

(No Model.)

2 Sheets—Sheet 1.

J. PEDDER.

MANUFACTURE OF COMBINED METAL PLATES.

No. 300,730.

Patented June 17, 1884.

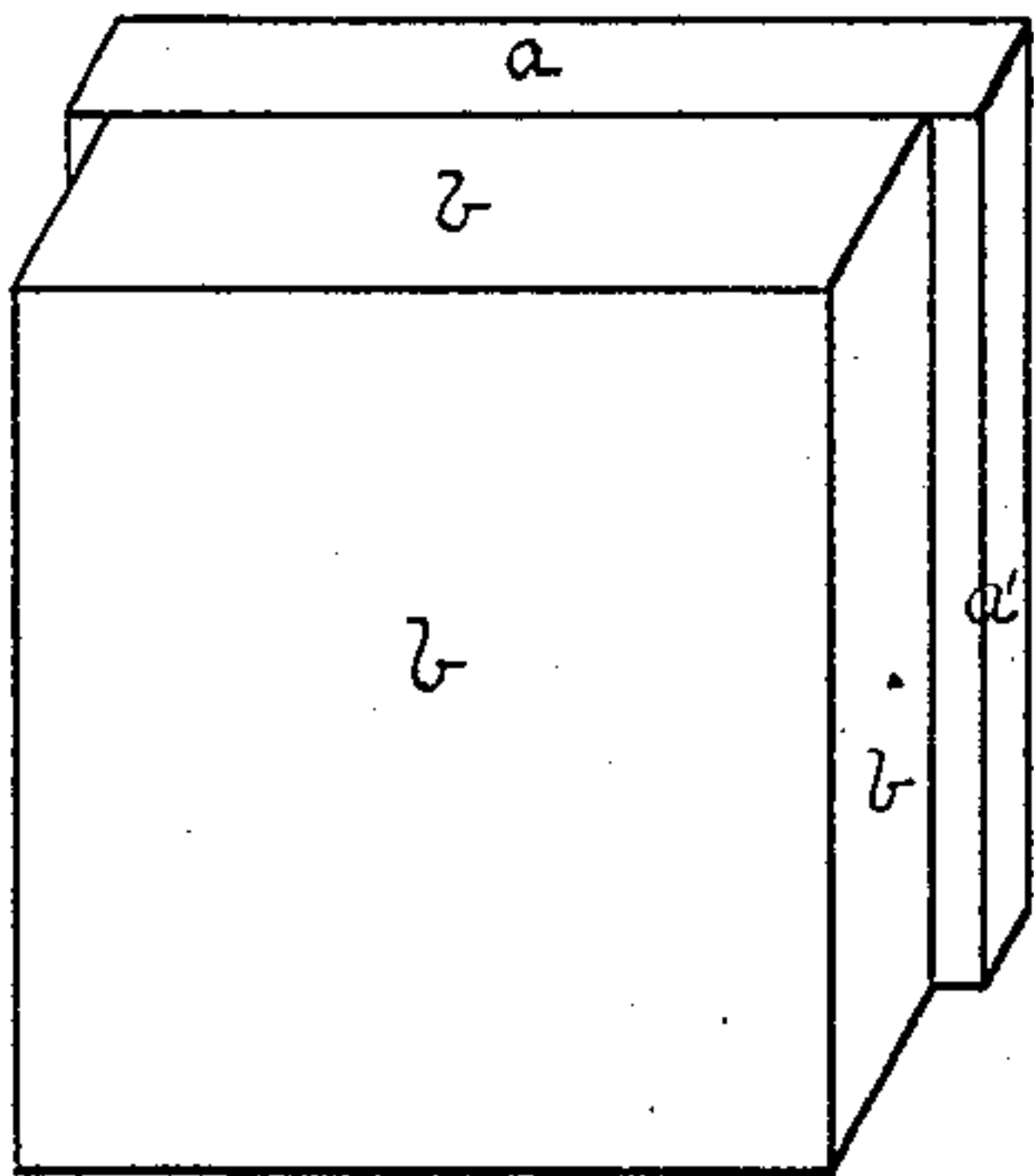


Fig. 3.

