(No Model.)

W. TAYLOR.

METHOD OF DRAWING WIRE OF ONE SECTIONAL FORM INTO WIRE OF ANOTHER SECTIONAL FORM.

No. 404,319. Patented May 28, 1889.

Fig. 1.

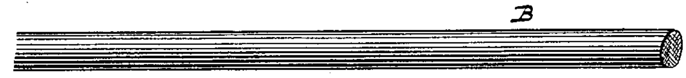


Fig. 2.

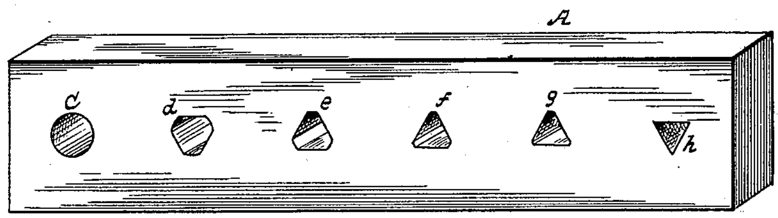


Fig. 3.

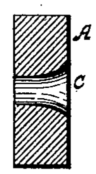
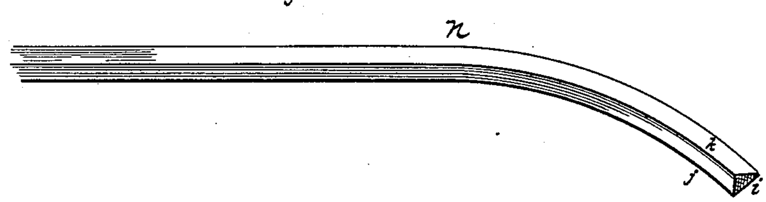


Fig. 4.



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WILLIAM TAYLOR, OF ALLEGHENY, PENNSYLVANIA.

METHOD OF DRAWING WIRE OF ONE SECTIONAL FORM INTO WIRE OF ANOTHER SECTIONAL FORM.

SPECIFICATION forming part of Letters Patent No. 404,319, dated May 28, 1889.

Application filed May 26, 1888. Serial No. 275,202. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM TAYLOR, a citizen of the United States, residing at Allegheny, in the county of Allegheny and State of Pennsylvania, have invented a new and Improved Method of Converting Wire of One Form in Cross-Section into a Wire of Another Form, of which the following is a specification.

I accomplish this by so treating the wire in its initial form that a part only of its surface shall at each of several successive stages be affected, the rest of said surface at each of said stages of treatment continuing in the same form that it was at one or more of the earlier stages; and I continue this gradual changing until the whole of the surface has been transformed, or until so much of it has been affected as to bring the wire into the desired shape.

It will be understood that when I herein mention "wire" I mean to be understood as referring to the long and continuously drawn filiments of metal ordinarily described in the arts as wire, in contradistinction to comparatively shorter sections or pieces of metal produced by various other processes.

I am aware of the fact that metal has been drawn into wires of various forms and that such wires have been drawn and redrawn for the purpose of and in such way as to accomplish the reducing of the wire, they in each case, after the process of thus reducing them has been completed, being of a cross-section similar in outline to that of the initial wire; but in every instance within my knowledge the process of drawing the wire has been so carried on and the devices with which the process has been effected have been of such nature that at each of the successive stages of drawing the whole surface of the wire has been attacked by the walls of the apertures in the draw-plates, said apertures throughout the whole series through which the wire is passed and repassed in the earlier processes being all similar to each other geometrically, differing merely in size in cross-section. By reason of this fact—namely, that heretofore the draw-plates for wires have always been provided with apertures similar to each other—it has been impossible to produce wires of a number of non-circular forms which have been desired in the arts, especially wires of a small gage. When attempts have been made to produce some of the said desired forms, it has been found that the friction and resistance experienced in using the older draw-plates have been so great as to practically ruin the wire or to destroy the draw-plates.

In order that the character of my invention may be fully understood, I will herein call attention to well-known facts.

