C. TOBER.

ROLLING MILL GUIDING APPLIANCE FOR WIRE, STRIP METAL, &c.

APPLICATION FILED JULY 27, 1909.

989,731. Patented Apr. 18, 1911.

3 SHEETS—SHEET 1.

Fig. 1.

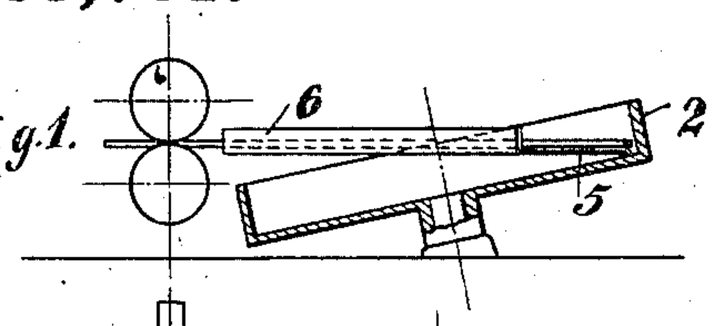


Fig. 3.

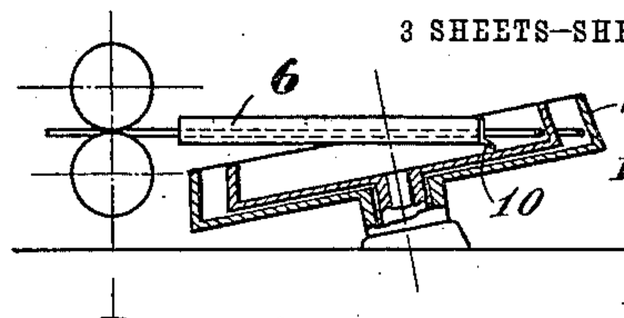


Fig. 2.

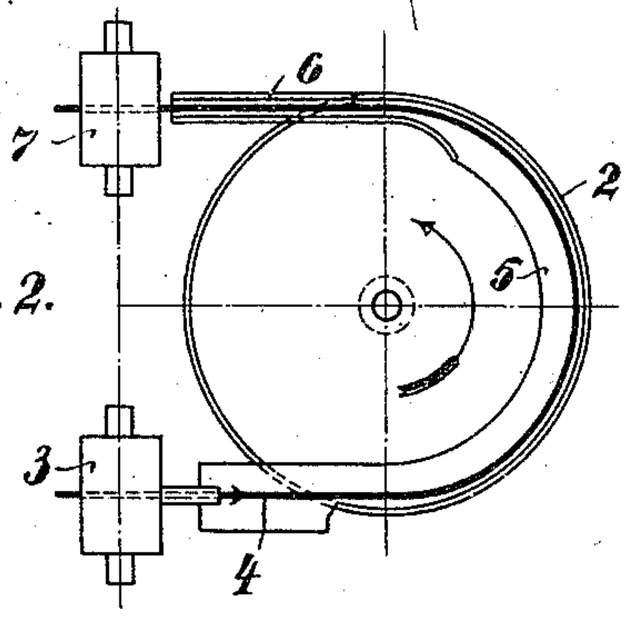


Fig. 4.

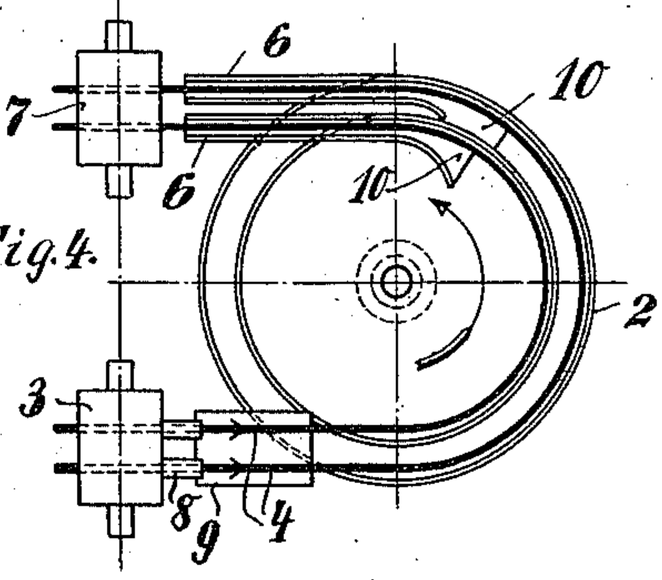


Fig. 5.

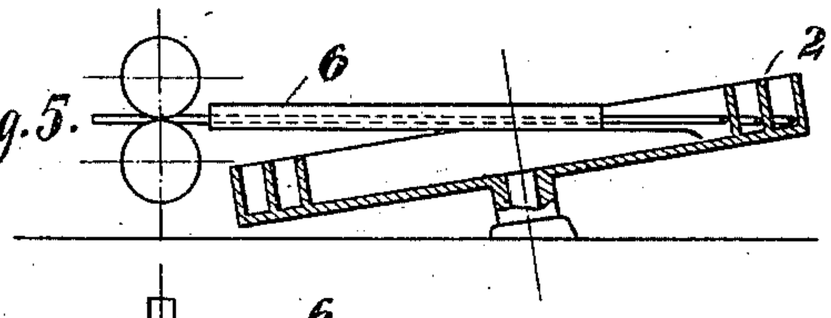


Fig. 7.

