

(No Model.)

J. GREEN.
SHAFT OR BAR IRON.

No. 504,431.

Patented Sept. 5, 1893.

Fig. 1

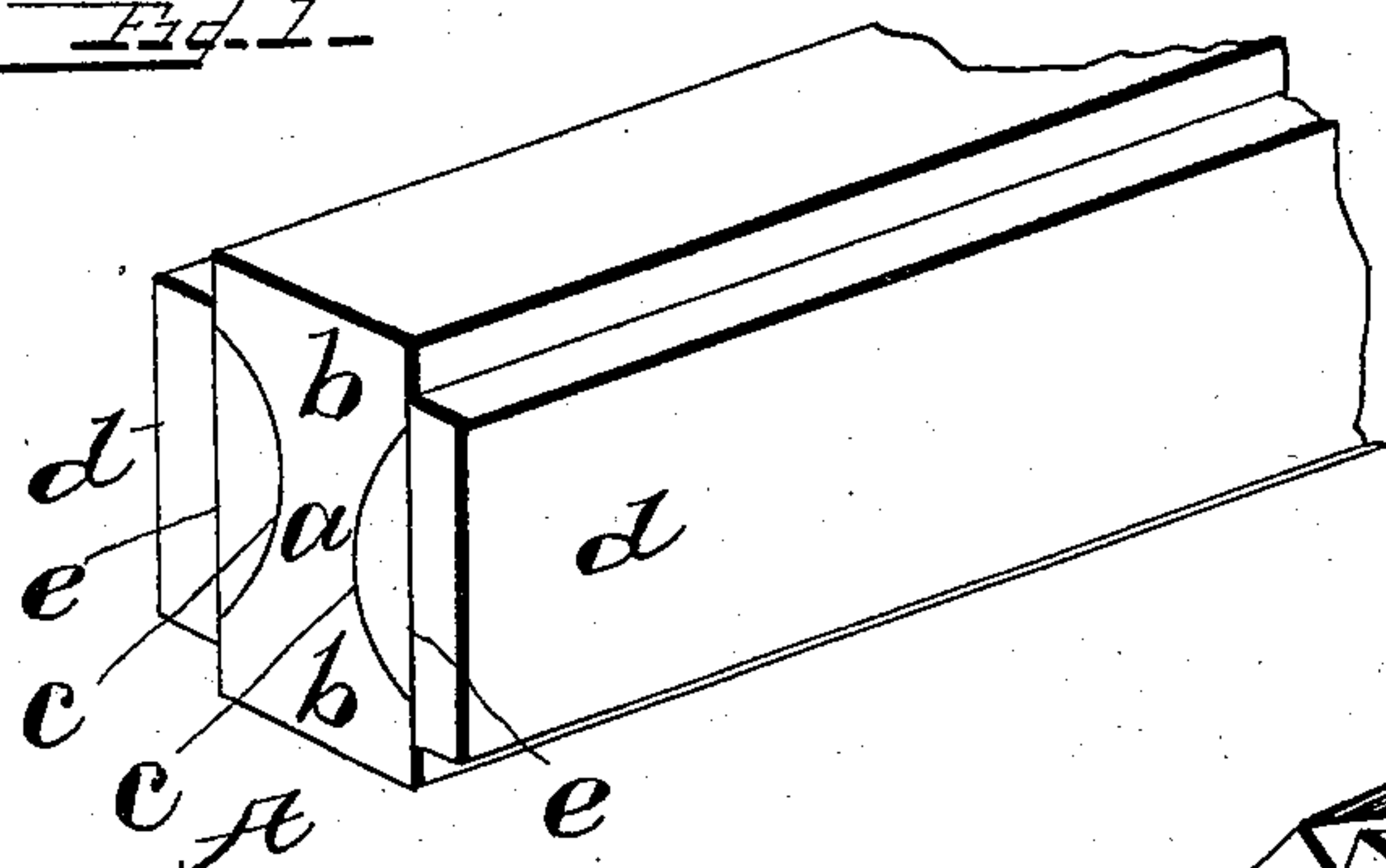


Fig. 2

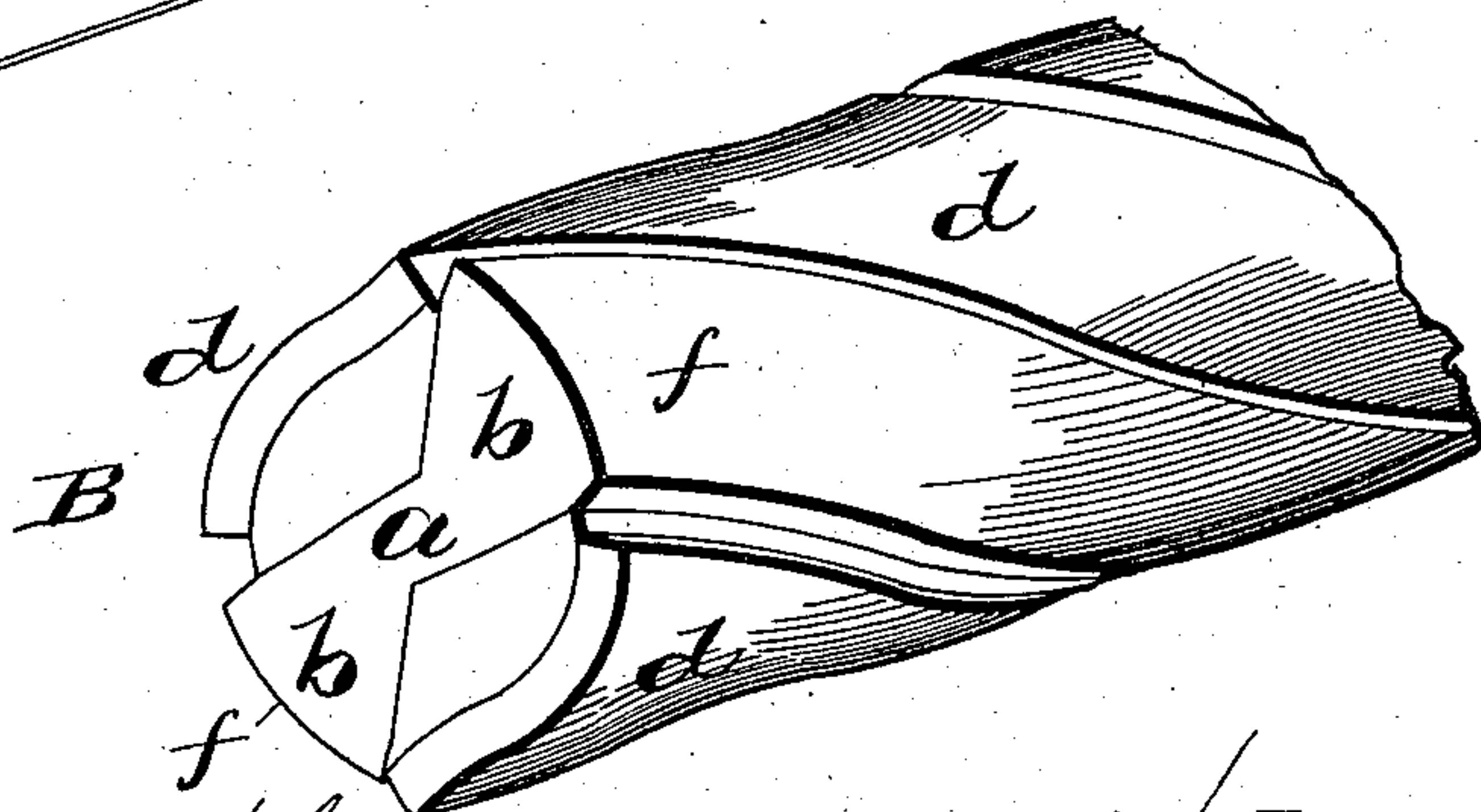


Fig. 3

