W. D. EYNON.

PROCESS OF ROLLING METAL.

APPLICATION FILED DEC. 21, 1908.

960,297. Patented June 7, 1910.

Fig. 1.

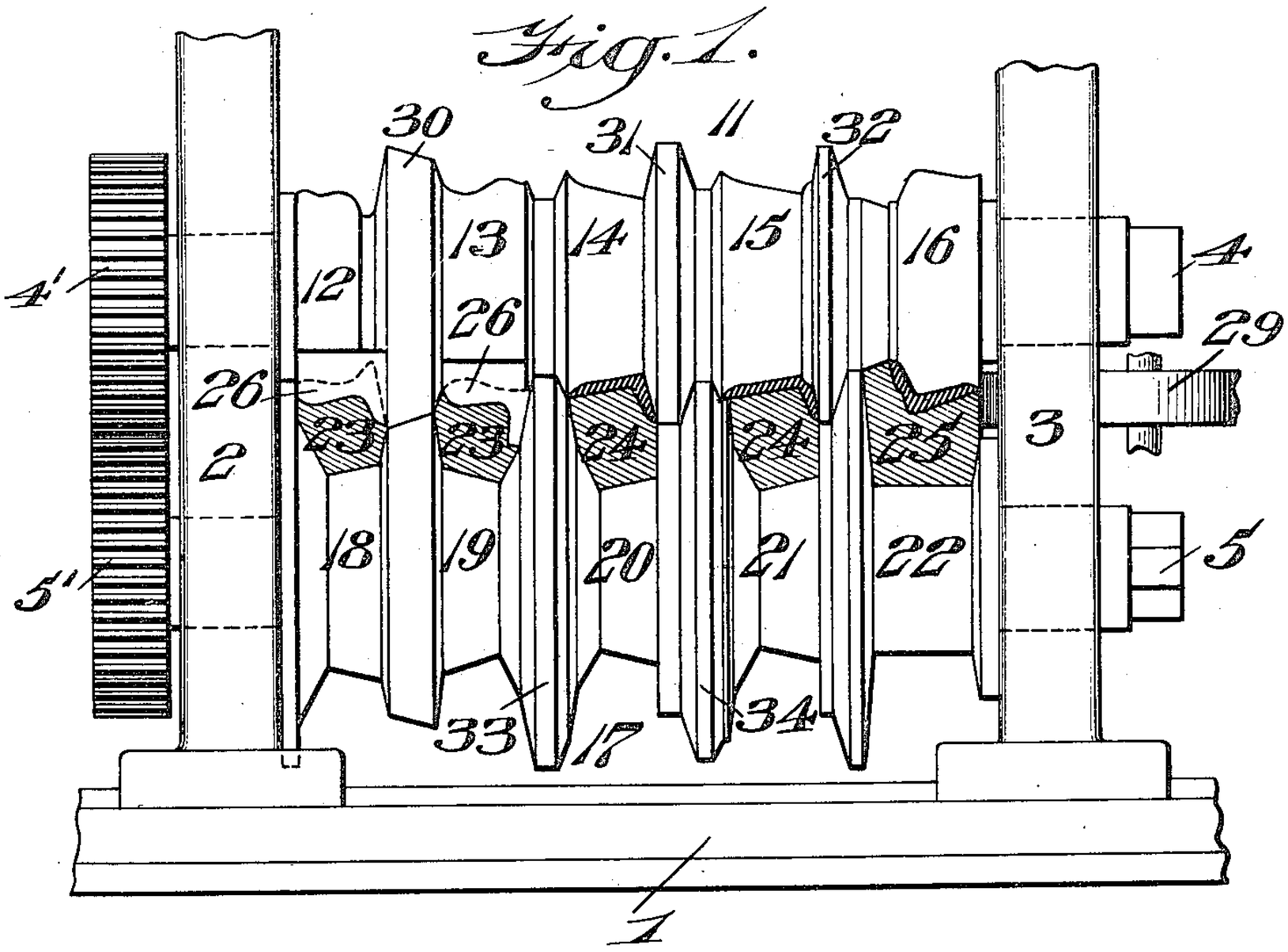


Fig. 2.