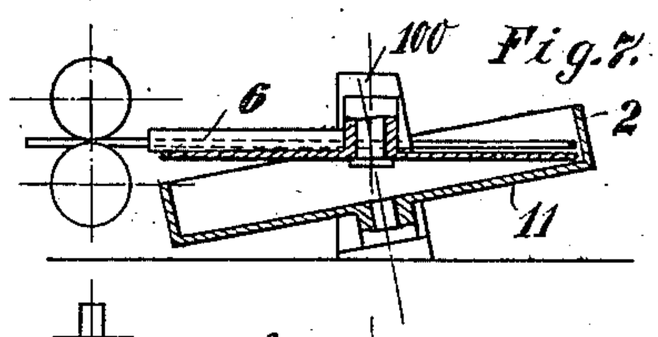


Fig. 6.

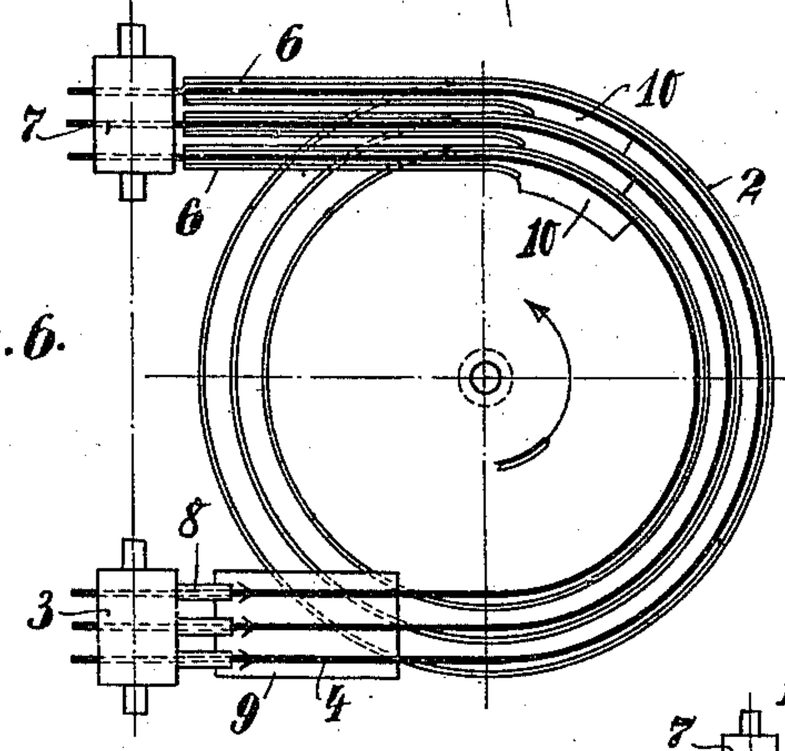


Fig. 8.

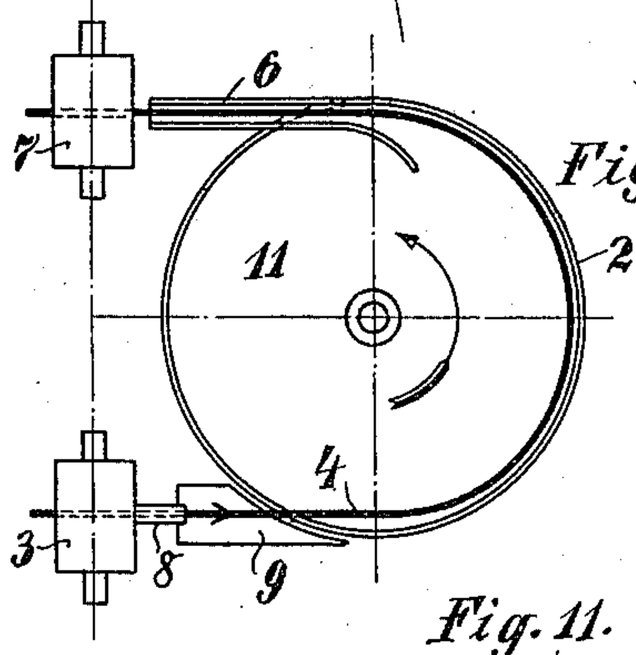


Fig. 11.

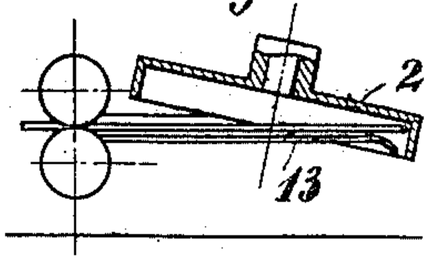


Fig. 10.

