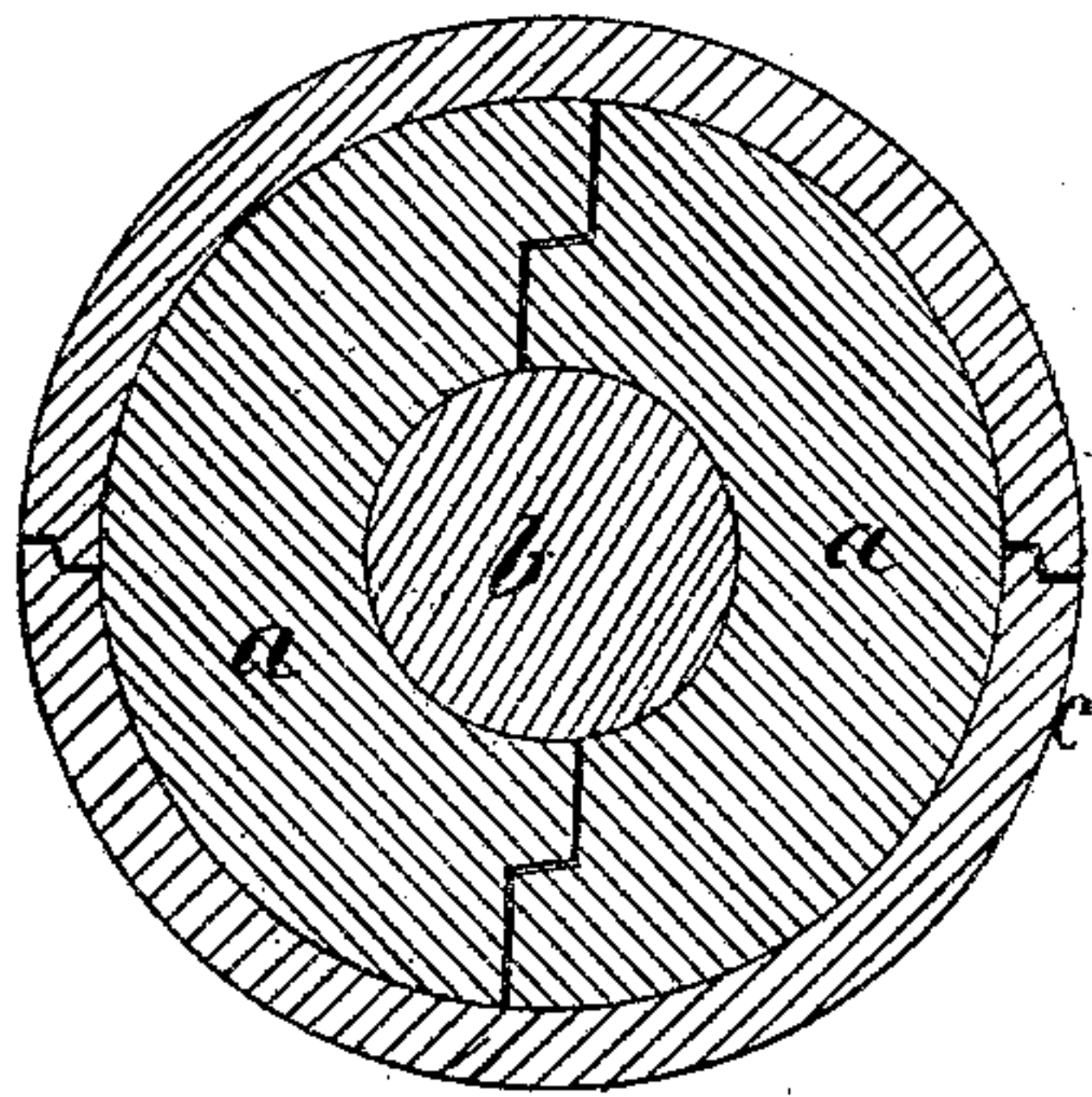