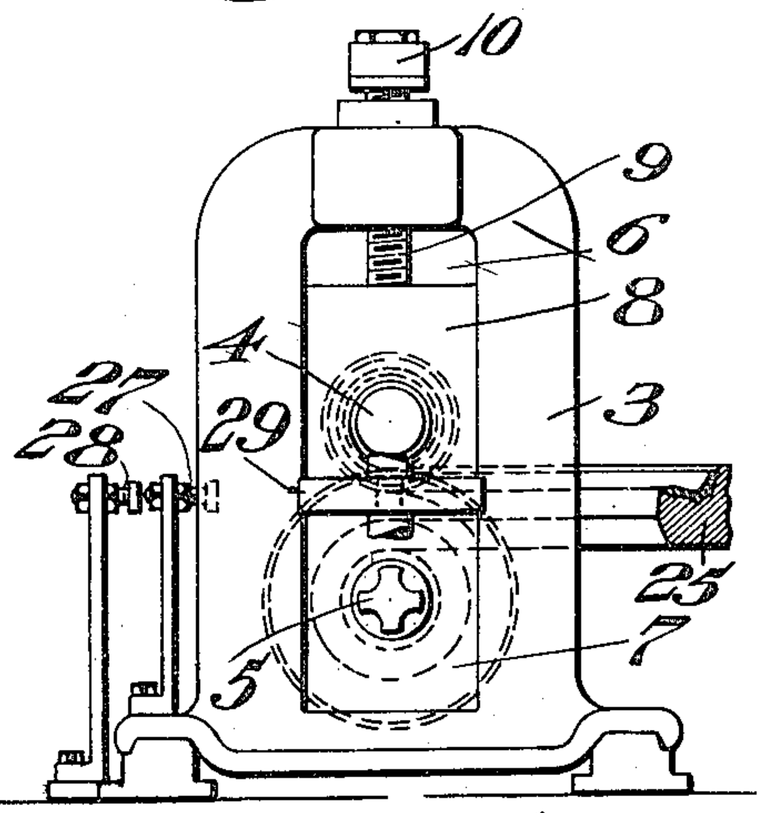
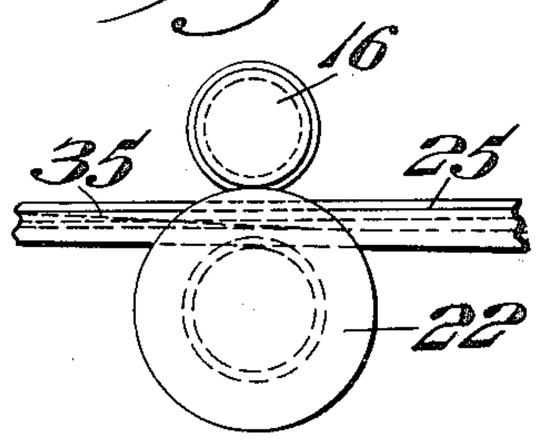


Fig. 3.



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PROCESS OF ROLLING METAL.

960,297. Specification of Letters Patent. Patented June 7, 1910.

Application filed December 21, 1909. Serial No. 534,439.

To all whom it may concern:

Be it known that I, WILLIAM D. EYNON, a citizen of the United States, residing in the city and county of Philadelphia, State of Pennsylvania, have invented a new and useful Process of Rolling Metal, of which the following is a specification.

This invention relates to a process of rolling metal forms and the like and more particularly to a method of rolling switch points from T-rails or like sections, as shown in my application Serial No. 323,021.

It is well known in rolling mill practice that it is necessary to carefully bring the metal down to the desired size and form through a series of stages, running from a minimum pressure, producing a five to ten per cent. working of the thickness of the metal or a maximum of twenty-five to thirty per cent. of the thickness of the metal in the final stages, whereby the required thickness of the finished article is produced. It is therefore necessary to use great care in the designing of the rolls in order to produce the most efficient working of the metal and still not cause a crushing or breaking down of the molecular section thereof. In the present day rolling mill practice, the metal which is passed through the rolls is subjected to a compressive force on one side and on the other to a resisting force, both forces producing a drawing of the metal on each side of substantially the same degree.

In certain classes of work it is desirable to affect the rolling of the metal on one side only, which class of work relates more particularly to the rolling of tapered articles and it is the object of my present invention to produce an article rolled from one side of the metal only during its travel through a succession of roll passes.