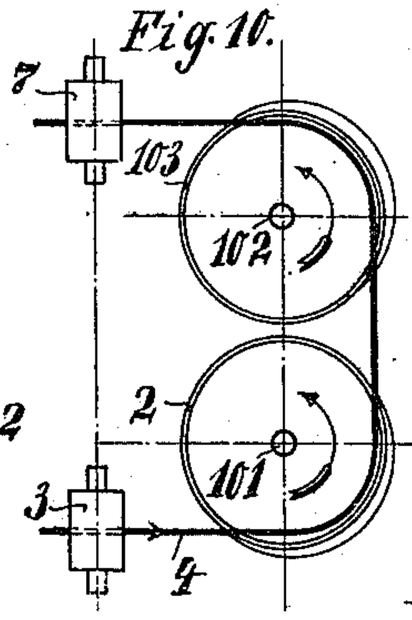


Fig. 9.

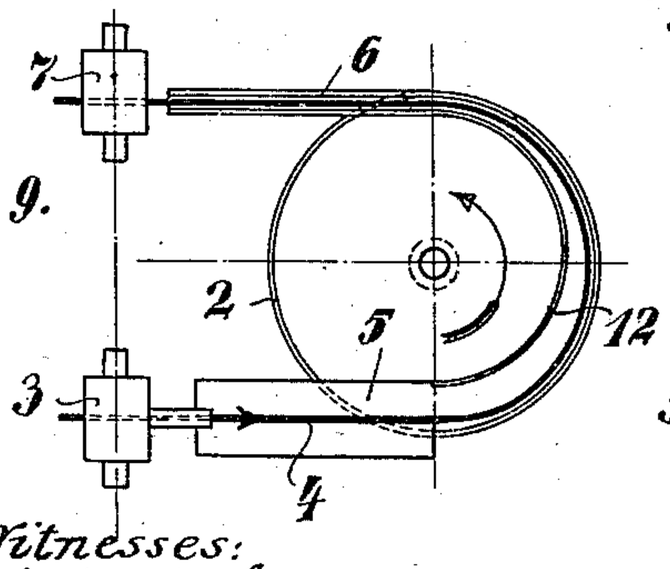
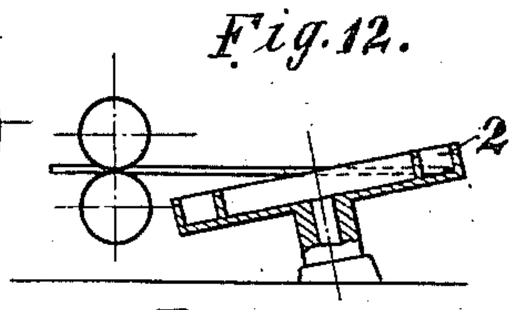


Fig. 12.



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3 SHEETS—SHEET 2.

Fig. 13.