The wire which is employed by me and by others following similar arts is produced in the first instance by a process of rolling or drawing through rolls, it being ordinarily round in section. It is practically impossible to carry the reducing of the size of the wire below a certain gage by this rolling process, the size ordinarily produced approximating what is known as "No. 6" in gage. It is this round wire of about this gage which is ordinarily employed in producing, by drawing, the wires of the smaller gages required in the arts for various purposes. I am not aware of the fact that prior to my invention a wire of this character or of other shape in section has been initially used and from it produced a wire differing radically in shape in section.

To illustrate this improved method, I hereinbelow describe in detail the manner of converting a wire round in cross-section into one of triangular form, and in the drawings have shown the devices used. In such a case I employ a draw-plate with a series of apertures that gradually change in series from a complete circle to a complete triangle. A round wire or rod is drawn, when necessary, through one or more circular apertures, in order to bring it to the required gage, and then it is passed through the others of the series in sequence, the walls of the latter being so arranged that the surface of the wire is more and more attacked as the process continues, portions of said surfaces at each stage prior to the last being left in the condition in which they were at one or more of the previous stages.

Figure 1 represents a round metallic wire or rod suitable for being drawn into wire; Fig. 2, a perspective view of a draw-plate provided with a series of holes shaped to reduce a round metal rod to a triangular form; Fig. 3, a transverse vertical section of said draw-plate. Fig. 4 represents a portion of equilateral triangular wire.

In the practice of my invention I prepare a strong metallic plate, A, and provide the same with a series of transverse conical holes, through which a suitable wire or rod, B, is to be drawn for its reduction to wire. The first of these holes is in the form of a complete circle, *c*, and through it the rod B is to be drawn to deprive it of any undue roughness or unevenness preparatory to its subsequent passage through the next hole of the series. This round or circular aperture *c*, or several of them, may be and generally are used also for reducing the gage of the wire before commencing to alter its form. The second hole, *d*, is different from that of the first in having three equidistant and equal portions of its circumference bounded by three straight lines arranged at an angle of sixty degrees to each other, the intervening portions of its circumference retaining a curvilinear form corresponding to the sides of the first hole. The rod B on passing through this second hole, *d*, assumes its shape by being elongated and depressed to the extent of having three equidistant portions flattened, each equaling in breadth one-sixth of the circumference of the rod. After its passage through the second hole, *d*, the rod is drawn through the third hole, *e*, of the series, which is similar in shape to that of the second hole, but differs therefrom in that its curvilinear faces or sides are narrowed and its straight ones proportionally broadened. The rod on passing through this third hole, *e*, has its form brought to a shape corresponding thereto. The rod is next to be passed through the fourth hole, *f*, which is shaped to further increase the width of its flat sides and lessen its curved portions. The rod is subsequently passed through the fifth hole, *g*, whereby it is given the shape of a triangle having rounded corners. Lastly and finally, the rod is passed through the sixth hole, *h*, having the shape of an equilateral triangle, and by which the wire *n* is ultimately brought to that form or given three plain sides, *i j k*, which meet in three parallel lines or angles the corners or edges of which will each touch at equidistant points the original circle of the first hole, *c*, when placed therein.

Among the several matters that will be noticed in connection with the facts above set forth are the following: The entire surface is not attacked at any of the stages of transformation. Gradually-increasing portions only of it are affected, the wire thus being brought step by step from one shape to the other. The fibers are allowed full opportunity to adapt themselves to the slightly-differing positions into which they are forced without there being any danger of either impairing them or more or less nearly destroying them and producing a crystalline structure of the metal. It is well known that if fibrous metal of this character is too violently attacked a change of molecular structure results, and in the case of wire of this sort repeated annealing becomes necessary because of such more or less violent treatment. In following the process herein set forth I avoid these objections entirely, and the wire can be carried directly through the whole series of steps and then be immediately employed for the use to which it is to be put after being brought to the desired form. Again, it will be seen that when the process is completed of converting a circular wire into a triangular one the surface is substantially the same as at the beginning. The width of each side of the wire is equal to the diameter of the initial round wire, and therefore the widths of the three sides are together substantially the same as the original circumference. It is well known that it is desirable to preserve as intact as possible that surface-texture which is produced in rolling or drawing wire and generally spoken of as the "skin," this being the portion which imparts the desirable toughness and strength to the metal. By my process the advantages of this part of the wire are preserved, notwithstanding the changes in form to which it is subjected.