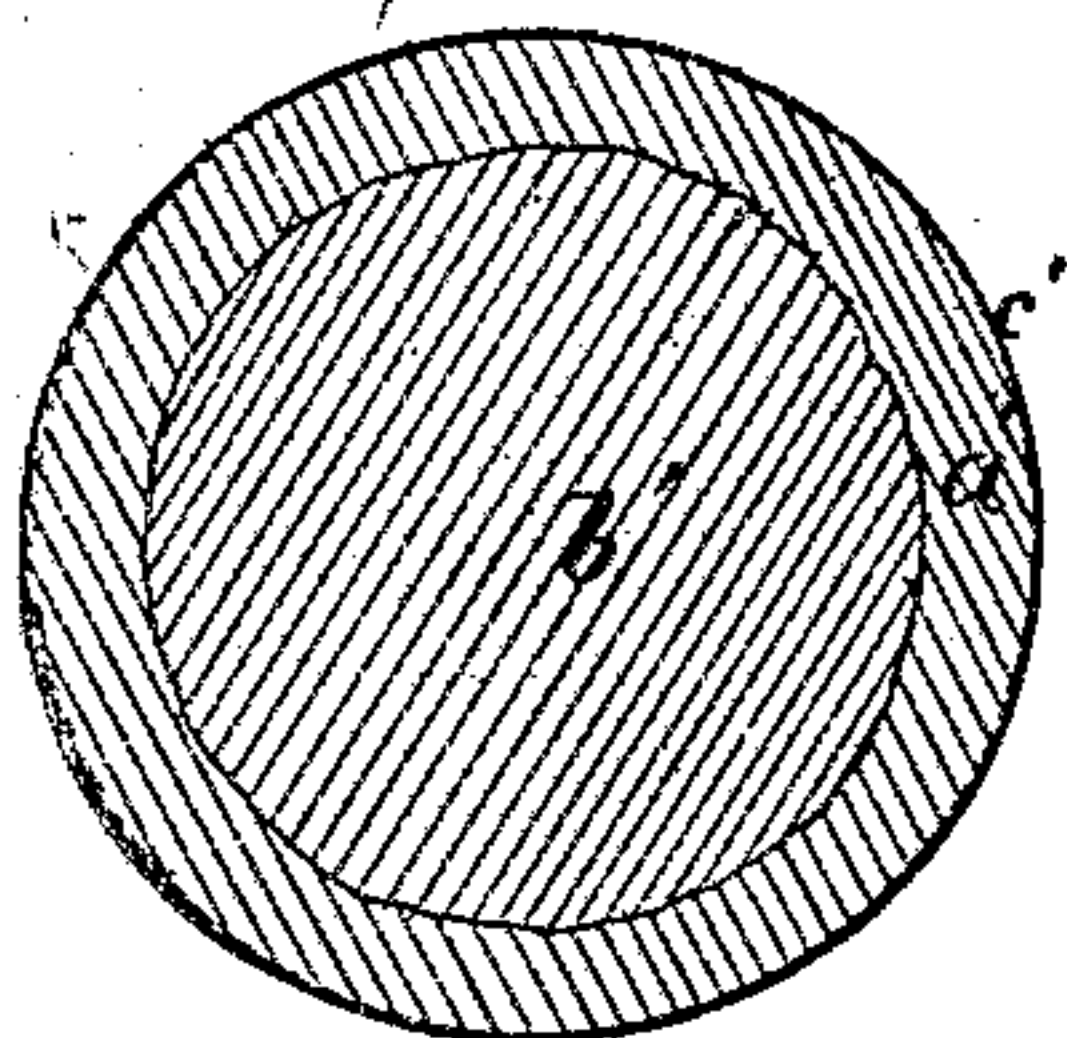