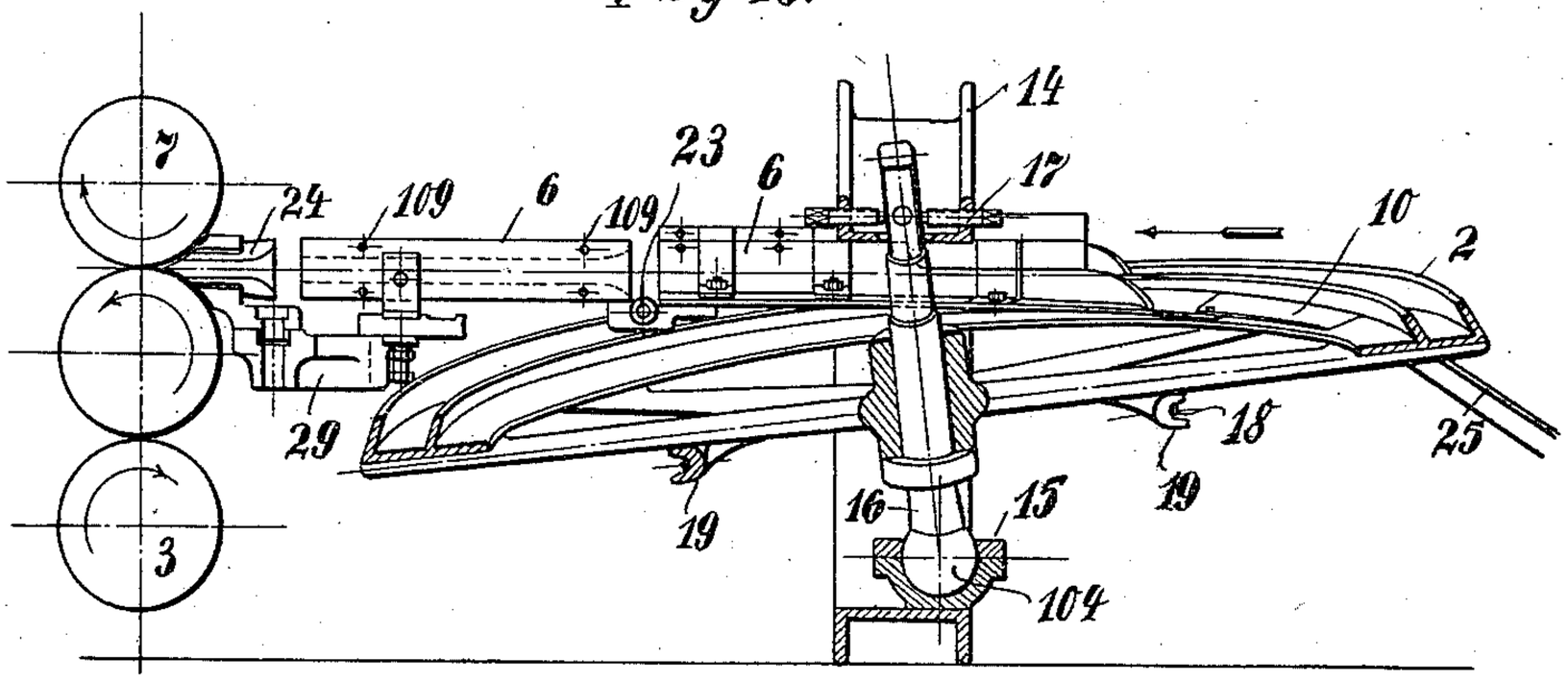
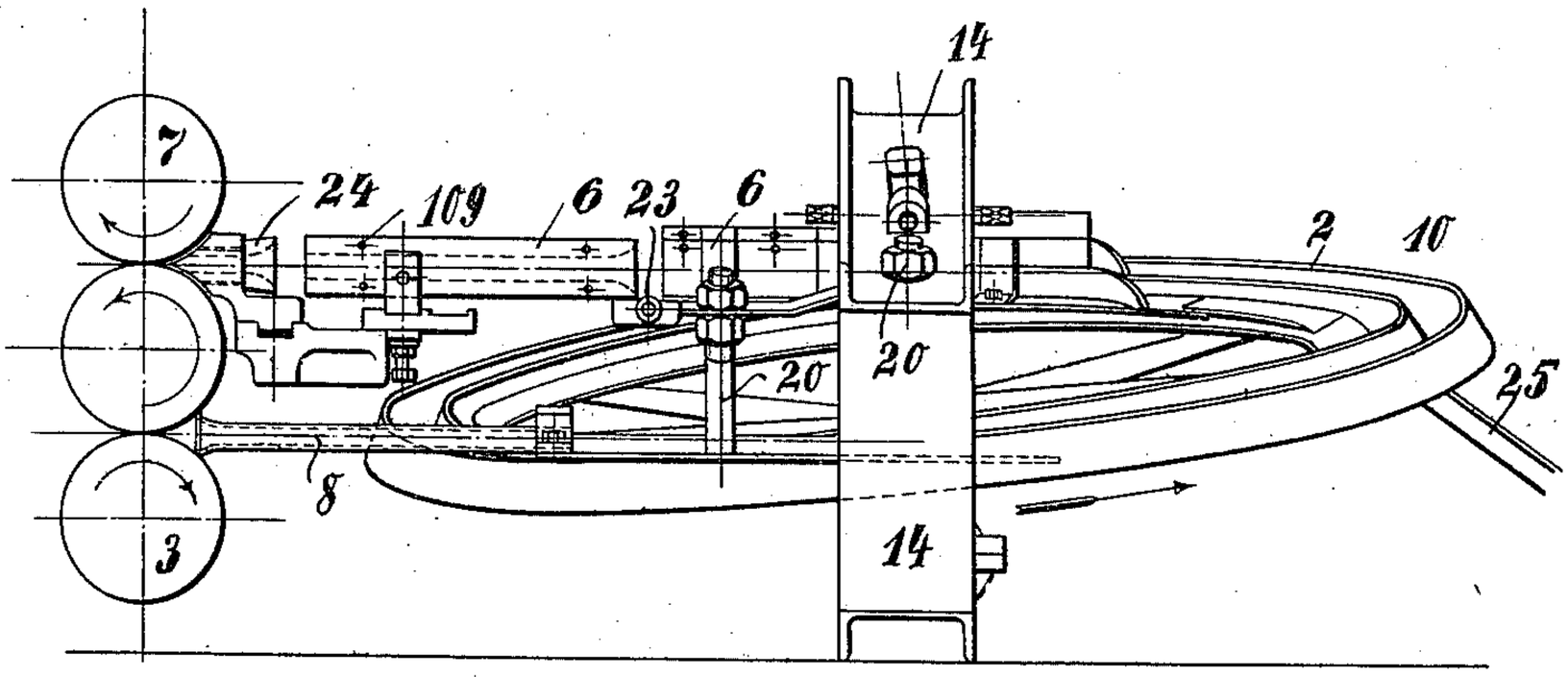


Fig. 14.



