(No Model.)

2 Sheets—Sheet 1.

F. H. DANIELS.

WIRE ROD ROLLING MILL.

No. 283,470. Patented Aug. 21, 1883.

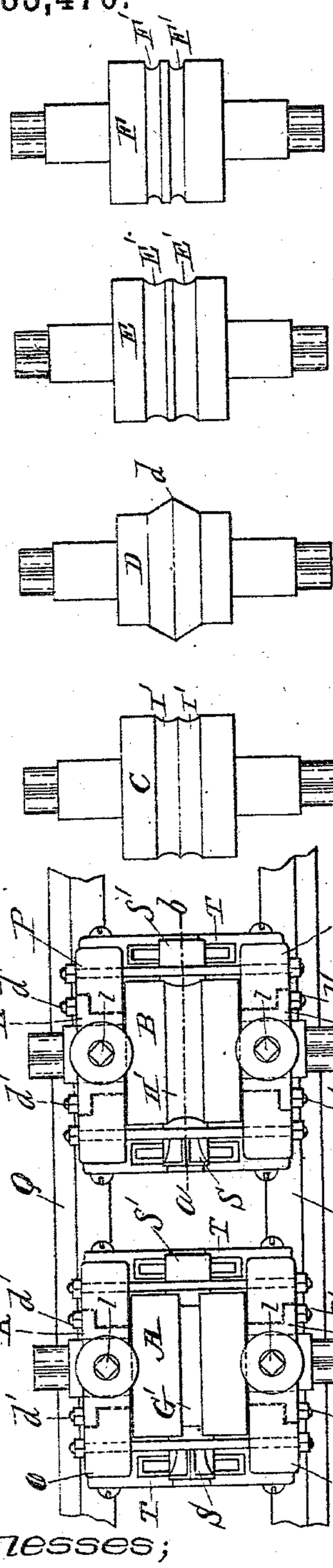

Fig. 1.

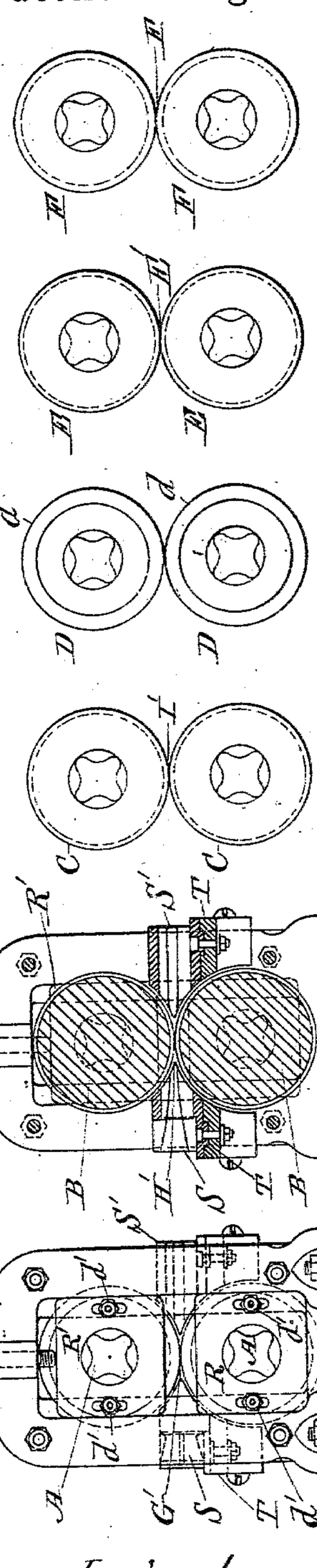

Fig. 2.

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(No Model.) 2 Sheets—Sheet 2.

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Fig. 3.

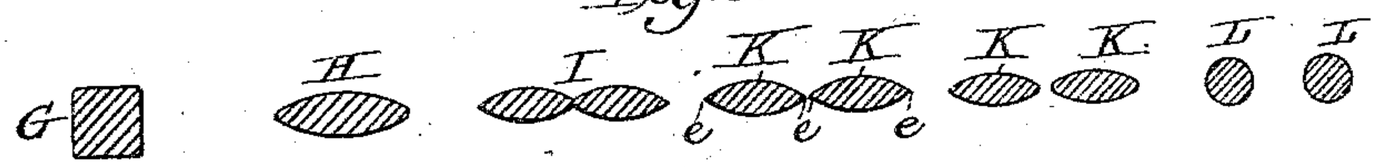


Fig. 4.