E. WHEELER.  
 Combined Iron and Steel Bar.  
 No. 104,237. Patented June 14, 1870.

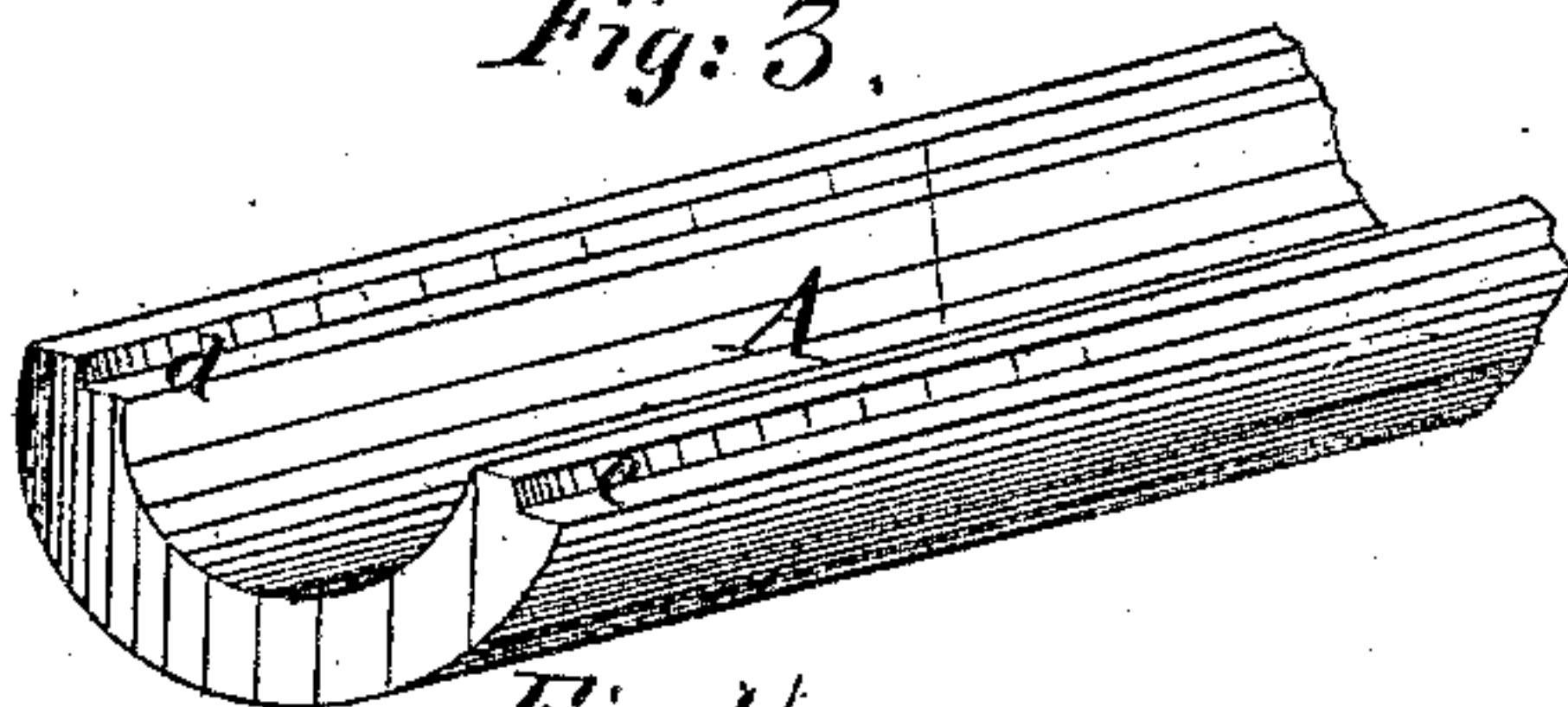
*Fig:1.*



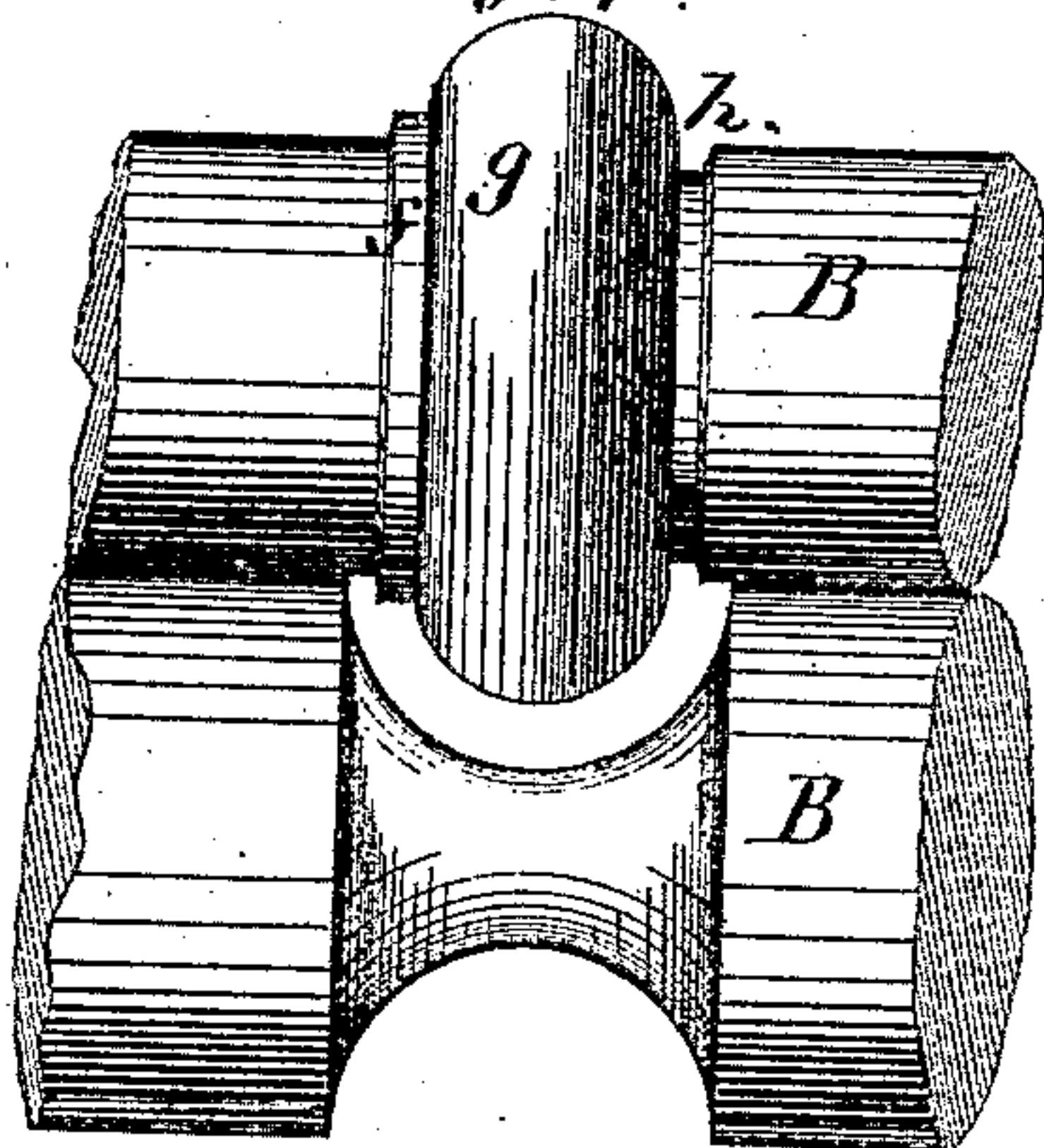
*Fig:2*



*Fig:3.*



*Fig:4.*



Witnesses:

*M. Wilbur*  
*Geo. E. Brook*

Inventor:

*Elbridge Wheeler*  
 PER *Wm. M. Munn*  
 Attorneys



# UNITED STATES PATENT OFFICE.

ELLRIDGE WHEELER, OF HUDSON, MASSACHUSETTS.

## IMPROVED COMBINED IRON AND STEEL BAR.

Specification forming part of Letters Patent No. **104,237**, dated June 14, 1870.

*To all whom it may concern:*

Be it known that I, ELLRIDGE WHEELER, of Hudson, in the county of Middlesex and State of Massachusetts, have invented a new and useful Improvement in Combined Iron and Steel Bars; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to make and use the same, reference being had to the accompanying drawing, forming part of this specification.

This invention relates to improvements in the manufacture of metal bars, having for its object to provide merchantable bars of combined iron and steel of the particular description hereinafter set forth, and of any size, shape, and length, the two metals being permanently welded, and adapted for working by the common method into any required articles.

The invention contemplates the production of these bars by a union of steel and iron by heat and rolling simply, avoiding the use of a hammer or fluxes in the process of welding, the preliminary rolling of the several parts of the fagot from which the bars are made, so that each and every part shall accurately fit the others, and also in proportioning and placing the several parts of iron and of steel in the fagot, and of manipulating the fagot so that they shall retain their relative position longitudinally and radially during the reduction of the fagot to the finished bar.

