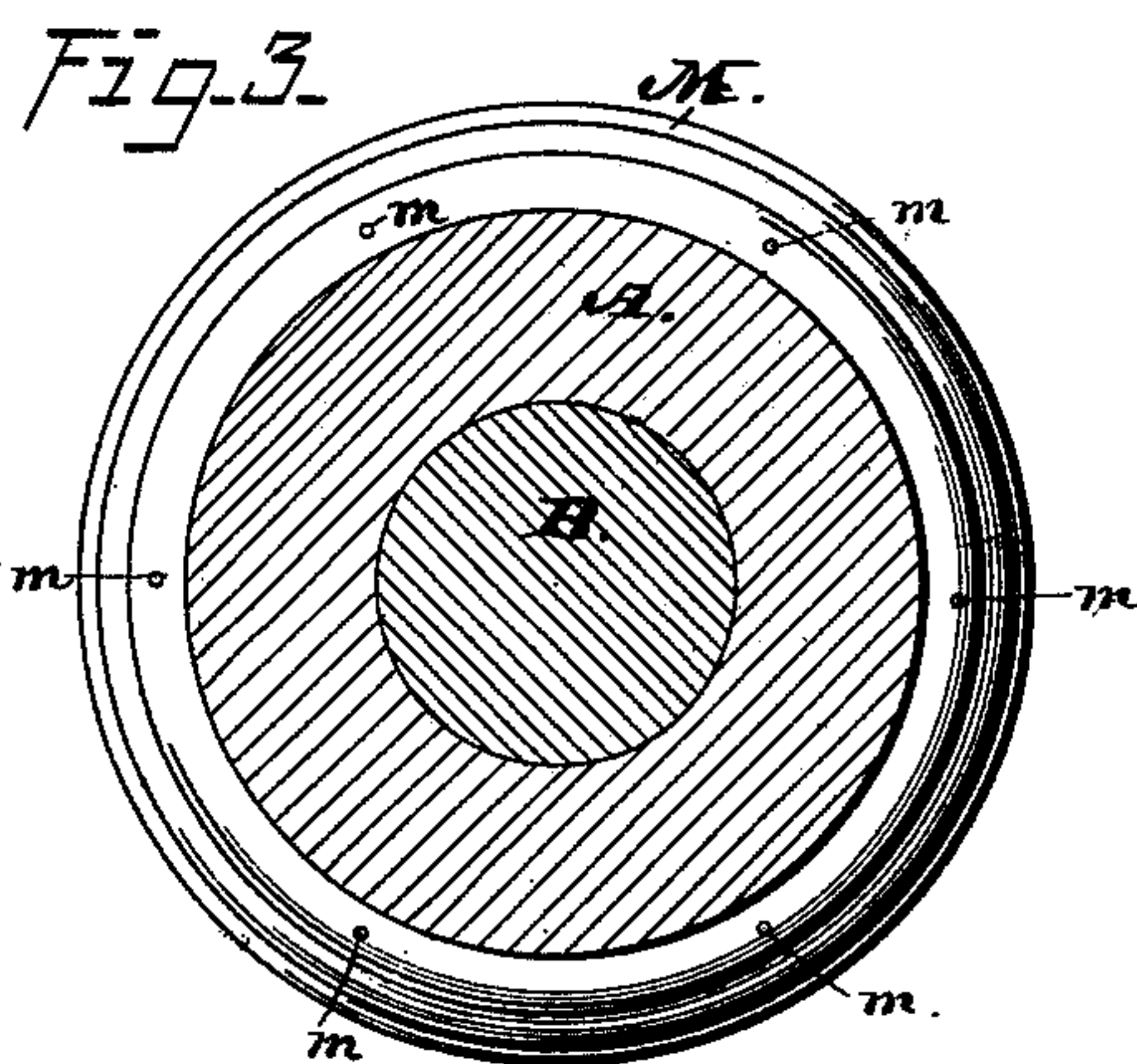
