E. T. GREENFIELD.

ROLLING OF FLAT STRIPS.

APPLICATION FILED FEB. 28, 1916.

1,217,750.

Patented Feb. 27, 1917.

3 SHEETS—SHEET 1.

Fig. 5.

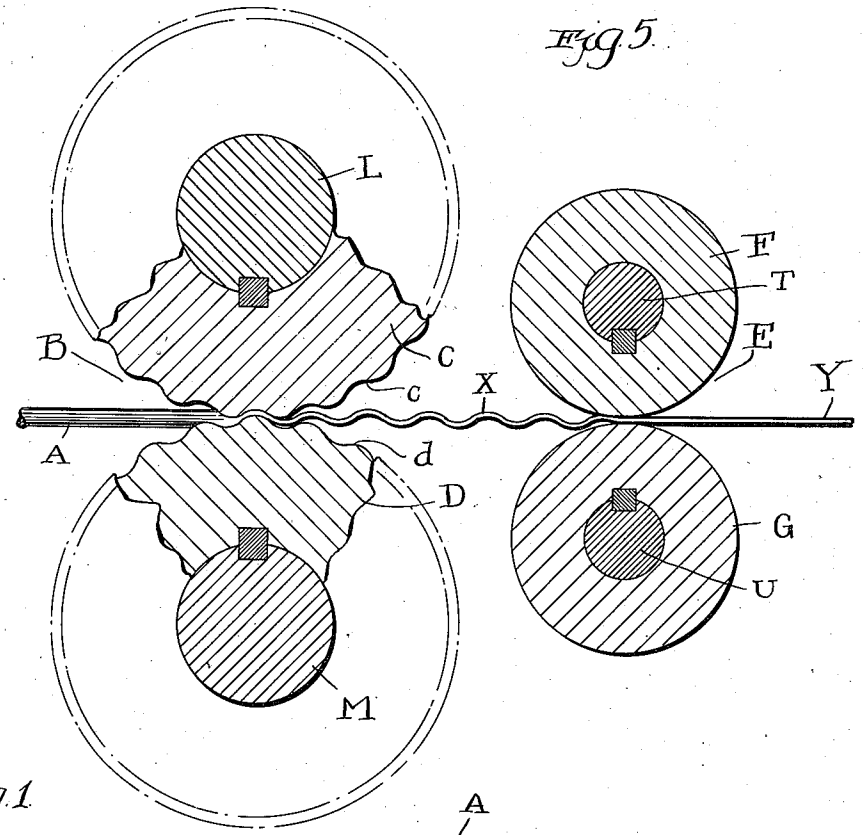


Fig. 1.



Fig. 2.

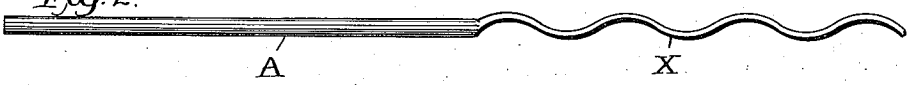


Fig 3.

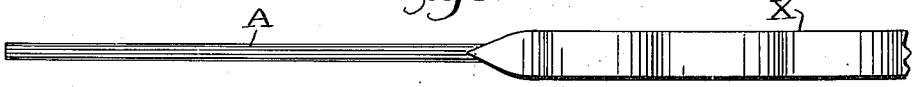
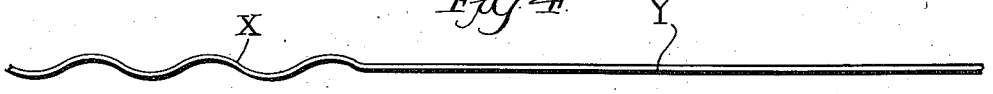


Fig 4.



