rotate at such angular velocity that the linear speed at its contact point D is equal to the linear speed at the contacts B and C. The angular velocity of disk member 34 is obviously produced by its contact with the stock A.

At any instant during the passage of the stock through the machine, it is in contact with deflecting points C and D on the ridges 31 and 32, and with deflecting point B on the ridge 30. The bar is flexed by the cooperation of the deflecting areas at the points B, C, and D, so that a double straightening twist is imparted to the bar in its passage through this deflecting area. It will be noted that the point of contact B is intermediate the points of contact C and D, thus giving the desired opposition for flexing the bar.

Figure 6 of the drawings illustrates a modification in the form of the special disk of the machine. As shown, a disk 36, having a single deflecting ridge 36a, takes the place of the exactly similar disk 19 shown in the preceding figures of the drawings. The disk 37, which takes the place of the disk 20, is however of modified form.

Disk 37, as shown, comprises a central portion 38, which bears against and is secured directly to the backing frame or disk holder 39. Concentric with this central portion 38 is an annular portion 40, which is free to rotate with respect to the central portion and the backing member 39. Roller bearings 41 are provided between the annular portion 40 and an annular flange 42 on the central member 38. On the face of portion 38 is an annular ridge 43, providing a line of deflecting points; and on the annular portion 40 is a concentric ridge 44 which also provides a line of deflecting points.

As shown in Figure 6, the disks are so arranged that any deflecting point E along

the ridge 36ª is intermediate any points F and G on the ridges 43 and 44.

The effect of the modified form of disk shown in Figure 6 is substantially similar to that of the form of disk shown in the preceding figures of the drawings. It will be readily understood, however, that with this modified disk 37, the opposing disk 36, which carries a single ridge, should be geared to rotate at the higher speed. This is because its deflecting ridge 36ª is closer to the axis of rotation than is the ridge 44 on the annular portion 40 of disk 37.

Incidentally to the straightening effect obtained, the action of the disks serves to exert a cleaning and polishing effect, known in the art as a "reeling" effect, on stock passed through the machine. A finer finish is given the stock by use of a disk having a free portion, because such structure reduces drag along the faces of the disks.

It will be obvious to one skilled in the art to which the invention pertains that the equalization of linear speed at all deflecting points avoids any drag on the bar during its passage through the machine, thus avoiding undesired marking and scrolling which would otherwise occur.

What I claim is:

1. In a straightening and reeling machine for bars and the like, the combination of two cooperating disks, the face of one disk having thereon two circular concentric deflecting ridges for contacting the stock and the face of the other disk having thereon a single circular deflecting ridge, the disks being mutually so mounted and arranged that the single deflecting ridge on one face contacts the stock intermediate the points of contact with the stock by the two deflecting ridges on the other disk.

2. In a straightening and reeling machine for bars and the like, the combination of two cooperating disks, the face of one disk having thereon two circular concentric deflecting ridges and the face of the other disk having thereon a single circular deflecting ridge, shafts for rotatably supporting said disks, mounting means, and bearings for the shafts in said mounting means mutually so arranged that the single deflecting ridge on one of the disks contacts the stock intermediate the points of contact with the stock by the two deflecting ridges on the other disk.

3. A deflecting disk for use in a straightening and reeling machine for bars and the like, comprising a body portion having a raised deflecting area thereon, and a floating portion having a raised deflecting area thereon, said floating portion being rotatably mounted in said body portion.

4. A disk for use in a straightening and reeling machine for bars and the like, comprising a body member having on the face thereof a circular ridge providing deflecting points for the stock, and a member freely rotatable on the body member and having on the face thereof a circular deflecting ridge concentric with that on the body member.

5. A disk for use in a straightening and reeling machine for bars and the like, comprising an annular body member, and a central member freely rotatable on said annular body member, each of said members being provided with a raised area arranged to provide deflecting points for the stock.

6. A disk for use in a straightening and reeling machine for bars and the like, comprising a body member having on the face thereof a circular ridge providing deflecting points for the stock, and a member mounted on said body member for free rotation relatively thereto and having on its face a circular ridge concentric with that on the body member.

7. A disk for use in a straightening and reeling machine for bars and the like, comprising an annular body member, and a central member freely rotatable on said annular body member, each of said members having on the face thereof a continuous ridge providing deflecting points for the stock.

8. In a straightening and reeling machine for bars and the like, the combination of a deflecting disk having a single deflecting ridge on the face thereof, a cooperating deflecting disk having two portions each provided with a deflecting ridge, said disks being relatively so mounted that the linear speed along the single ridge of one disk is equal to the linear speed along one ridge of the disk having two deflecting ridges, and a portion having thereon the second ridge of the latter disk mounted for free rotation relatively to the other portion thereof.

9. In a machine for straightening and reeling bars and the like, the combination of two deflecting disks each having on the contoured face thereof a circular ridge providing points of deflection for the stock, rotatable shafts carrying said disks, the ridges on the two disks being at different radial distances from the axis of the shaft of each disk, means for rotating the shafts at such relative speeds that the linear speed at the two deflecting ridges is equal, and an additional deflecting ridge on one of the disks concentric with the other ridge thereon.

10. In a machine for straightening and reeling bars and the like, the combination of two deflecting disks each having on the contoured face thereof a circular ridge providing points of deflection for the stock, rotatable shafts carrying said disks, the ridges on the two disks being at different radial distances from the axis of the shaft of each disk, one of said disks having a portion freely rotatable on the remainder of the disk, and a second deflecting ridge

on said freely rotatable portion concentric with the other deflecting ridge of the disk.

11. In a machine for straightening and reeling bars and the like, the combination of two cooperating disks, shafts carrying said disks, and bearings for said shafts disposed out of mutual alinement with each other, each of said disks comprising a portion fixed to its shaft and a portion concentric therewith mounted for free rotation with respect to the shaft and the fixed portion of the disk.

12. In a machine for straightening and reeling bars and the like, the combination of two cooperating disks, shafts carrying said disks, and bearings for said shafts disposed out of alinement with each other, one of said disks comprising a portion fixed to its shaft, and a portion concentric therewith mounted for free rotation with respect to the shaft and the fixed portion of the disk.

13. In a machine for straightening and reeling bars and the like, the combination of two cooperating disks, shafts carrying said disks, and bearings for said shafts disposed out of alinement with each other, one of said disks comprising an annular portion fixed to the shaft, and a central portion mounted for free rotation with respect to the shaft and the annular portion of the disk.

14. An element for use in a machine for straightening and reeling bars and the like, comprising the combination of a shaft, and a disk comprising a portion fixed to the shaft to rotate therewith, and a portion concentric with said fixed portion and mounted for free rotation with respect to the shaft and the other portion of the disk.

15. An element for use in a machine for straightening and reeling bars and the like, comprising the combination of a shaft, and a disk comprising an annular portion fixed to the shaft, and a central portion mounted for free rotation with respect to the shaft and the annular portion of the disk.

16. An element for use in a machine for straightening and reeling bars and the like, comprising the combination of a shaft, a disk comprising a portion fixed to the shaft and a portion concentric with said fixed portion and mounted for free rotation with respect to the shaft and the fixed portion of the disk, and a circular deflecting ridge on each of said disk portions.

17. An element for use in a machine for straightening and reeling bars and the like, comprising the combination of a shaft, a disk comprising an annular portion fixed to the shaft and a central portion mounted for free rotation with respect to the shaft and the annular portion of the disk, and a circular deflecting ridge on each of said disk portions.

In witness whereof, I hereunto set my hand.

GEORGE A. WISE.