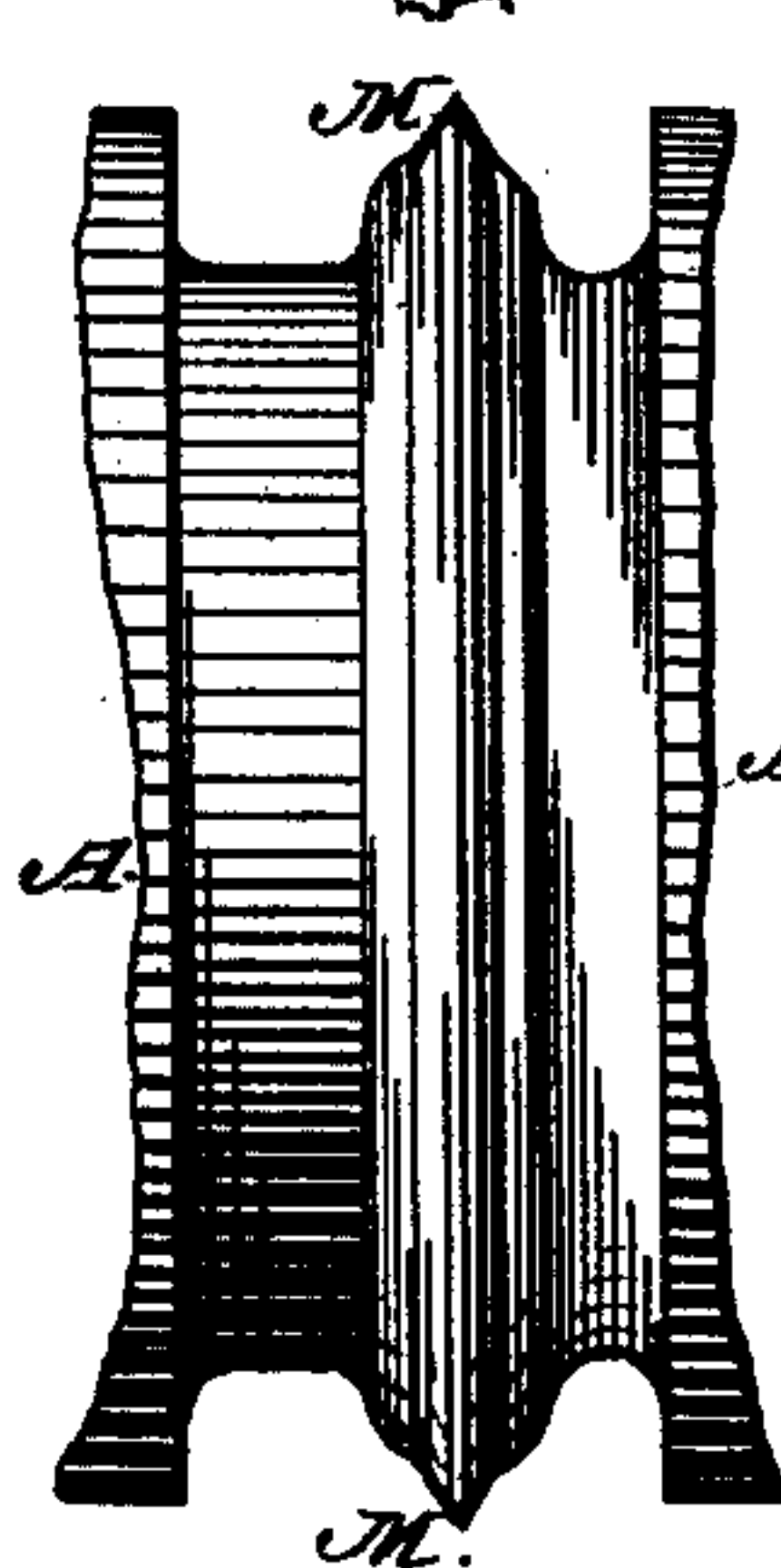
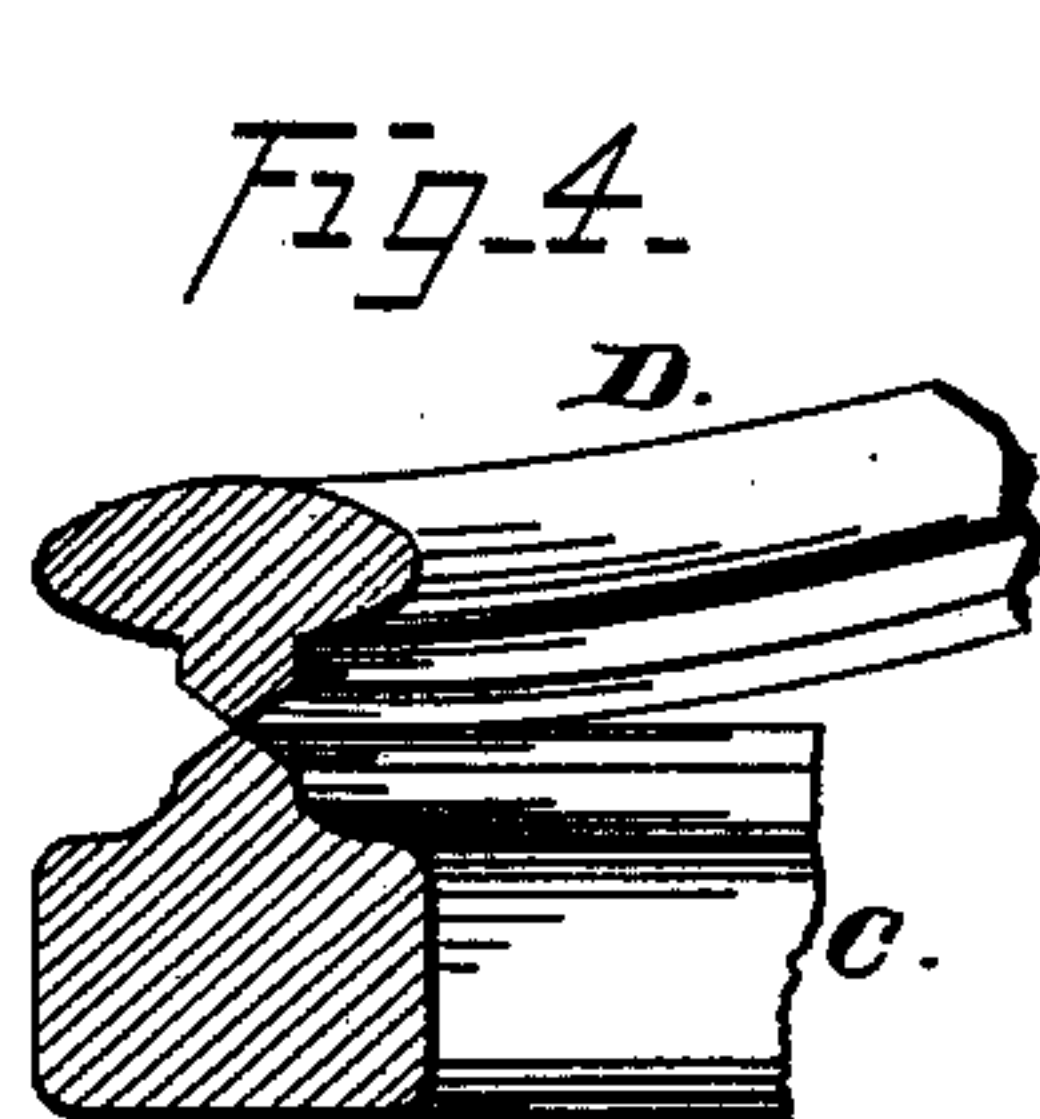