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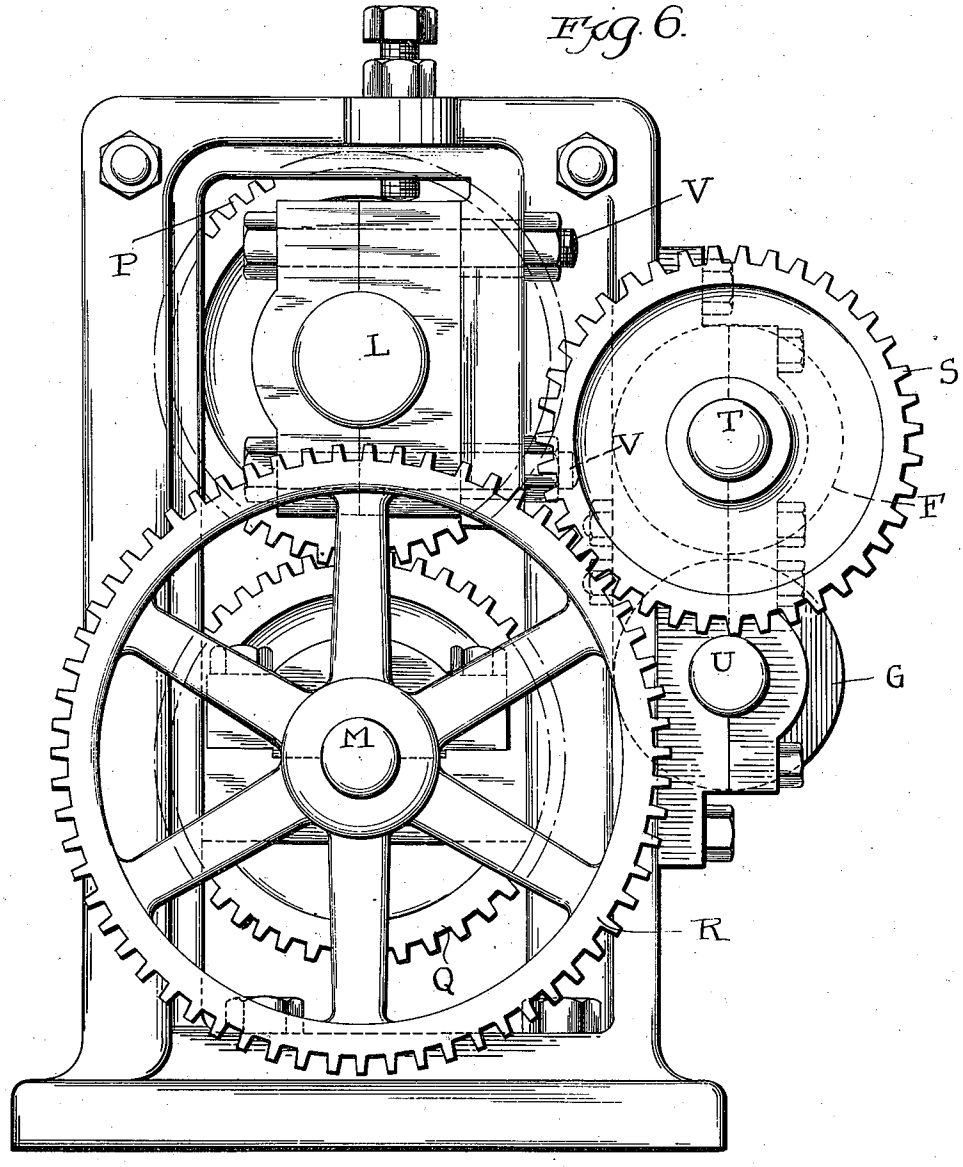
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3 SHEETS—SHEET 2.

Fig. 6.