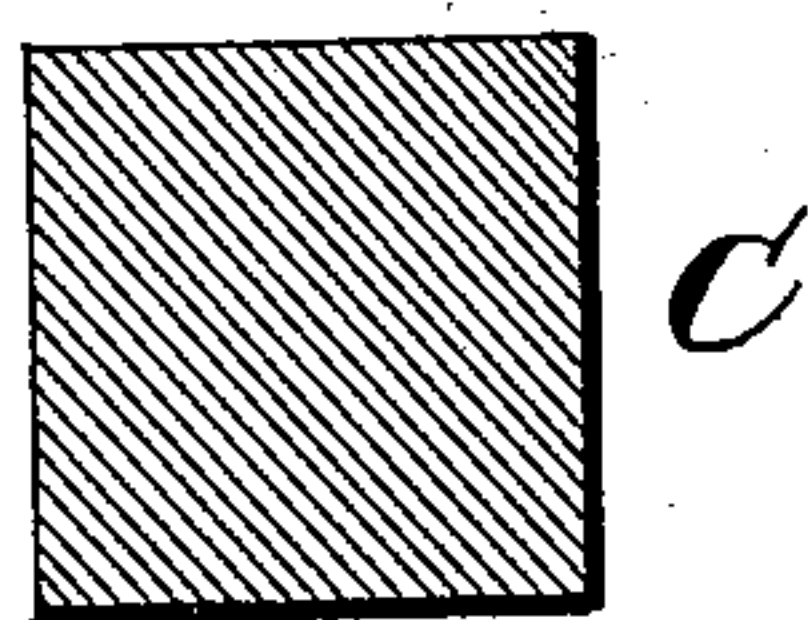


Fig. 4

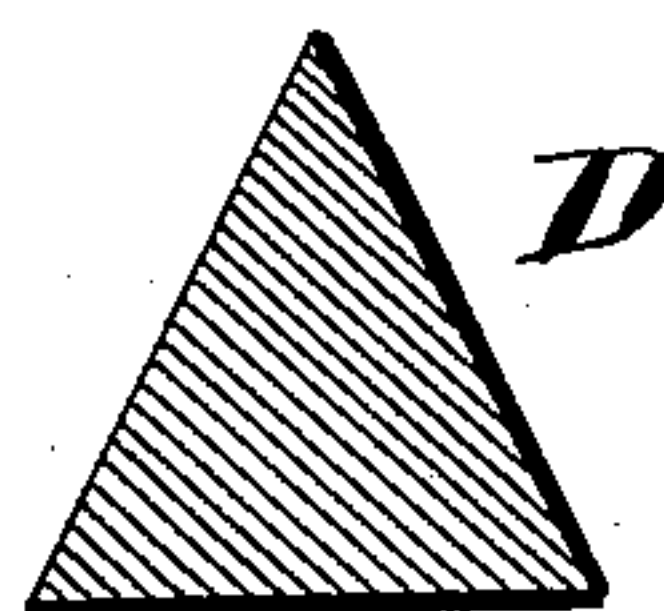


Fig. 5