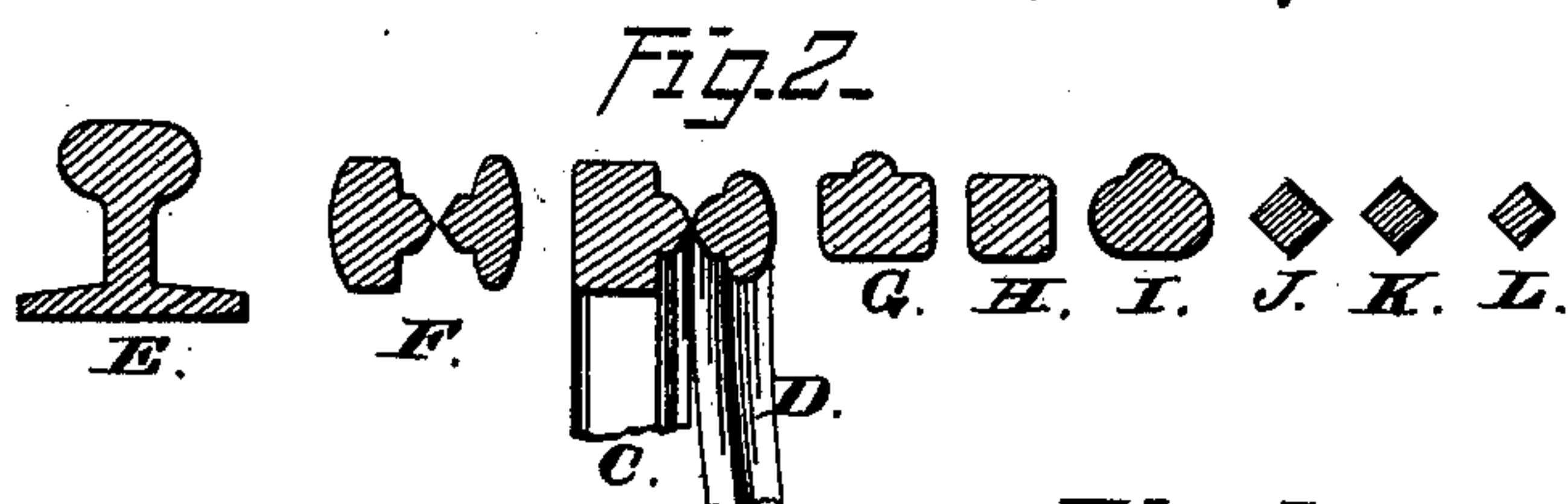