The length of the wire or rod is an immaterial matter if it be long enough to be subjected to the several steps involved in this method.

The wire or metal which I thus produce can be used in any of the several arts, it being applicable to any uses, so far as I have yet learned, to which can be put round wire of a transverse diameter equal to the width of one of the sides of mine. For instance, I have found it especially valuable in the art of manufacturing wire nails. The nails produced are much cheaper than the round nails of the same gage, inasmuch as in the process of converting the round wire into the triangular I increase the length to a considerable extent. This increasing of the length is not due to a forcing outward of the metal, but to drawing it away from each part of the wire longitudinally, the original surface portion or skin being preserved.

I do not limit my invention specifically to the converting of wire which is circular in section to one which is triangular in section, for it will be seen that there will be no departure from the spirit of my invention if materials of other initial sectional form are by this method converted into materials of sectional form other than triangular, if the initial material be subjected to a series of actions, at each of which a portion only of the surface is forced away from its previous form, and it will be caused to assume the desired sectional form at the last action of the series, it having been subjected during one or more actions preceding the said last one to an action by which only a portion of the surface is affected, the residue of the surface being thereby unaffected; nor do I limit myself in thus gradually forcing the surface away from its initial form to the use of the draw-plates.

By the means and in the manner described the rod B is elongated and drawn from a round shape to that of an equilateral triangular wire, *n*, without unnecessary friction, consequent resistance, or danger of crystallizing the metal, the resultant product being a tough smooth wire having a new and useful form, and especially adapted to the purposes hereinbefore set forth.

Having thus briefly described my invention, I claim—

1. The herein-described method of converting wire, or its equivalent, of one sectional form into a wire, or its equivalent, of another sectional form, it consisting in subjecting it to a series of two or more drawing actions, at each of which a portion of the surface is forced away from its previous form, the material assuming the desired sectional form at the last action of the series, and being subjected during one or more drawing actions preceding the said last one to a drawing action by which a portion only of the surface is forced away from its previous form, the residue of the surface being thereby unaffected, substantially as set forth.

2. The herein-described method of converting wire of one sectional form into wire of another sectional form, it consisting in subjecting it to a series of drawing actions, at each of which a portion of the surface of the wire is forced away from its previous form, the residue of the surface remaining unaffected, and the extent of the surface acted on increasing with each successive action, substantially as described.

3. The herein-described method of converting wire of one sectional form into wire of another sectional form, it consisting in subjecting it to a series of drawing actions, at each of which only a portion of the surface is affected by the walls of the draw-plate, the residue of the surface remaining substantially unaffected, and at the last of which actions the extent of surface affected by the walls of the draw-plate is greater than that affected at any previous action, substantially as described.

4. The herein-described method of manufacturing wire triangular in section, it consisting in subjecting wire initially circular in section to a series of several drawing actions, at each of which three separate portions of the surface of the wire are pressed relatively inward, three intermediate portions of said surface being allowed to remain with the curvature they had prior to said action, substantially as set forth.

5. The herein-described method of manufacturing wire triangular in section, it consisting in subjecting wire initially circular in section to a series of several drawing actions, at each of which three separated portions of the surface are pressed relatively inward, and at each of which actions after the first the extent of the inward-pressed surface gradually increases relatively to the preceding, substantially as set forth.

6. The herein-described method of manufacturing wire of one gage and triangular in section, it consisting in subjecting wire initially circular in section and of a larger gage to a series of drawing actions, during the first one or more of which the wire remains round in section, but is reduced to the gage of the desired triangular wire, and during one or more of the remainder of which actions separated portions only of the surface are pressed relatively inward, the wire being thereby gradually brought to a triangular sectional form, substantially as set forth.

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