In my novel process, as herein disclosed, material is placed on a suitable device and passed successively through a series of rolls, whereby one side of the metal is substantially unaffected, while the opposite side is compressed and drawn to produce, when the last step is completed, a complete unitary finished article of the shape and size desired.

For the purpose of illustrating my invention, I have shown in the accompanying drawings one form thereof which is at present preferred by me, since the same has been found in practice to give satisfactory and reliable results, although it is to be understood that the various instrumentalities of which my invention consists can be variously arranged and organized and that my invention is not limited to the precise arrangement and organization of these instrumentalities as herein shown and described.

Figure 1 represents, in front elevation, a plurality of rolls and coöperating adjuncts embodying my novel process of rolling metal. Fig. 2 reperesents a side elevation of the same on a somewhat reduced scale, showing a portion of one of the pass tables. Fig. 3 represents a detailed side elevation of a pair of rolls showing more particularly a table in operative position.

Similar numerals of reference indicate corresponding parts in the figures.

Referring to the drawings: 1 designates a base, having supported thereon standards 2 and 3, serving as journal supports for the shafts 4 and 5, carrying respectively my novel rolling mechanism. In the present instance each of the standards 2 and 3 is provided with a recess 6 adapted to support suitable bearing blocks 7 and 8, in which the shafts 4 and 5 are respectively journaled, the upper bearing blocks 8 being preferably mounted for sliding movement in order to vary, as desired, the distance between the two shafts 4 and 5 and consequently the compressive action between the rolls carried thereby. As here shown, the bearing blocks 8 are each secured to a screw 9 which passes through a threaded aperture in the end of the standards 2 and 3 and are maintained in correct position by means of set nuts 10.

The shafts 4 and 5 are suitably connected by gears 4′ and 5′, whereby rotation of the shafts 4 and 5 and their adjuncts is effected in opposite directions. The shaft 4 carries thereon a roll 11, hereinafter referred to as the compression roll, which consists, in the present instance, of a plurality of circumferential grooves 12, 13, 14, 15 and 16, each forming a surface for working the metal to complete one step in the rolling process. The shaft 5 carries thereon a roll 17, hereinafter referred to as a resisting roll, the sur-

face of which is divided by a number of circumferential grooves 18, 19, 20, 21 and 22, each forming a surface corresponding in number to the grooves of the compression roll 11 and located in substantial alinement with the same, for a purpose to be hereinafter described.

It will be noted that the contour of the grooves 18 and 19 is such as to conform to and coöperate with the bottom and sides of a work or pass table 23 and each having two surfaces formed at different angular inclinations with respect to the axis 5 of the roll 17, whereby the table 23, as it traverses the two passes, successively receives a different position. The contour of the grooves 20 and 21 is substantially similar to each other and conforms to the bottom and sides of a different work or pass table 24, with which they coöperate, the groove 21 having greater circumferential diameter than the groove 20, thereby working the metal carried by the table to a greater degree than that traversed by the table in the pass formed by grooves 14 and 20. The contour of the groove 22 is likewise shaped to the outline of a work or pass table 25 and acts to support the same in its correct position relative to the compression groove 16 of the roll 11. It will thus be apparent that a series of openings are formed extending the length of the rolls 11 and 17 and through which the metal to be worked is passed successively on what I term a work or pass table. Attention is called to the openings formed by the grooves 12 and 19, 13 and 19, in both of which the compression grooves 12 and 13 have a cut away portion 26, whereby a segmentary surface is formed in order that the compressive effect may not be exerted upon the full length of the material in the initial stages of working.

Adjacent one side of the two rolls 11 and 17 and in the present instance extending substantially in alinement with the passes receiving the table 23, are a pair of stops 27 and 28, respectively, one of which, 27, is preferably located at a point nearer the rolls than the other stop 28, for the purpose of limiting the first stage of working the metal. Adjacent the end of the rolls 11 and 17 where the final rolling is accomplished, a roll 29 is mounted in any suitable manner for rotation and so placed as to bring the periphery thereof in contact with the joint formed between one of the rolls, here shown as 11, and the table 25.