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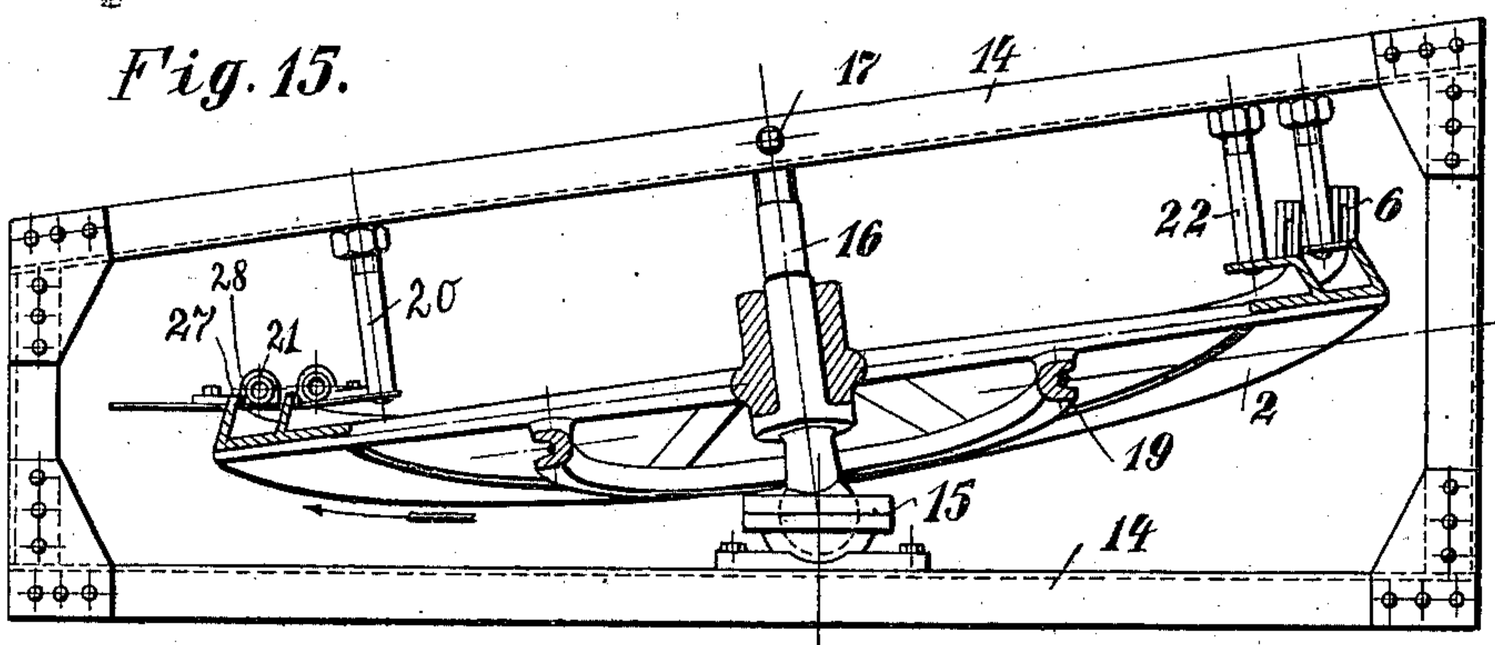
3 SHEETS—SHEET 3.

Fig. 15.