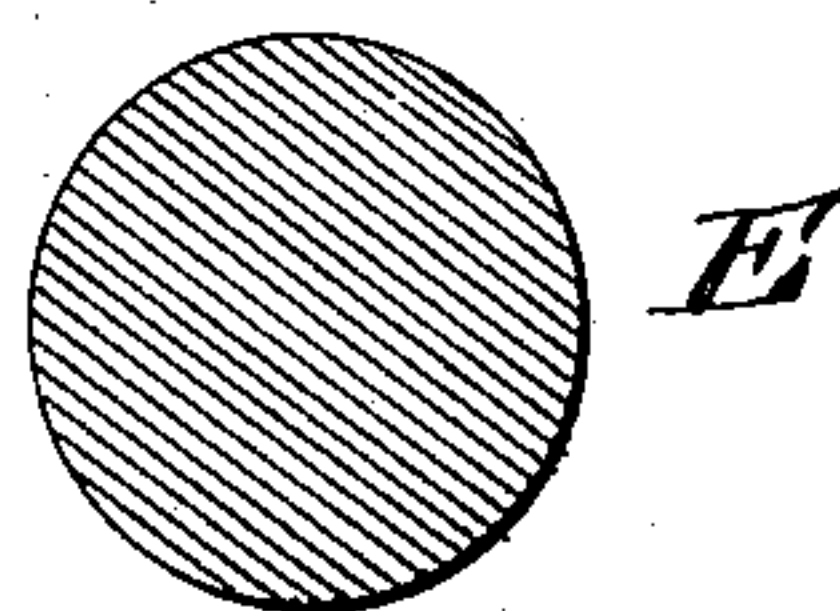


Fig. 6

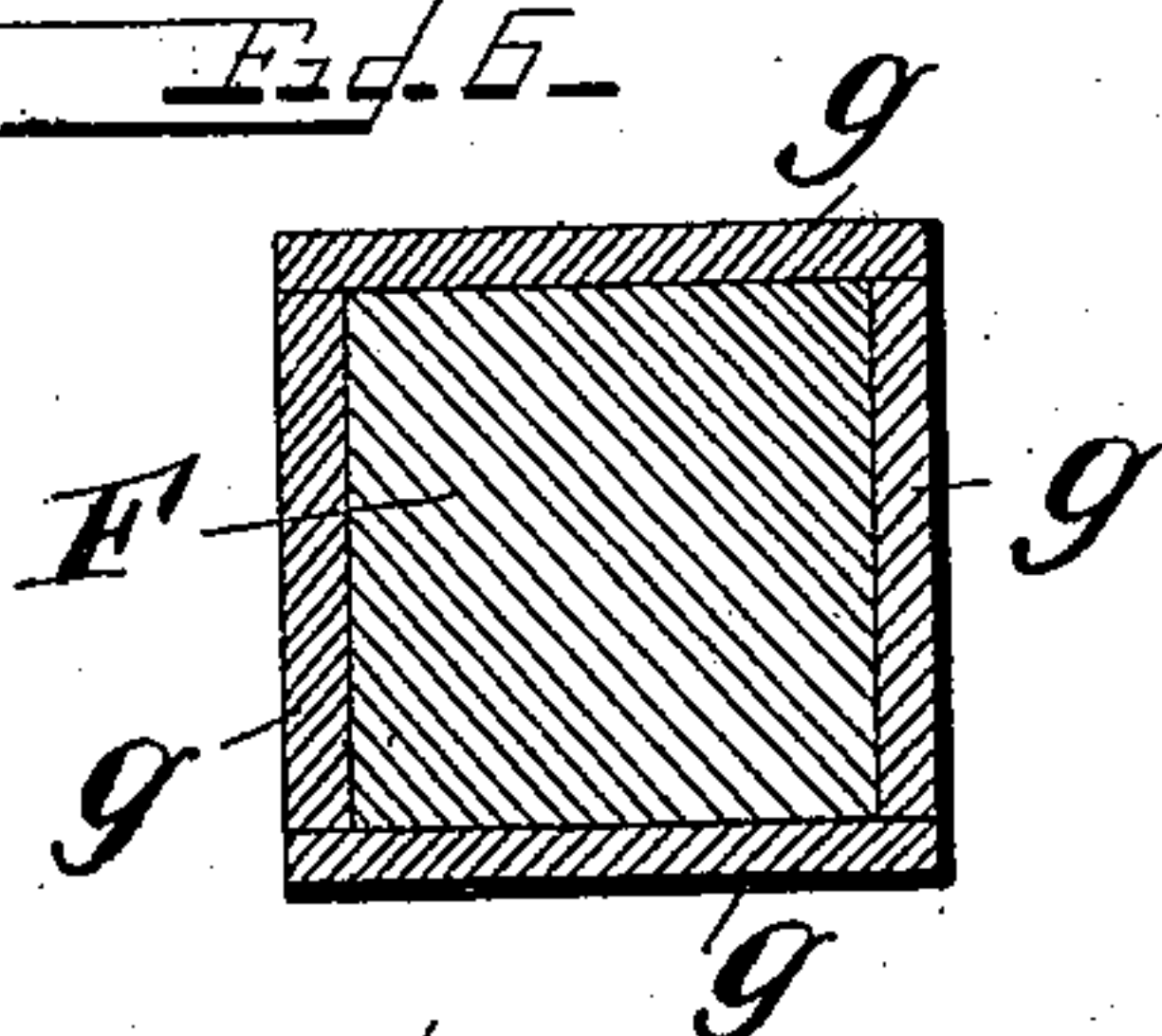