It will be apparent that any material traversing this opening on the table 25 will thus receive a lateral working in combination with the usual vertical acting compressive force. It will be noted that on the compression roll 11, flanges 30, 31 and 32 are provided, which in the present instance extend a sufficient distance from the shaft 4 to bring them beyond the edge of the pass table and thereby completely inclose the metal being worked upon.

On the lower resisting roll 17 similar flanges 33 and 34 are formed and extend also in a manner to inclose the work and pass table. The function of these flanges is to prevent finning of the article during its travel through the rolls, since in each case the angular sides of the flange tend to work the metal laterally under a vertical pressure, and thereby overcome the tendency to form a bur or fin. Furthermore, this inclosing of the table and the material between the flanges of the working rolls guards against lateral drawing and permits only lengthwise drawing, as desired. The table 23, which coöperates with the first pair of rolls, is provided with a working surface so shaped as to receive a T-rail blank, one side of which is to be shaped by the grooves 12 and 13, preparatory to traversing the two openings formed by the grooves 14 and 20, 15 and 21. In these latter passes the contour of the table surface is so changed as to vary the longitudinal rolling action, drawing the metal on one side, reducing the flanges and forming a longitudinal tapered article.

25 designates the finishing table, whereon the material is placed to roll out a switch point as a completed structure. This table 25 performs the last step in my novel rolling process and the construction thereof preferably differs from the other pass tables in that a taper 35 is provided, running, in the present instance, longitudinally of the table and varying in distance from the axis of the compression roll.

Of course it will be understood that various tapers may be formed on the table to produce a variety of results, the function of the taper being to bring the material closer to the compression roll at certain parts of its travel through the pass and thereby work one side only to a corresponding taper.

In the rolling of material into articles such as switch points, by the ordinary methods, the forces are such as tend to produce a shearing of the metal near the base of the flange and it is impossible to produce the result I have attained by my novel process of rolling.

By the use of a member which moves with and supports the material during rolling, I am enabled to distribute the reacting force over a considerable area and thus reduce the working of one side to a minimum, resulting for all practical purposes, to substantially an unappreciable rolling of this side, while the opposite side is worked as desired. The method consists in placing a blank on a suitable supporting member, having a surface conforming to the contour of one side of the blank, and then passing both the blank and supporting member through a

series of passes, which operate to reduce and draw one side of the blank only.

In the rolling of a switch point the method is continued through several series of passes, in each of which series a separate supporting member is utilized in order to give to the blank the necessary configuration of the article desired.

It will now be obvious that I have devised a new method of rolling metal forms and more particularly switch points from a T-rail, the fundamental, underlying principle of which consists of passing in a succession of steps, a member adapted to support a blank to be rolled, which in traversing the rolls of a rolling machine produces a drawing and working of the metal on one side only and in each step bringing the metal to a desired shape and thickness.

In so far as I am aware I am the first in the art to devise a process of working metal on one side only while traversing a series of passes, whereby a predetermined shape and drawing of the metal is accomplished.

It will now be apparent that I have devised a novel and useful construction which embodies the features of advantage enumerated as desirable in the statement of the invention and the above description and while I have in the present instance shown and described the preferred embodiment thereof which has been found in practice to give satisfactory and reliable results, it is to be understood that the same is susceptible of modification in various particulars without departing from the spirit or scope of the invention or sacrificing any of its advantages.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. The method of forming a tapered switch point from a longitudinally extending blank, of flanged cross-section, which consists in supporting the blank upon a table which conforms in shape to one side of the blank and subjecting the other side of said blank to longitudinal rolling action sufficient to draw the metal on said side of the blank, reduce the flanges, and form a longitudinally tapered article.

2. The method of forming a tapered switch point from a longitudinally extending blank, of flanged cross-section, which consists in supporting the blank upon a table which conforms in shape to one side of the blank and subjecting the other side of said blank to longitudinal rolling action sufficient to draw the metal on said side of the blank, without disturbing the opposite side, reduce the flanges, and form a longitudinally tapered article.

3. The method of forming a tapered switch point from a standard railroad T-rail, which consists in supporting the rail upon a table which conforms in shape to one side of the rail and subjecting the other side of said rail to longitudinal rolling action sufficient to draw the metal on said side of the rail without disturbing the opposite side, reduce the flanges and form a longitudinally tapered article.

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