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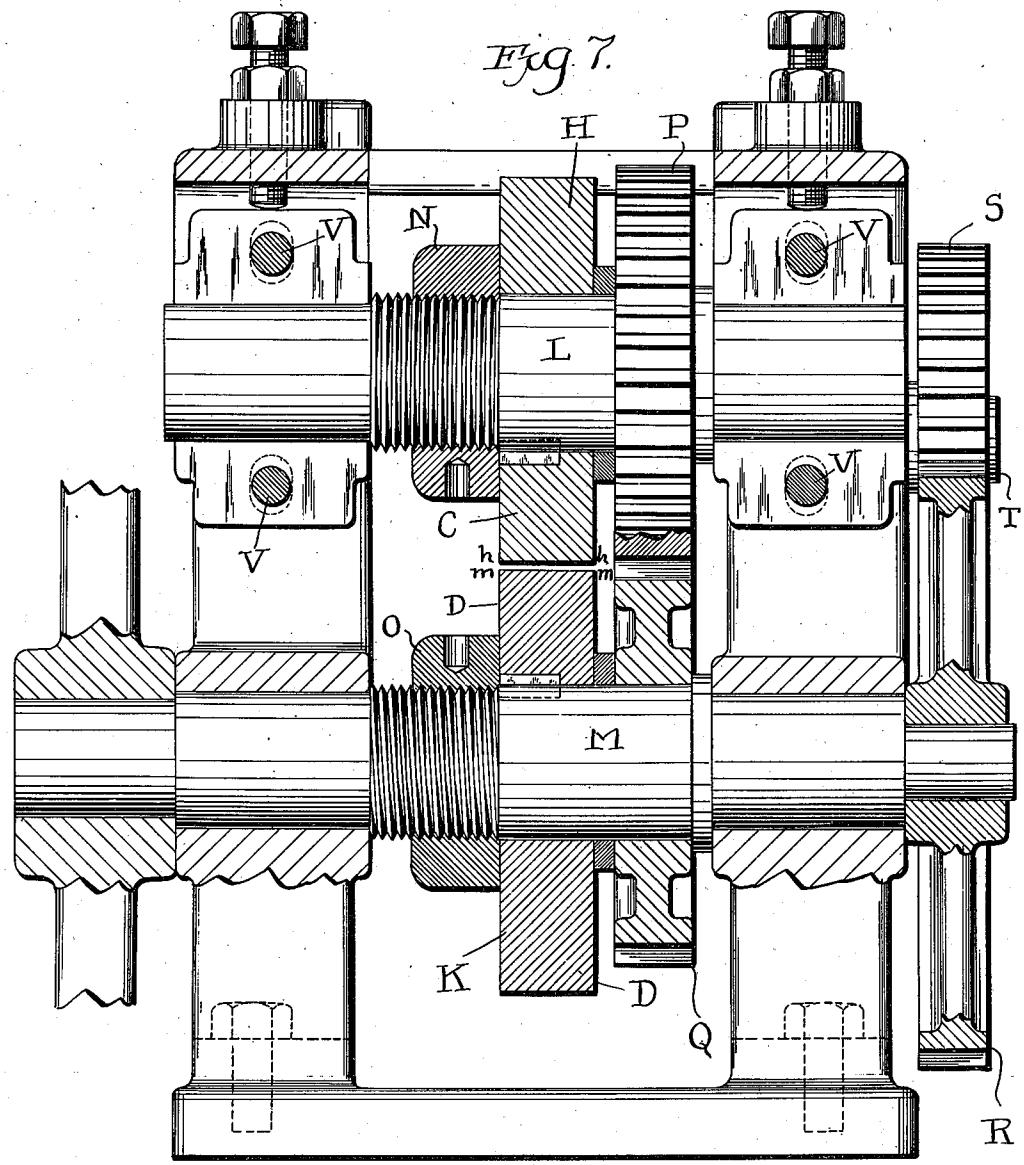
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3 SHEETS—SHEET 3.

Fig. 7.



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ROLLING OF FLAT STRIPS.

1,217,750. Specification of Letters Patent. Patented Feb. 27, 1917.