Fig. 7

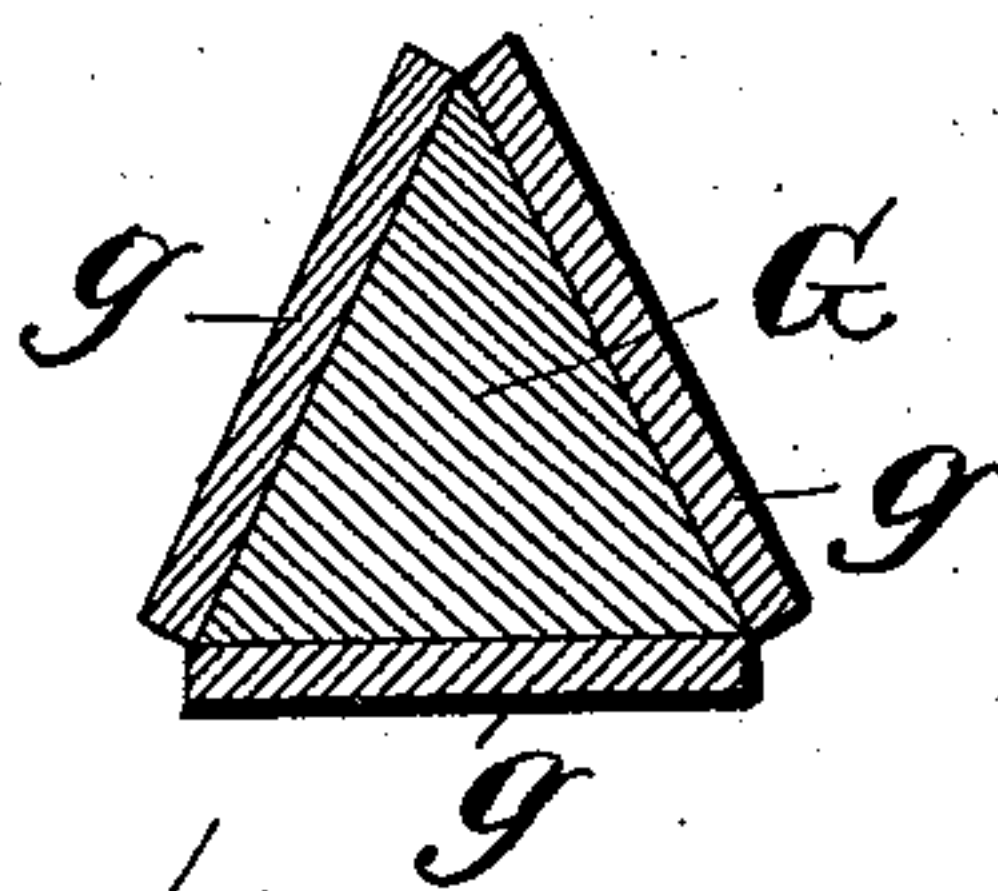


Fig. 8

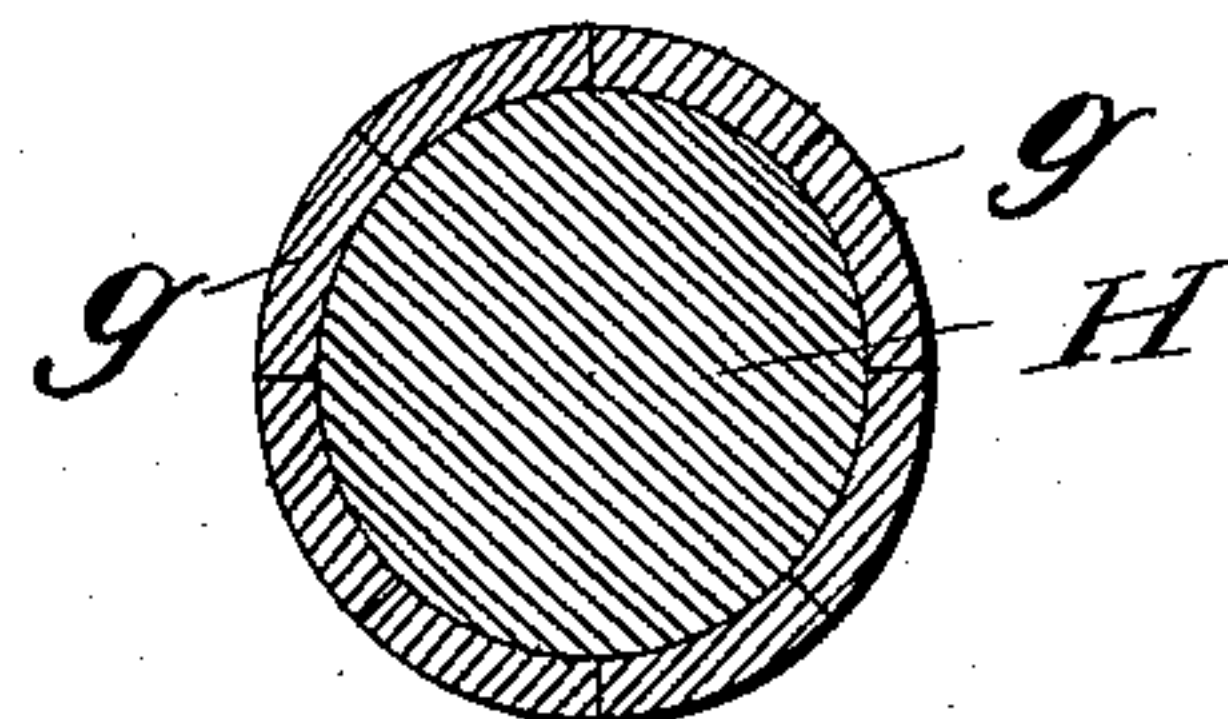