These bars I produce by the following method: I take a core of iron of suitable size, around which I place two half-tubes or saddles of steel, which are previously formed to the proper shape, and around the steel thus placed I place two half-tubes or saddles of iron, which are also previously formed to the requisite shape.

These several parts form my fagot, which can be heated in any ordinary heating-furnace used for heating iron without danger of injury to the steel portions, as the outside tube of iron protects the same.

I make my half-tubes of both iron and steel, of a peculiar shape, so as to facilitate welding, and also proportion their thickness in the fagot to any required thickness in the finished bar.

The steel half-tubes are rolled from a steel ingot or pile, or rolled to the required shape in iron, and then converted through their en-

tire mass into steel. This latter method is the one I preferably employ, as the peculiar shapes required for my half-tubes or saddles are more easily and cheaply produced in iron. These half-tubes are rolled to any convenient length, say thirty or forty feet, by means of rolls, which are shown in the accompanying drawing, and are so constructed that, when cut into sections of the proper length for a given fagot, any and each section will form either the upper or lower half of the sectional tube. These sectional tubes or saddles are made to form a cylinder, a square, or a polygon, as may be best adapted for the finished bar required.

I do not confine myself to the proportion of the several parts of the above-described fagot, but modify according to the bar desired.

The above-described fagot is intended to produce a bar having a core of iron surrounded by a tube of steel, which latter is itself surrounded by a thin and uniform shell or coating of iron welded thereto.

In all cases I produce a combined iron and steel bar having an exterior surface of iron, and the object and improvement in so doing are that in any subsequent reworking of the combined bar by the smith or artisan the exterior shell of iron protects the steel in the forge or furnace from decarbonization or burning, enables the artisan to employ a greater degree of heat than if the steel were exposed directly to the flame, and thus renders it more malleable and more readily manipulated than at the low temperature at which exposed steel can be safely heated. Again, the exterior surface of iron greatly facilitates the process of welding the bar to itself or to other bars or masses of iron or of steel, and obviates the necessity of using borax or fluxes and chemicals now in general use to obtain a weld and to protect the steel from injury.

Where the combined iron and steel bar is manipulated by machinery, as for axles, shafting, engine-slides, &c., the exterior iron surface is turned or planed off, leaving a fine polished surface of steel for wear or friction, and the operation of turning or planing is accomplished more rapidly, easily, and cheaply by working off an iron chip than if the exterior were of steel.

Figure 1 is an end view of the fagot intended for a bar having an iron center surrounded by



a steel tube, which is itself covered by a circum-jacent shell or coat of iron. Fig. 2 represents a completed bar made as described. Fig. 3 represents, in perspective view, one of the semicircular sections of a tube of iron or steel, such as I use in making up the fagot; and Fig. 4 represents a front elevation of a part of a set of rolls such as I use to form these sections, showing the form of the grooves to shape the edges of the sections to form the lap-welds.

Similar letters of reference indicate corresponding parts.

In Fig. 1, *a* represents the steel semicircular sections of a tube arranged with a central core, *b*, of iron, and other larger protecting-sections, *c*, of iron, to form a fagot for a round bar. I propose to form these sections *A*, Fig. 5, with rabbets *d e* in the edges, so that, when lapped together and reduced, they will form lap-welded joints, the rabbets on one side being at the outer corner of the edge, and the other at the inner corner, so that any two parts will match, and to shape these edges in this way I pro-

vide on the rolls *B*, which form the groove of the sections *A*, a projecting rib, *f*, at one side of the large oval collar *g*, and a groove, *h*, on the other.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The improved fagot hereinbefore described.

2. As an article of manufacture, the improved bar represented in Fig. 2 of drawing, consisting of a core of iron inclosed by a tube or layer of steel, and the latter in turn inclosed by a thin shell of iron.

3. The combination of two rolls, *B B*, one of which has a plain groove, while the other has a collar, *g*, with annular projections *f* on one side, and annular groove *h* on the other, all as shown and described.

ELLRIDGE WHEELER.

Witnesses:

HARRY G. BUFFUM,  
J. P. DELANEY.