Application filed February 28, 1916. Serial No. 80,887.

To all whom it may concern:

Be it known that I, EDWIN T. GREENFIELD, a citizen of the United States, and a resident of Kiamesha, county of Sullivan, and State of New York, have made a certain new and useful Invention Relating to the Rolling of Flat Strips, of which the following is a specification.

The invention relates to a method of forming flattened strips.

An object of the invention is to reduce a wire or rod preferably circular in cross-section between opposing reducing rollers in such a manner that the wire or rod being treated will be spread laterally without being elongated to any substantial extent.

This is accomplished between opposing reducing rollers that are shaped so that the metal of the rod while being reduced is restrained from flowing longitudinally but is free to flow laterally or in a direction transverse to that in which the reducing pressure is applied. This is effected in the apparatus shown by means of a set of opposing reducing rollers—which in effect constitute opposing dies—that have scalloped faces and arranged so that when pressing the material being treated the projections of one die enter the recesses or dwells of the opposing die.

As illustrating a specific manner in which the invention may be realized reference is made to the drawings forming a part of this specification and in which drawings,—

Figure 1 represents a side view of a wire or rod to be treated which is preferably circular in cross-section.

Figs. 2 and 3 are respectively side and plan views of the same wire or rod after a portion of it has been reduced or flattened between a set of scalloped rollers.

Fig. 4 is a side view of the same rod after it has been reduced or flattened by the scalloped rollers and also after a portion of the resulting product has been straightened.

Fig. 5 shows in cross-section a pair of opposing reducing rollers and a pair of straightening or ironing rollers arranged in tandem.

Fig. 6 is an end view of the machine in which the rollers shown in Fig. 5 are embodied.

Fig. 7 is a vertical view partially in section showing the arrangement of the scalloped rollers relative to each other and means for driving the same.

The wire or rod to be treated is designated by A and the set of opposed reducing or scalloped rollers for crushing and spreading this wire or rod so as to form a flattened strip is designated by B. Each set of reducing rollers comprises an upper roll C and a lower roll D which rolls have the scalloped faces clearly shown at *c* and *d*. (See Fig. 5.) In this same figure there is indicated a set of straightening or ironing rollers E comprising an upper roll F and a lower roll G both of which are shown cylindrical. The wire being treated is first crushed so that the part which has been treated in the set of scalloped rollers B will assume the fluted or waved but flattened form shown at X in Figs. 2 and 3. The waves, however, of this resulting product can immediately be pressed so that they will assume the substantially straight form shown at Y in Fig. 4. In Fig. 5 the rod being treated is shown in three stages, viz., a portion of the rod as it appears after it has been flattened so that it takes the fluted or waved form, and also a portion of the rod in which the flutes or waves have been substantially removed by the ironing or straightening rollers E.

The opposing set of scalloped reducing rolls or rollers C and D may be made in any suitable manner. In the construction shown on the drawings the rolls C and D are in the form of annular rings or body members H and K which are mounted upon driving shafts or spindles L and M. The body members are held in place on the shafts or spindles L and M by means of suitable lock-nuts N and O. The spindles L and M are caused to be driven in unison by the set of intermeshing gears P and Q which are respectively secured to the spindles L and M. The spindle M has secured at the outer end thereof a gear R which in turn meshes with a gear S that is secured to the shaft

T of the upper roll F of the set of ironing or straightening rollers E. The lower roll G of the set last mentioned has not been shown as being positively driven but manifestly it can be positively driven if desired by suitable gearing which can be secured to the shaft U thereof. The shaft or spindle of the lower roll D is mounted in a suitable bearing carried on the housing and the upper shaft L is also carried in suitable bearings which are adjustably mounted on the housing and secured in place thereupon by means of the bolts V. The shafts T and U of the straightening rollers E are carried in suitable bearings which are secured to the rear side of the housing, as will be obvious from an inspection of Fig. 6. The wire or rod being treated can be guided by a suitable member to and from the scalloped reducing rollers B and to and from the rollers E. However, as guide-members for opposing rollers are old and well known in the art it is believed to be unnecessary to illustrate such members on the drawings.