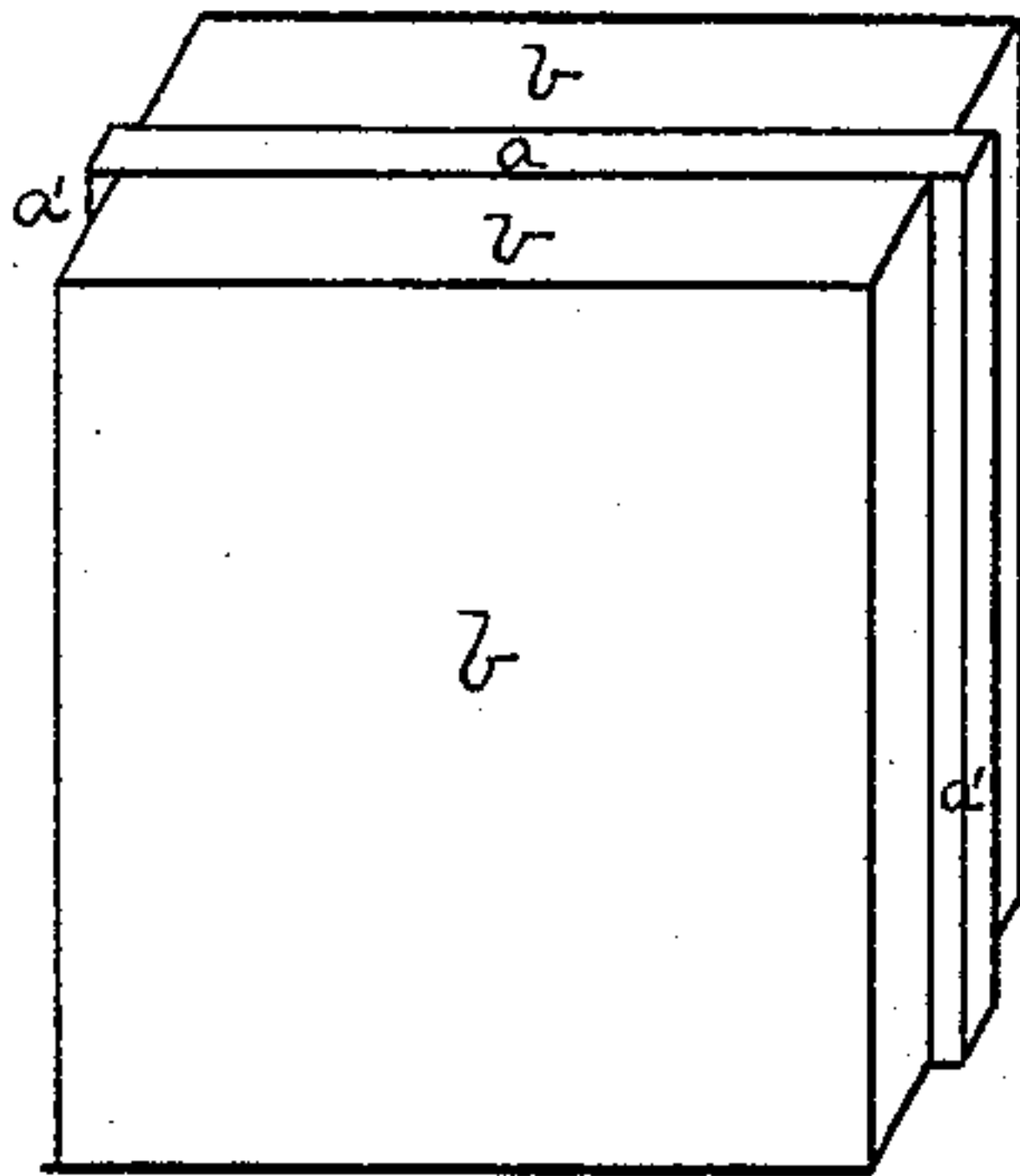


Fig. 2.