Fig. 5.

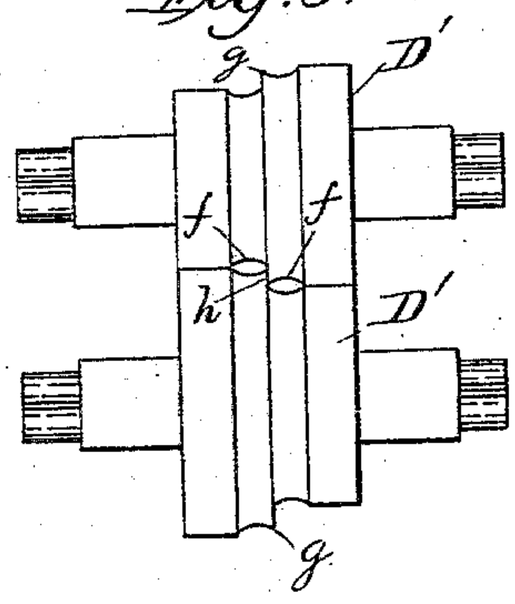


Fig. 6.

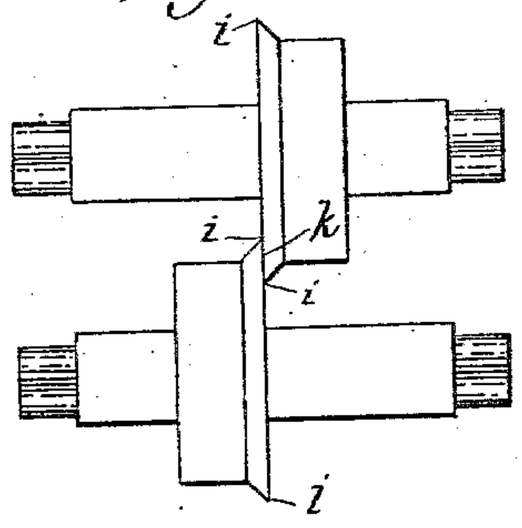
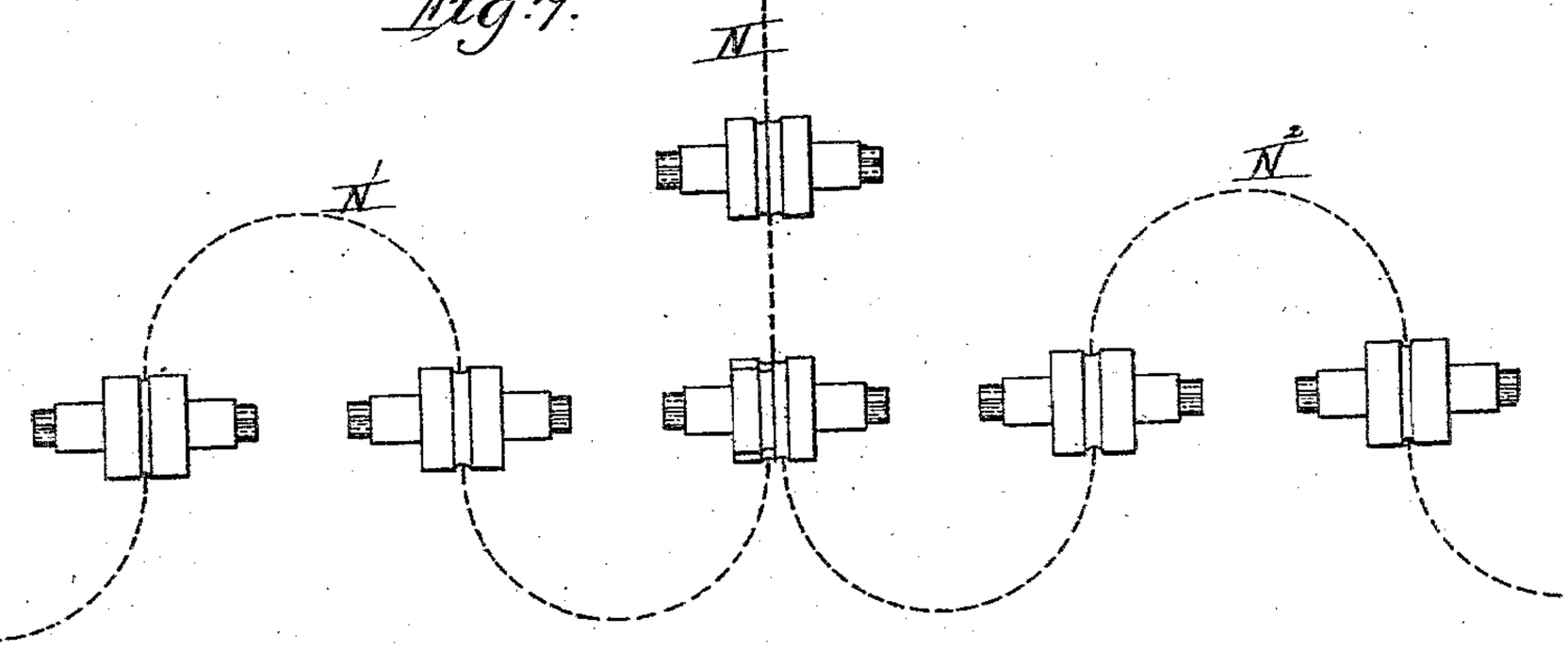