The pass between the reducing rollers which may be considered to be defined as by the lines *h*—*h* and *m*—*m* is of sufficient width to permit a free lateral flow of the material, as the reducing pressures of the rollers or dies operate upon the metal rod to decrease its thickness as the rod passes longitudinally between the opposing rollers or dies but in a direction transverse to the axes of the rollers. The reducing pressures are applied at substantially right angles to the lines *h*—*h* and *m*—*m* or in other words to the surface of that portion of the member defining the pass. The reducing rollers due to their scalloped configuration serve to confine the material so as to avoid substantial elongation whereby the lateral flow in a transverse direction relative to the reducing pressure, viz. in a direction parallel to that in which the axis of the reducing rollers extends, will necessarily take place since this is the only way in which the metal is unconfined whereby the flow can take place. The material as it leaves the reducing rollers B has the wavy or scalloped appearance as shown at X, but this wavy effect can be removed as by the ironing or straightening rollers E or by any other suitable means for straightening the strip.

The invention is particularly useful where it is desirable to obtain a comparatively wide thin strip from a wire or rod, which is preferably worked when in heated condition, and this invention is exceedingly useful where it is desirable to accomplish this without reheating the article being treated. In other words, a wire or rod can be heated and immediately crushed into a comparatively thin wide strip at substantially a single operation.

The improvements herein set forth are not limited to the precise construction and arrangement shown and described for they may be embodied or realized in various forms and modifications within the scope of the appended claims without departing from the spirit and scope of the invention.

What I claim is:

1. The method of making thin flat strips which method comprises heating a rod, passing the same between fluted or scalloped rollers having between them a pass of such shape that the rod can be reduced into a thin wide strip and subsequently flattening the strip.

2. In the rolling of metals the method which comprises subjecting successive portions of a rod to the reducing action of opposing scalloped dies which are constructed so as to restrain the rod against substantial elongation during said reducing operation and so as to allow the material of the rod to flow laterally at right angles to the direction in which the reducing pressure is applied while the rod is being reduced.

3. In the making of flattened strips the method which comprises passing a rod between opposing fluted or scalloped rollers which are arranged so as to simultaneously reduce the rod in thickness and restrain it against substantial elongation while permitting the material being treated to flow laterally at substantially right angles to the line of reducing pressure.

4. The method of forming flattened strips which method comprises passing a round rod between rolls having scalloped faces and which rolls have between them a pass in which the material being treated can flow laterally substantially parallel to the axes of the rolls while being reduced in thickness.

5. In the manufacture of flattened strips the method which comprises passing a round rod between scalloped rolls that are shaped and positioned so as to reduce the rod being treated into a thin strip which is substantially wider than the rod from which it is made.

6. The method of making thin flat strips which method comprises passing a rod between reducing rollers having scalloped cooperating faces so that the rollers will reduce the rod in thickness and convert it into a strip which is of substantially the same cross-sectional area as the rod from which the strip was made and subsequently pressing the flutes or scallops in the product resulting from the passing through the scalloped rollers so as to make a substantially straight flat strip.

7. In the making of flattened strips the method which comprises passing a rod between opposing fluted or scalloped rollers which are constructed and arranged so as to

restrain the rod against substantial elongation while the rod is being passed longitudinally between the rollers but in a direction transverse to the axes of the rollers and while simultaneously applying reducing pressure to the rod by means of the rollers which are so shaped as to permit the material being thus reduced to flow laterally at substantially right angles to the line of reducing pressure.

This specification signed and witnessed this 23d day of February, A. D. 1916.

EDWIN T. GREENFIELD.

Signed in the presence of—

EDWIN A. PACKARD,

G. MCGRANN.