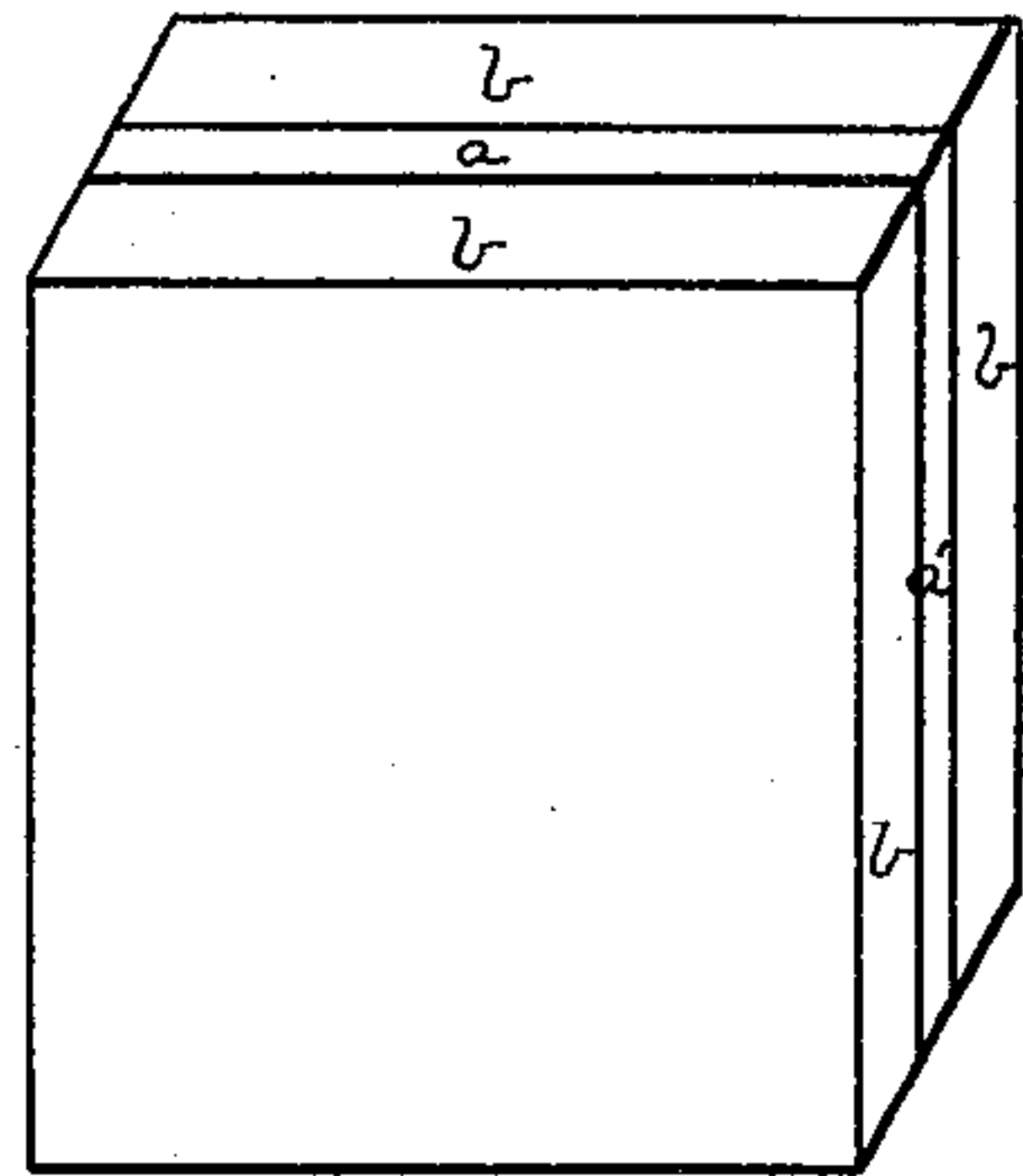


Fig. 1.