Fig. 7.



Witnesses;
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UNITED STATES PATENT OFFICE.

FRED H. DANIELS, OF WORCESTER, MASSACHUSETTS.

WIRE-ROD ROLLING-MILL.

SPECIFICATION forming part of Letters Patent No. 283,470, dated August 21, 1883.

Application filed January 25, 1883. (No model.)

To all whom it may concern:

Be it known that I, FRED H. DANIELS, of Worcester, in the county of Worcester and State of Massachusetts, have invented certain new and useful Improvements in Wire-Rod Rolling-Mills; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification.

The objects of my present invention are to provide means whereby wire rods can be economically produced or rolled more rapidly, and of much smaller size, than can be done in rolling-mills as heretofore constructed; to combine with a rolling-mill for reducing wire rods a device or means for separating the rod, when at a suitable stage of reduction, into two or more strands or divisions; to afford means in a wire-rod rolling-mill for separating the rod into two or more divisions or strands, and for separately imparting to each of said strands the finishing form for an independent wire rod. These objects I attain by mechanism such as hereinafter described, the particular subject-matter claimed being definitely specified.

My improvements are more especially designed to be applied to continuous wire-rod rolling-mills, but are also applicable to "Belgian mills," or other kinds of wire-rod rolling machinery.

With rolling-mills of ordinary construction it has been found impractical to reduce the rods while in heated condition to sizes less than about No. 4 to No. 6 wire gage, whereas with mills embracing my invention it is practical to roll or reduce wire rods as small or smaller than No. 12 wire gage without additional expense in heating, and with material advantages in quality and quantity of the wire rods produced, thereby diminishing in a great degree the cost of the finished wire, while my improvements adapt the mill for producing wire suitable for fencing, telegraph-lines, and similar purposes solely by rolling operation, and without requiring the subsequent operations of drawing, annealing, &c.

In the drawings, Figure 1 is a plan diagram, and Fig. 2 is an elevation diagram, showing so much of a continuous wire-rod rolling-mill as is necessary to illustrate the nature of my invention, the bearing-housings being shown only on the first two pairs of rolls, and the rolls at second position on Fig. 2 being represented in vertical section, taken on line *a b* of Fig. 1. Fig. 3 represents, upon an enlarged scale, cross-sections of a wire rod at different stages of reduction, corresponding to that imparted by the several pairs of rolls, as shown in Figs. 1 and 2. Fig. 4 represents similar cross-sections of the wire rod illustrating modifications in the shape or section form that may be employed, if desired. Figs. 5 and 6 represent forms of roll that may be employed in a continuous mill for parting the partially reduced wire rod, as hereinafter explained. Fig. 7 is a plan diagram illustrating the adaptation of my invention to that class of mills known as "Belgian mills."

My improved machinery for rolling wire rods comprises, essentially, devices for partially reducing the rod, devices for spreading the rod or preparing it for division, devices for separating the rod into two or more parts or strands, and devices for imparting proper finish form to the separate strands. These described devices may be severally employed or combined under various modifications for effecting similar results in substantially equivalent manner, according to the particular circumstances and requirements of the work and the kind of mill on which the invention is adapted.