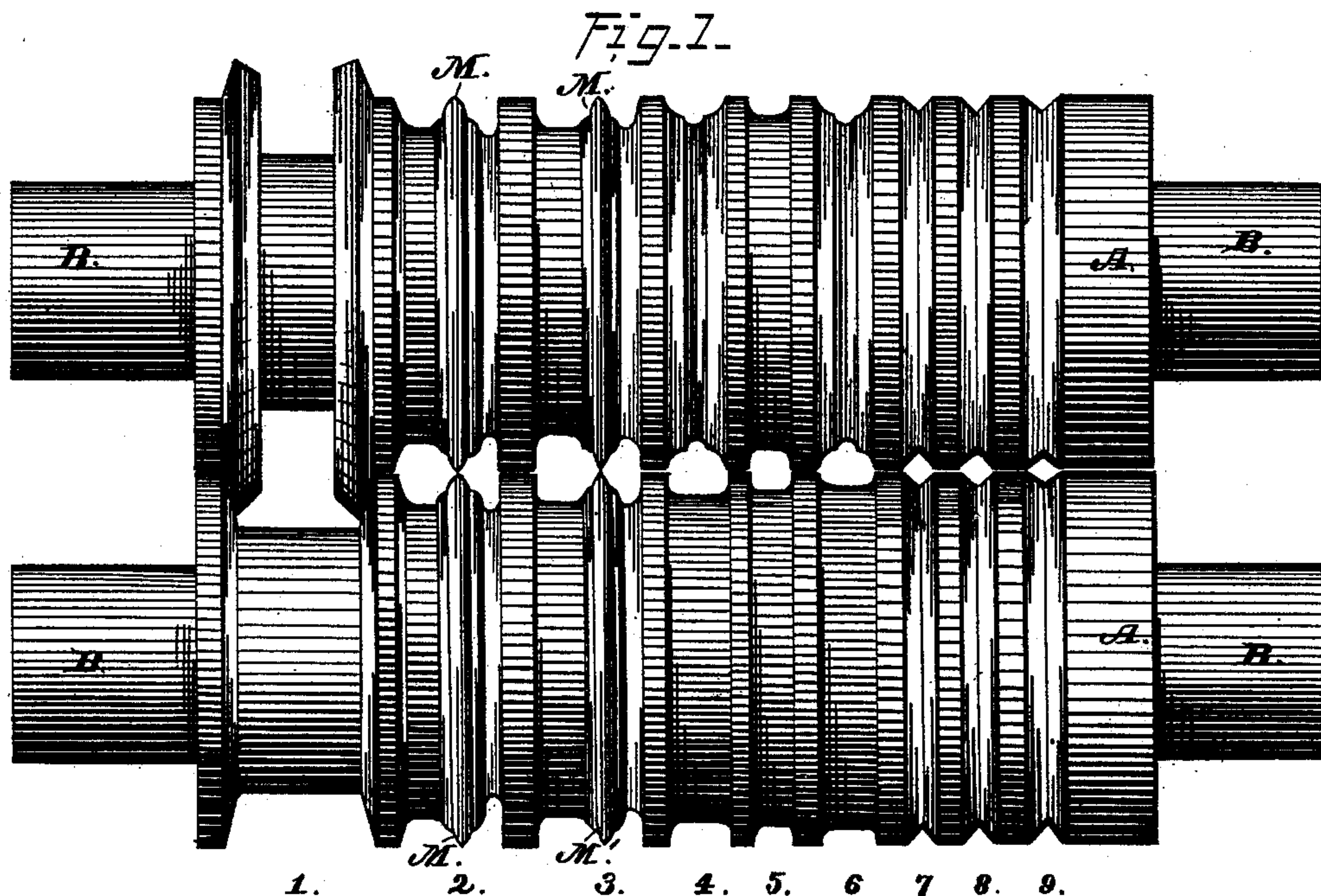