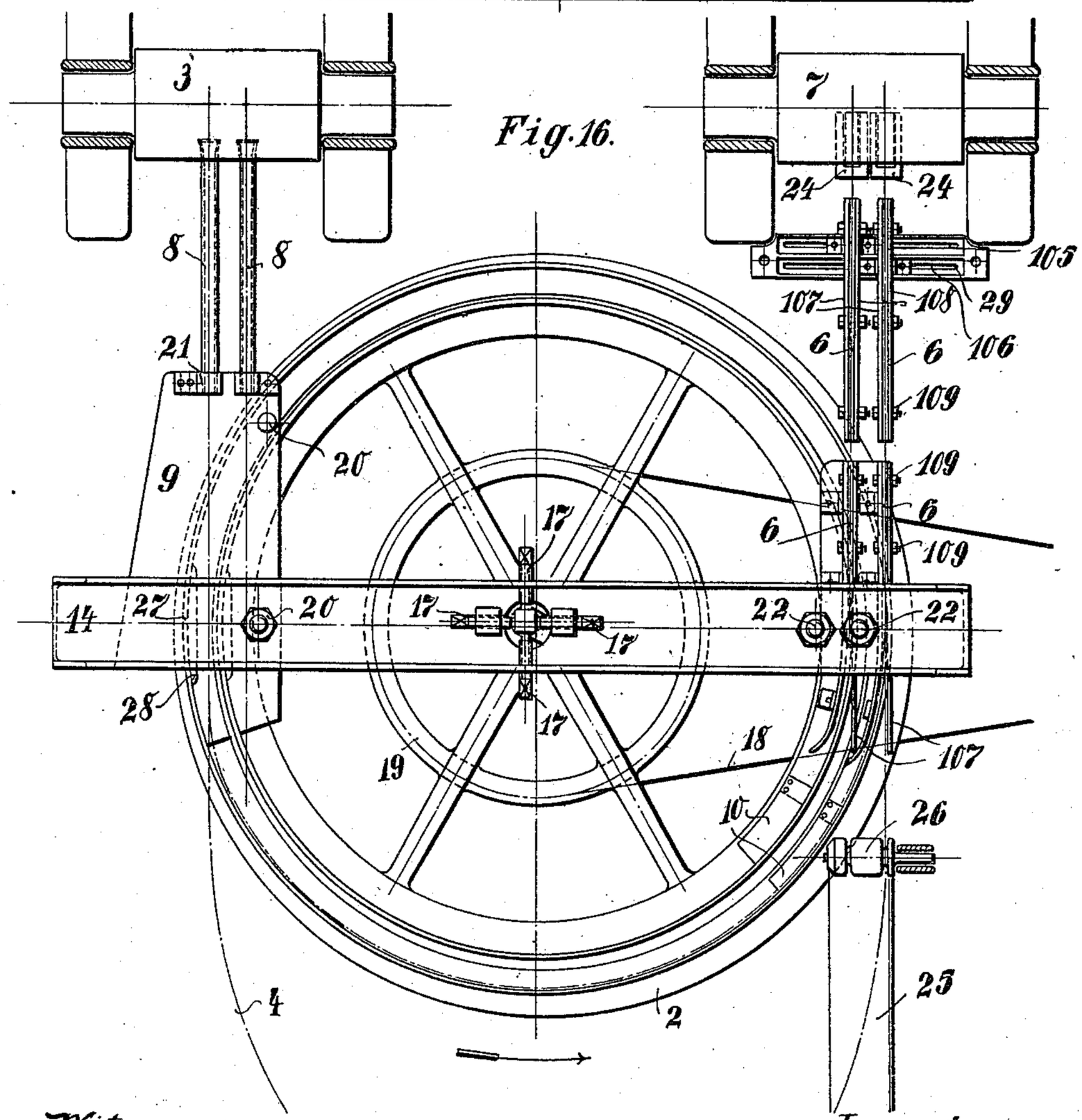


Fig. 16.

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UNITED STATES PATENT OFFICE

CARL TOBER, OF OBERSCHÖNEWEIDE, GERMANY.

ROLLING-MILL GUIDING APPLIANCE FOR WIRE, STRIP METAL, &c.

989,731. Specification of Letters Patent. Patented Apr. 18, 1911.

Application filed July 27, 1909. Serial No. 509,937.

To all whom it may concern:

Be it known that I, CARL TOBER, engineer, a subject of the German Emperor, King of Prussia, and a resident of Oberschöneweide, Province of Brandenburg, Kingdom of Prussia, German Empire, have invented new and useful Improvements in Rolling-Mill Guiding Appliances for Wire, Strip Metal, and the Like, of which the following is a specification.

The present invention refers to a means for guiding automatically wire strip metal and the like.

It is old to roll wire and the like from a rod down to about five millimeters in diameter whereby the material when going through the process of rolling obtains alternately square and oval (or rhombical) section. For reasons of convenience the wire or material of oval section is always placed upon its longest diameter that is to say in an upright position when passing through the rolls. When finishing the process of rolling it is desirable to use some suitable contrivance to reconduct or return the wire to rolls without in any way having to do this by hand. For this latter purpose grooves were hitherto employed open at the top but it was found that this arrangement could only be used with wire of square or round section and that with oval section material it was still necessary for the workmen to place same into the next pair of rolls by hand. From points of economy and to avoid the dangers of handling hot wire or material it has also been arranged to guide the said material by means of revolving disks in such way that the material coming from the rolls was received upon or by the outer side of a disk which had a projecting lower edge and served to take the material along such a disk being assisted in this operation by convenient devices such as small rollers, clips, grips, and the like which pressed and held the material against the circumference of said disk and so helped in the guiding of the material along to the next succeeding pair of rolls. In place of the before mentioned mechanical devices such as rollers, clips and grips it is also old to hold the material to the disk by means of magnetic devices but here the said mechanical devices could not be dispensed with altogether. At the same time the necessity for a special fastening device was always looked upon as a considerable hindrance or objection and this no doubt has been the reason that such a device has not been put to practical use. The fastening device was inconvenient and greatly prevented the wire curving into a bow or bowing which is always known to take place in the process of rolling because when using uniform speed the one pair of rolls cannot use up so much material as is guided to them by the adjoining pair of rolls. The magnetic devices were very often known to fail because wires of copper or brass could not be held thereby and often iron and steel wires placed obstacles in the way on account of the increased temperature. Another disadvantage of the usual guiding arrangement was that several wires could not be guided at one operation.

According to this invention which is designed to overcome the difficulties aforesaid, the material is not guided in grooves upon the periphery of a disk or wheel, but contacts with the inner annular wall of a ring, against which the material presses, and travels by reason of the movement imparted thereto by rolls or the like, or it may be aided in its progress toward the next pair of rolls by independently driving the said ring.

It will be found useful to place the guiding ring in a slanting position so that the material can enter and leave same without any additional guidance.

By the description hereinafter appearing with reference to the annexed drawings several arrangements according to the invention will be made clear the drawings being for the most part diagrammatic.

Figure 1 is an elevation in section of a simple guiding device and Fig. 2 is a plan of Fig. 1. Figs. 3 and 4 show a sectional elevation and a plan of the same device Figs. 1 and 2 but with two rings one inside the other, for the guiding of two wires. Figs. 5 and 6 the same of a guiding device with 3 guiding rings for 3 wires, Figs. 7 and 8 show a sectional elevation and a plan of a modification with an inner rotating feeding disk in the guiding ring, Fig. 9 is a plan of the same device as Figs. 1 and 2 but with a long guiding groove, Fig. 10 is a plan of a modification with two guiding rings, Fig. 11 is an elevation in section where the guiding ring is inverted or turned upside down. Fig. 12 shows an elevation in section of a guiding device with two flanges for two wires, Fig. 13 shows an elevation of the de-

vice in section as it is actually used for two wires with two guiding rings, and Fig. 14 the same in perspective, Fig. 15 is a sectional view in a plane at right angles to that of Fig. 13, and Fig. 16 is a top plan view of the same.