Fig. 9

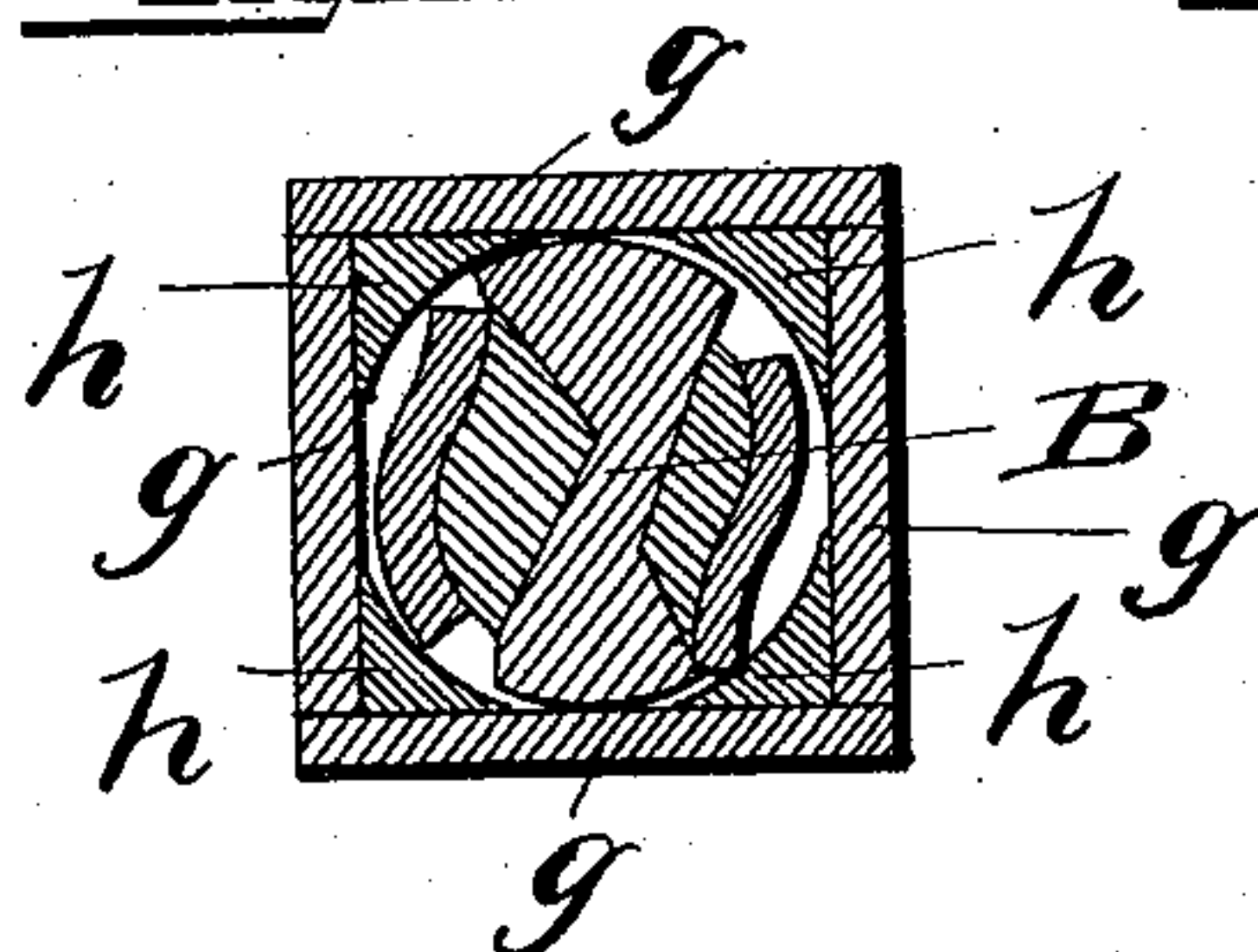
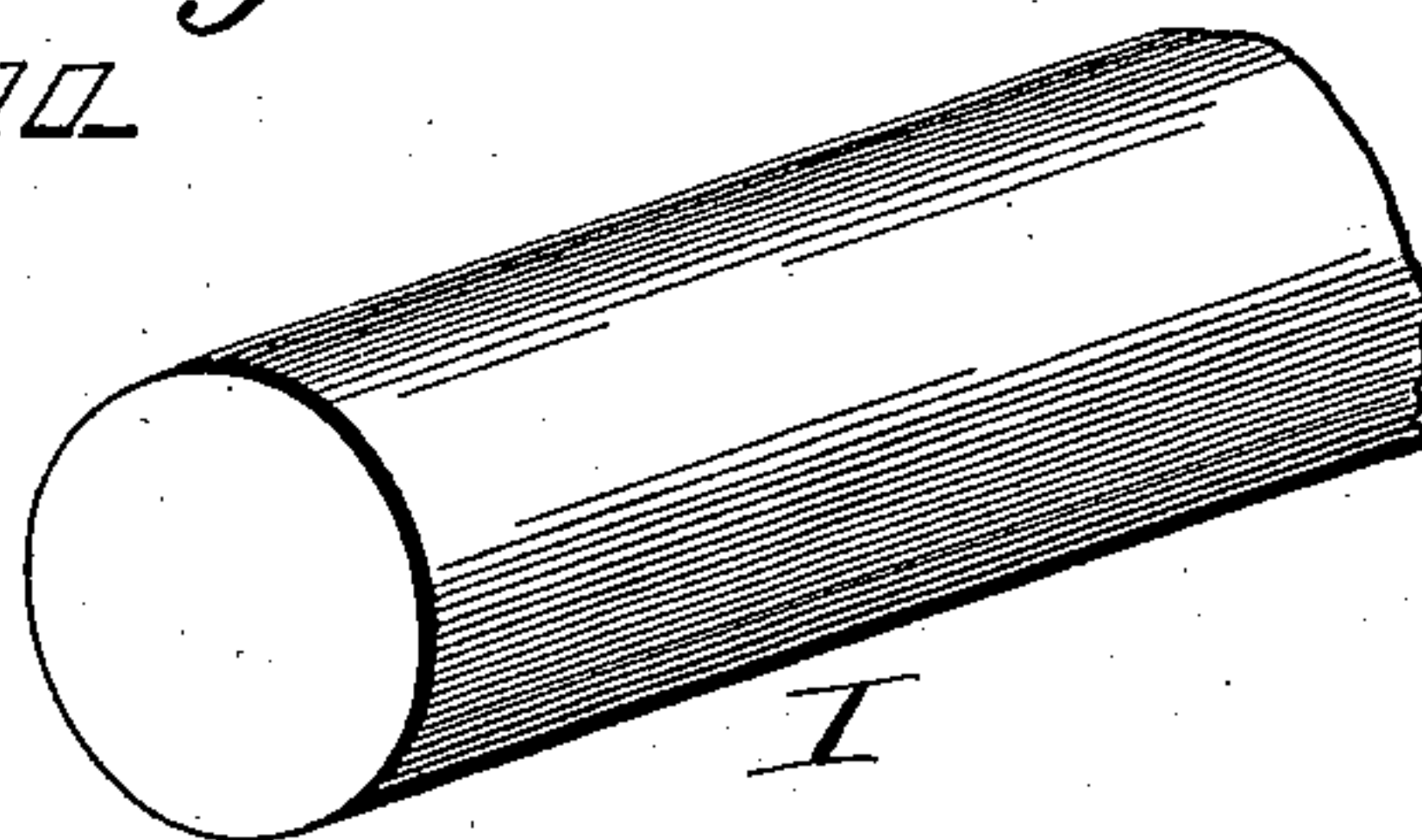


Fig. 10



Witnesses
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UNITED STATES PATENT OFFICE.