P. & W. B. HAYDEN.  
Machine for Splitting Railway-Rails.

No. 219,722.

Patented Sept. 16, 1879.



WITNESSES-

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# UNITED STATES PATENT OFFICE

PETER HAYDEN, OF NEW YORK, N. Y., AND WILLIAM B. HAYDEN, OF COLUMBUS, OHIO.

## IMPROVEMENT IN MACHINES FOR SPLITTING RAILWAY-RAILS.

Specification forming part of Letters Patent No. **219,722**, dated September 16, 1879; application filed April 16, 1877.

*To all whom it may concern:*

Be it known that we, PETER HAYDEN, of the city, county, and State of New York, and WILLIAM B. HAYDEN, of Columbus, in the county of Franklin and State of Ohio, have jointly invented a new and useful Improvement in Metal Rolls for Rolling and Splitting Metal Bars and Railway-Rails, which improvement is fully set forth in the accompanying specification and accompanying drawings, in which—

Figure 1 is a front elevation of a pair of rolls constructed according to our invention. Fig. 2 shows a series of cross-sections, including a railway-rail before being split and the separate portions thereof after being passed through the different grooves or passes of the rolls. Fig. 3 is a detail view of the scoring-pass of one of the rolls and a cross-section of the same, illustrating the preferred mode of securing the scoring-ring to the roll. Fig. 4 is a partial perspective view of a rail after passing through the tearing-pass at 3 in Fig. 1.

The special object of our invention is to split and reduce old steel railway-rails to merchantable bar steel at a single heat and without distorting or injuriously disarranging the fiber thereof, or of forming a fin at the severed edge or edges, though it is also applicable to the splitting and reduction of other metal bars.

Heretofore it has been customary in splitting steel railway-rails preparatory to reducing them to bar steel to separate a rail longitudinally through the web into two parts at a single pass by means of cutters, the head and base or flange being undisturbed or left in their original shape and size during the splitting. Owing to the crushing action of the knives or shears there is a considerable drawing and deflection of the fibers of the web at and near the severed edges, and a thin fin is usually formed.

The disarrangement of the fiber has been found to result in a lack of homogeneity in the parts of the rail, which cannot be overcome by subsequent rolling in further reducing said

parts, and the fin cannot be upset or forced into the mass to join perfectly therewith, but must be folded thereupon by rolling, and will form a seam impossible to be eradicated.

Owing to these difficulties in the way of their reduction it has been impossible to convert old steel rails into first-class bar steel. These difficulties occur in the splitting and reduction of other metal bars besides railway-rails, and in overcoming them our invention consists in, first, the process of splitting a metal bar by first scoring the same partially through, and then compressing and elongating the portion of the bar on one side of the score, whereby the parts of the said bar are torn asunder, and the formation of a fin and distortion of the fiber, which would result from cutting through the bar, is avoided; second, the process of splitting a metal bar, substantially as hereinafter described, the same consisting in first scoring the bar partially through and simultaneously compressing and elongating the portions of said bar on each side of the score, and then compressing and elongating the portion of the bar on one side of the score, whereby the two portions are torn asunder, and the forming of a fin and distortion of the fiber ordinarily resulting from cutting through metal are avoided, and the severed edges left in condition to be subsequently rolled smooth without seams; third, rolls provided with a pass with scorers for scoring the rail or bar at or near its center and simultaneously reducing the portions on both sides of the score with a pass for tearing the two portions asunder, and with a series of passes for effecting the reduction of the severed portions, substantially as hereinafter described.

To split and work up a rail, bar, or bloom we form the rolls with such shaped grooves as required by successive action to give the parts the desired size and cross-section.

In the accompanying drawings, the letter A designates a pair of metal rolls adapted for reducing steel railway-rails, and B the journals thereof.

The numerals 1, 2, 3, 4, 5, 6, 7, 8, and 9



designate the various passes of the rolls and indicate the order of their use.

In Fig. 2 the letter E designates a cross-section of a railway-rail commonly known as a "T-rail." Such a rail, after being heated, is to be passed through pass 1 of the rolls, its base being flat on the lower roll. This reduces the rail to a proper height to be passed through 2.