By the simple arrangement in Figs. 1 and 2 and in all other modifications the revolving and driven guiding ring 2 is so arranged that its axis lies at an angle to the vertical plane of the rolls 3 and 7. The material 4 proceeding from pair of rolls 3 travels over the flange of the guiding ring 2 into the ring and is taken along by the inner flange or face of same until it comes to the position where it has to be returned to rolls when it again passes over the flange to be gripped by the further pair of rollers 7.

It is preferable to use a bottom plate 5 by which the wire 4 is guided into the trough 6 to the rollers 7.

Two guiding rings of different sizes may be placed one within the other (Figs. 3 and 4) in order to guide two wires one directly after the other. In this case the second wire is fed into the rollers 3 before the first wire has passed therebetween. After leaving the rollers 3 the material 4 passes over the guiding plate 9 through guide tube 8 over the flange of the guiding ring 2 and is guided by the interior portion thereof till it arrives at the plate 10 which is placed close to the bottom of the guiding ring 2 and forms a prolongation of the bottom of trough 6. The material 4 is thus made to pass over the edge of the guiding ring 2 into trough 6 and to the pair of rollers 7.

Instead of placing a smaller guiding ring inside a larger one for the purpose of guiding several wires, a single guiding ring with several flanges may be employed as shown in Figs. 5, 6 and 12. The material is guided in the manner already described.

The bottom-plate 5 shown in Fig. 2 may be replaced by a rotatable or revolving disk 11. This arrangement is shown in Figs. 7 and 8. Of course the axle of the disk must have its bearings 100 above the guiding ring 2. The inner flange 12 of the guiding trough 6 may be extended to the place where the material 4 enters the guiding ring 2 (Fig. 9). The flange 12 may also be evolved into a separate guiding rail fastened on the bottom-plate 5 eccentrically to the guiding ring 2; as shown in Fig. 9.

Fig. 10 shows the arrangement if two separate guiding rings 2 and 103 are used; their axles 101 and 102 must be inclined toward each other in order that the wire 4 may pass from the first to the second guiding ring, after having traveled for about a quarter circle on the first guiding ring 2, the second ring 103 passing wire 4 on to the rollers 7. Of course both axles are also inclined toward the vertical plane passing through the axles of the rollers having thus a double inclination. The guiding ring 2 may also be arranged in such a way that it is open at the bottom as in Fig. 11. The material 4 is then fed over a guiding plate 13.

In consequence of the rollers of three high rolling mills revolving in opposite directions, the wire has to be guided a diameter of said rolls higher or lower thus requiring that the axle of the guiding ring 2 be inclined both toward a plane through the axles of the pair of rollers and toward the axles of the rollers (Figs. 13, 14, 15).

The device shown in Figs. 13–16 is intended for the guiding of two wires. On the frame 14 rests the bearing 15 for the ball 104 of the axle 16, which is held at its upper end by screws 17 and on which the guiding ring 2 is fastened. The ring 2 is revolved by a belt 18 passing through the pulley 19. The guiding plate 9 is fixed by bolts and nuts 20 to the frame 14 and the guiding tubes 8 by rings 21 to plate 9. In the same manner the trough 6 and a guiding plate 10 are fastened by bolts and nuts to frame 14. In order to be able to regulate the position of the guiding trough 6 with relation to the guiding piece 24 said trough 6 is made of separate parts connected by a link 23. The outer end of trough 6 rests on the bracket 29, which is provided with slits 105 and 106 in which the trough may be moved more or less toward the side. The trough 6 consists of two halves 107 and 108 bolted together by bolts and nuts 109. In order to allow of an easy running of the wire after it has formed the loop and gone over the edges of the guiding ring, the outer half of flange 107 of the trough 6 is made straight and serves to guide the wire just after it has left the ring. The inclined plate 25 and roller 26 also serve as guides to this portion of the wire. The plate 10 is connected with trough 6 and its free extremity must always be close to the bottom of ring 2. For this purpose it is made with advantage of steel, which being elastic permits of its touching the bottom of said ring. After the wire has entered the second pair of rollers 7 it must be able to leave the guiding ring 2 as the rollers 7 cannot roll as much wire as is fed by the pair of rollers 3. The wire 4 leaves the guiding ring by itself in consequence of its increasing length between the two sets of rollers, and begins to glide over the flange of ring 2 at 27, which is its lowest part, and rests on the floor of the building. A small inclined plate 28 is placed here for the purpose of facilitating the exit of the wire after the formation of the loop. This plate is stationary and simply prevents the wire from clinging too closely to the ring.

The desired guiding device is primarily

intended for oval rods or wire but may be used as well for square material.