In the drawings, A A, B B, C C, D D, E E, and F F represent a series of rolls arranged in relation to each other to form a continuous rod-rolling mill, the several rolls being provided with grooves for reducing and molding the metal into the shapes represented in Fig. 3. The first set of rolls, A A, in the present instance, mold the metal into the square shape G (see Fig. 3) by passing between the rolls in the groove G′, the groove H′ in the second set, B B, reducing it to the oval shape H. The grooves I′ I′ in the third set, C C, mold it into the double oval or ribbed strand I, and the next set of rolls, D D, are made to operate as cutters or shears, with sharp angles or flanges, *d d*, for dividing the rod into two separate strands, (see K K, Fig. 3,) which strands are separately directed by means of suitable

guides to the grooves E′ E′ of the following sets of rolls, E E and F F, which press in the sharp edges or fins by the grooves E′ E′, and impart to the two strands the proper form for the finished rod L L by the semicircular grooves F′ F′.

If preferred, the rolls E may be dispensed with, the strands being passed directly from the dividing mechanism to the last set of rolls F F, which imparts to them the finished shape L.

The mill may be made with any desired number and shape of reducing, molding, or shaping and parting rolls without departing from the principle of my invention—as, for instance, the rolls may be of the proper number and shaped to reduce, mold, and cut apart the metal, as shown in Fig. 4, instead of as before described and shown in Fig. 3.

Figs. 5 and 6 represent modifications of rolls D D for cutting apart the metal. The rolls, Fig. 5, are provided with guiding-grooves *f f*, and with cutting-edges *g g*, which act as shears when said rolls are in operation to cut apart the metal, as before described, the shape of the rolls being such that the cutting-edges overlap each other, as shown at *h*. The rolls shown in Fig. 6 act similar to those shown in Fig. 5, with the exception that the guiding-grooves are left off in this instance. The cutting-edges *i i* overlap each other at *k*, and shear against each other as the rolls revolve.

In order that the construction of a continuous or similar wire-rod rolling-mill may be more clearly understood, as well as the application of my invention to the same, I have represented the first two sets of rolls, A A, B B, of said mill as being arranged and supported in suitable housings, O O, P P, which are in turn supported upon the bed-plates Q Q in suitable manner. It will be understood that the entire series of rolls are thus mounted and supported. The rolls are fitted to turn in suitable bearings, R R′, arranged in the housings, the lower bearings, R, having a solid support at the bottom upon the housings, while the upper ones, R′, are simply held in position laterally and fitted to slide up and down vertically in the housings. Therefore the whole weight of the upper rolls rests upon the lower ones.

The pressure upon the metal passing between the rolls may be adjusted by means of adjusting-screws *l*. The cutting-edges of the metal parting-rolls are adjusted and held in position after adjustment, so as to properly cut said metal when the rolls are in operation, by means of set-screws *d′ d′*, fitted in the bearings of the rolls, and arranged to press or bear longitudinally against said rolls.

The guides S S′, for directing the wire rod from one pair of rolls to the next, are arranged and supported on slotted cross-bars T, secured to the housings, and which may be adjusted laterally upon said supporting-bars. As the construction of these guides, as well as the operating gearing and other parts connected with the housings, are old and of well-known construction, no further description in relation to the same is here necessary.

In Fig. 7, I have represented only so much of a Belgian mill as is necessary to illustrate my invention applied to the same. The different sets of rolls are represented as being provided with similar-shaped grooves to those before described, the passage or course of the metal between said rolls indicated by the dotted lines N N′ N².

In lieu of the dividing rolls or devices D being formed as herein shown, any suitable mechanism capable of effecting equivalent results in the separation of the rod may be employed.

By my improved machinery rods produced by the old method and means of rolling may be reheated and reduced to small size, the preliminary reducing-rolls being in such cases of course omitted.

What I claim as of my invention and desire to secure by Letters Patent is—

1. In a machine for forming wire rods, the combination, substantially as hereinbefore described, of rolls for reducing the billet or bar into a series of ribs or incipient rods joined by longitudinal webs, a mechanism for shearing or dividing the partially-reduced rods along said webs into separate longitudinal strands, and means for imparting to each separate strand the finished form as an independent wire rod of small size.

2. The combination, in a continuous or other wire-rod rolling-mill, of pairs of rolls A, B, C, D, E, and F, having reducing and shaping grooves G′, H′, I′ I′, E′ E′, F′ F′ and cutting-edges *d d*, for reducing, shaping, and parting the partially-reduced metal while still hot to form two separate wire rods, L L, of equal size, from number ten to twelve, or less, wire gage, substantially as shown and described.

3. The combination, with the reducing and shaping rolls and their respective grooves, of parting-rolls D D, or their equivalents, provided with suitable cutting-edges, substantially as and for the purpose set forth.

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Witnesses:
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ALBERT A. BARKER.