JOHN GREEN, OF RENOVO, PENNSYLVANIA.

SHAFT OR BAR IRON.

SPECIFICATION forming part of Letters Patent No. 504,431, dated September 5, 1893.

Application filed March 15, 1893. Serial No. 466,033. (No model.)

To all whom it may concern:

Be it known that I, JOHN GREEN, a citizen of the United States, residing at Renovo, in the county of Clinton and State of Pennsylvania, have invented certain new and useful Improvements in Shaft or Bar Iron; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My present invention relates to shaft or bar-iron designed for general use where great strength and resistance to crystallization is required, as in engine shafts, shafting for machinery, car-axles, locomotive and bridge iron, and has for its object the construction of composite shaft or bar-iron, which may be of any desired configuration and in which the core or center of the bar shall be twisted and said core surrounded by a body of metal forming its outer surface.

In the practical use of shaft or bar-iron subject to weight, jar, or vibration the metal crystallizes from the center outward and consequently the first breakage of the iron is at the center, from which it extends to the surface. It is my purpose to construct shaft or bar-iron with the strongest metal at the part of the shaft or bar subject to the greatest strain and where the break or fracture usually commences, so that the tendency to crystallization shall be reduced to the minimum.

Shaft or bar-iron of my construction is especially adapted for use in manufacturing car-axles, which, to overcome the effect referred to have been increased in diameter, where iron axles are used, or steel axles substituted for iron.

The invention will be fully disclosed in the following specification and claims.

In the accompanying drawings which form part of this specification Figure 1 is a perspective of a pile for making my improved shaft or bar-iron; Fig. 2 a like view of the pile after it has been twisted; Figs. 3, 4, and 5 transverse sections of the pile after it has been welded and forged or rolled into different forms; Figs. 6, 7, and 8 like views of the welded pile with pieces of metal applied preparatory to welding to form the outer surface of the shaft or bar-iron; Fig. 9, a like view of a

modification, and Fig. 10 a perspective of a shaft or bar of iron such as are usually employed for making car-axles.

Reference being had to the drawings and the letters thereon A indicates a pile composed of a center piece *a* having heads *b b* on both edges and grooves *c c* on both sides between the heads, which piece is preferably rolled into form and severed into suitable lengths. On the sides of the center-piece *a* are pieces *d d* which may be rolled in one piece, or they may be in two pieces separated on the line *e*. The several parts composing the pile A are secured together in the usual manner preparatory to heating.

B, indicates the pile after it has been twisted and in which the edges *f f* of the heads *b b* and the side pieces *d d* alternate in the circumference of the pile, and present the edge and the side grain of the metal which when formed into a homogeneous mass by forging or rolling has the effect of greatly augmenting the strength of the bar by one bracing the other. The pile B may now be subjected to a welding heat and the pieces *a* and *d d* firmly welded together either by forging under a hammer or by rolling and reducing the welded pile into the square form C, the triangular form D, the cylindrical form E, or any other desired form.

F, G, and H indicate the welded pile provided with pieces of metal *g g* preparatory to welding said pieces to the piles which now constitute the core or center of the new pile and subsequently becomes the core or center of the bar-iron I Fig. 10. The pieces *g g* surround the core and when welded thereto, constitute the outer surface of the bar, and serve to brace or augment the strength of the bar.

While I prefer to weld the parts comprising the twisted pile B, before welding the pieces *g g* thereto, these pieces *g g* may be applied to the pile B before welding, as shown in Fig. 9 and filling pieces *h h* inserted. In this construction all the parts may be welded at one operation, and may be practiced in large forgings, such as engine-shafts or other heavy forgings.

In manufacturing shafts or bars, the core should constitute from one half to two thirds of the body, and in heavy work the parts com-

prising the pile may be twisted separately before assembling them in a pile.

Having thus fully described my invention, what I claim is—

- 5 1. The method of making shaft or bar-iron, which consists in forming a twisted core, enveloping said core in metal and welding the metal to the core.
2. The method of making shaft or bar-iron
10 which consists in forming a pile, twisting the pile, surrounding the pile with pieces of metal and welding said pieces to the pile.

3. Shaft or bar-iron having a twisted core enveloped in metal.

4. Shaft or bar-iron having a composite body 15 consisting of an inner twisted body or core and an outer body enveloping the core and welded thereto.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN GREEN.

Witnesses:

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