At about the middle of pass 2 there is in each roll a scoring-knife, M, the preferable manner of securing which will be hereinafter described. These knives or scorers are of such a height as simply to score the web of the rail or bar on each side on directly opposite lines, but not to cut through the rail or bar; and the grooves on each side of the scorers are of such size and the rolls so set as to reduce and elongate the portions of the rail or bar on each side of the score simultaneously with the formation of said score, so that a corresponding elongation and tension of the fiber of the parts will be produced from edge to edge, and said fiber will not merely be elongated and deflected at the severed edges by the crushing or drawing action of the scorers.

The letter F, Fig. 2, indicates the cross-section of rail after passing through pass 2, the web being scored longitudinally on each side, but the two parts not severed. Now, to separate these two parts, the scored rail is passed through pass 3, the groove on the left of scorer M' being of such size as to permit the base portion *c* of the rail to pass easily and without reduction, while the groove at the right of the scorer M' is of such size as to compress and elongate the head portion D of the rail, and, consequently, to tear it from the part *c*, as illustrated at Fig. 4 on the line of the score.

The scorers M' may, in a machine for splitting thick bars or rails with very thick webs, be high enough to give the score an additional depth as the bar or rail is put through pass 3; but usually we prefer that said scorers shall simply form a partition of the pass and serve as a guide. The parts being thus separated, the part *c* is then run through pass 4, and assumes the cross-section, as approximately shown at G, and the part D should be simultaneously run through pass 6, assuming approximately the cross-section shown at I. The two parts may then be successively passed through pass 5, assuming the cross-section shown at H. Then the two parts may be passed simultaneously through passes 7 and 8, and reduced to cross-section as shown at J K, and if further reduction is desired the parts may be successively passed through pass 9 and assume a smaller cross-section, as indicated at L; or one of the parts may be passed through pass 9, and the other left as formed by a preceding pass.

The grooves 7, 8, and 9 are of such shape and relative arrangement as to compress all

the parts of the bars toward a central line, thus making a very compact bar.

The forms of the various passes may, of course, be varied to produce bars of desired shape and size.

In providing the rolls with the scoring-knives, we preferably make steel rings of such size and form as may be required for the work to be performed; countersink or make holes near their inner edges, as shown at *m*, Fig. 3.

The rings should be of sufficient breadth to be firmly held by the cast-iron, and when properly prepared, they are placed in the sand molds made for the rolls at the points desired—that is, at about the middles of the passes 2 and 3—and extending inward into the cavity of the molds.

When the molten metal is poured into the molds, it flows around the inward-projecting portions of the rings and into the countersinks or holes, embracing the inner edges of the rings and holding them firmly.

While we have found this method of securing the scorers very effective, we do not claim it as our invention, and may use other methods as well.

The results obtained by our improved process and devices are very important.

The splitting of a metal bar by our process and by means of our devices in process of its reduction in size, facilitates the operation, leaves the metal where sundered in a perfect condition for subsequent rolling, and enables the operator to produce two or more perfect bars free from seams or defects caused by fins, and all at one heat and in one pair of rolls.

It is obvious that a great saving is effected in fuel and labor in the working of a large bar or bloom, when it is to be split up to form several smaller bars, or in the reworking of railroad-bars. These, owing to their peculiar shape, (being mostly of the T-form,) composed of thick and thin masses, cannot be successfully formed into round or square iron bars as a whole, as the welding of the parts would be imperfect; but by means of our process and devices they are so divided and worked that perfect bars are produced.

What we claim is—

1. The process of splitting a metal bar by first scoring the same partially through, and then compressing and elongating the portion of the bar on one side of the score, whereby the parts of the said bar are torn asunder, and the formation of a fin and distortion of the fibers which would result from cutting through the bar are avoided.

2. The process of splitting a metal bar, substantially as herein described, the same consisting in first scoring the bar partially through, and simultaneously compressing and elongating the portions of said bar on each side of the score, and then compressing and elongating the portion of the bar on one side of the score,



whereby the two portions are torn asunder, and the forming of a fin and distortion of the fiber ordinarily resulting from cutting through metal are avoided, and the severed edges left in condition to be subsequently rolled smooth without seams.

3. Rolls provided with the pass, with scorers for scoring the rail or bar at or near its center, and simultaneously reducing the portions on both sides of the score, jointly with the pass for tearing the two portions asunder, and with

a series of passes for effecting the reduction of the severed portions, substantially as described.

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