I claim:

1. Rolling apparatus comprising a reducing appliance, and a ring journaled in a plane intersecting the path of issuance of material emerging from said appliance, such intersection occurring at a point within and substantially adjacent to the inner face of the ring, the axis of said ring being located to one side of the path along which the material travels when approaching said ring, the said material engaging said ring substantially tangentially thereof.

2. In a device of the class described, guiding means comprising a journaled ring, and means for directing material thereagainst at an angle to the plane of said ring, the point of intersection between said plane and the line in which said material is traveling just prior to its impingement against said ring being within and substantially adjacent to the inner face of the ring, the axis of said ring being to one side of said line, and the material engaging said ring substantially tangentially thereof.

3. Rolling apparatus comprising a reducing appliance, and a rotatable ring journaled in a plane of rotation intersecting the path of material issuing from said appliance, said material being delivered to the interior of said ring.

4. In a device of the class described, guiding means comprising a journaled member rotatable in a plane normal to the journal axis, said member having a laterally extending part thereon, and means for directing material against said member at an angle to said plane, the point of intersection between said plane and the line in which said material is traveling just prior to its impingement against said member being within and substantially adjacent to the inner side of said laterally extending part, the axis of said member being to one side of said line, and the material engaging said member substantially tangentially thereof.

5. A rolling mill appliance for strip metal and the like, comprising means for guiding said metal from one portion of the rolling apparatus to another, said means comprising a ring in a plane inclined to and intersecting the path of material directed thereagainst, the angle of inclination of said ring to said path being less than 45°, said ring having its interior annular surface approximately tangent to said path, the said path being to one side of the axis of said ring.

6. Rolling apparatus comprising a reducing appliance, a ring rotatable in a plane inclined to and intersecting the path of issuance of the material reduced by said appliance, and a guide for conducting said material to a point on the interior annular surface of said ring, the axis of said ring being located at one side of the path along which the material travels when approaching said ring, the said material engaging said ring substantially tangentially thereof.

7. Rolling apparatus comprising reducing appliances, a ring rotatable in a plane inclined to the paths of issuance and entrance for the material acted on by said appliances, said paths intersecting said ring in directions approximately tangent thereto and within the interior annular face thereof.

8. In a machine of the class described, reducing appliances having points in the paths of issuance therefrom and entrance thereinto at different levels, a ring rotatable in a plane inclined to said path of issuance, and having its interior annular surface approximately tangent thereto, the opposite side of said ring being also presented at an inclination to the path of entrance.

9. In a machine of the class described, rolls adapted to deliver and to receive rolled material at different levels respectively, and a ring rotatable in a plane inclined to both the paths of delivery and entrance of the material for said rolls and having its interior annular surface substantially tangent to said respective paths at diametrically opposite sides of the ring.

10. In a machine of the class described, rolls adapted to deliver and to receive rolled material at different levels respectively, and a ring rotatable in a plane inclined to both the paths of delivery and entrance of the material for said rolls and having its interior annular surface substantially tangent to said respective paths at diametrically opposite sides of the ring, and guides for conducting the material to and from said ring on the diametrically opposite sides thereof.

11. In a machine of the class described, two sets of rolls respectively adapted to deliver and to receive rolled material and to reduce the cross section thereof when said material is passed between the respective rolls of each set, and a rotatable ring having its interior annular surface in the path of material issuing from the first set of rolls, said ring being formed to permit the material to leave said ring and form a loop while the rolling is in progress, the first set of rolls normally delivering more material than can be received by said second set during a given unit of time.

12. In a machine of the class described, two sets of rolls respectively adapted to deliver and to receive rolled material and to reduce the cross section thereof when said material is passed between the respective rolls of each set, and a rotatable ring having its interior annular surface in the path of material issuing from the first set of rolls, and a guide adapted to eject the material from said ring to form a loop while the rolling is

in progress, the first set of rolls normally delivering more material than can be received by said second set during a given unit of time.

13. In a machine of the class described, rolls adapted to deliver and to receive rolled material, a ring rotatable in a plane inclined to both the paths of delivery and entrance of said material from and to the respective rolls, and guiding means for conducting the material to and from the interior annular surface of said ring on diametrically opposite sides thereof respectively.

14. Apparatus comprising a guiding device provided with a plurality of concentric rings and means for directing material along parallel paths into said rings, each path being directed into substantial tangency with an annular surface of one of said rings.

15. Apparatus comprising a rotatable guiding device provided with a plurality of flanges disposed in concentric relation about the axis of said device and means for directing material along parallel paths into the respective spaces at the inner sides of said flanges.

16. Apparatus comprising a rotatable guiding device having a base portion disposed in a plane normal to the axis of said device and a plurality of flanges thereupon disposed in concentric relation about said axis, and means for directing material along parallel paths into the respective spaces at the inner sides of said flanges.

17. Apparatus comprising a rotatable guiding device provided with a plurality of inclined flanges disposed in concentric relation about the axis of said device and means for directing material along parallel paths into the respective spaces at the inner sides of said flanges.

In witness whereof I have hereunto set my hand in presence of two witnesses.

CARL TOBER.

Witnesses:
HENRY HASPER,
WOLDEMAR HAUPT.