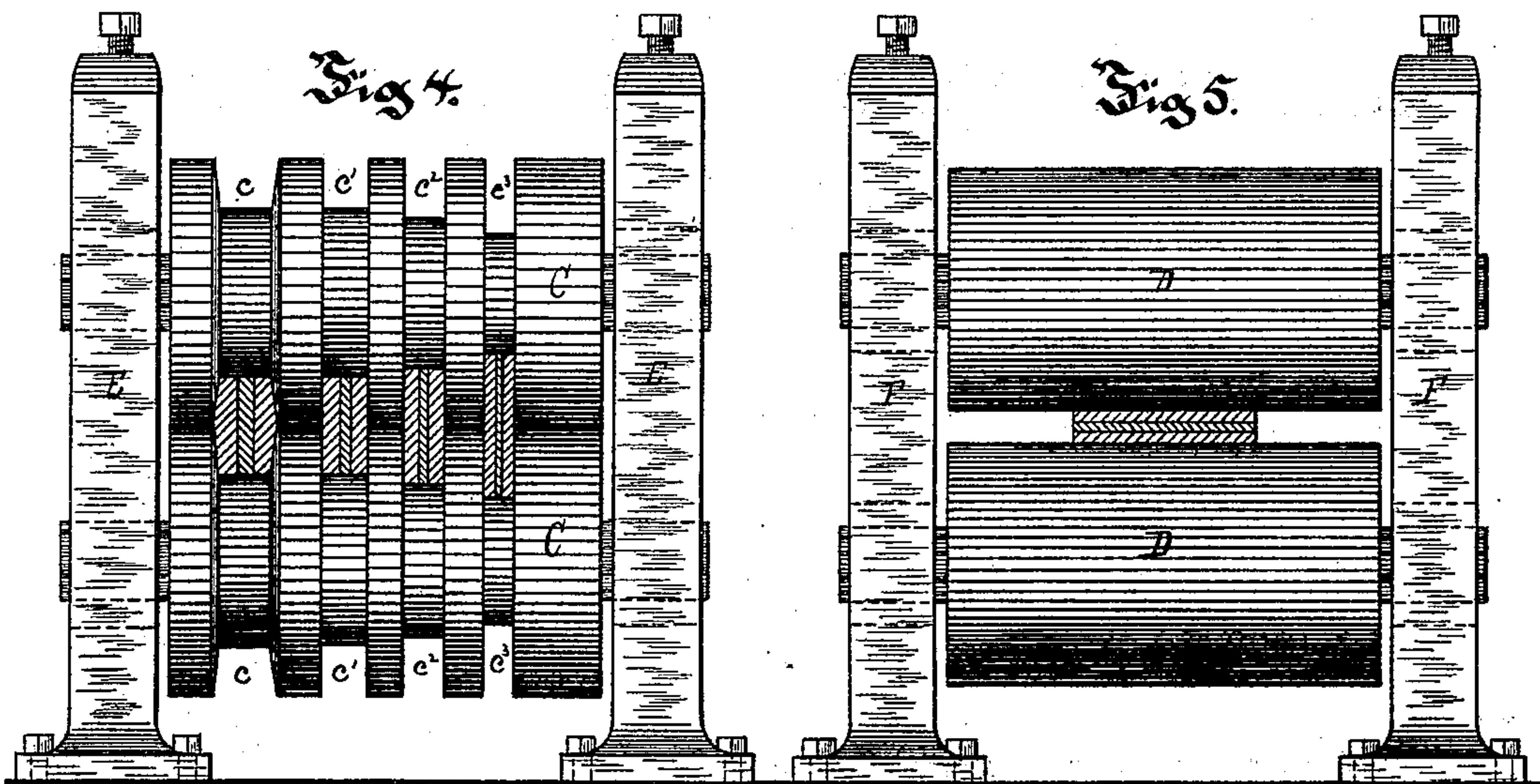


Fig. 4.

Fig. 5.

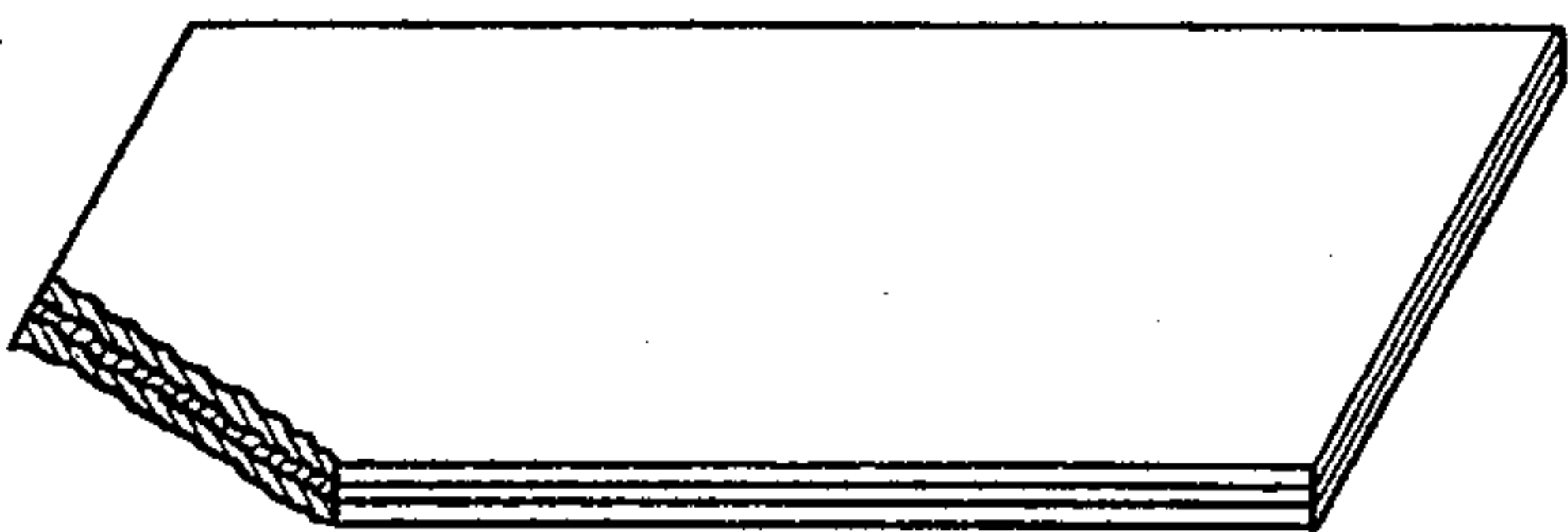


Fig. 6.

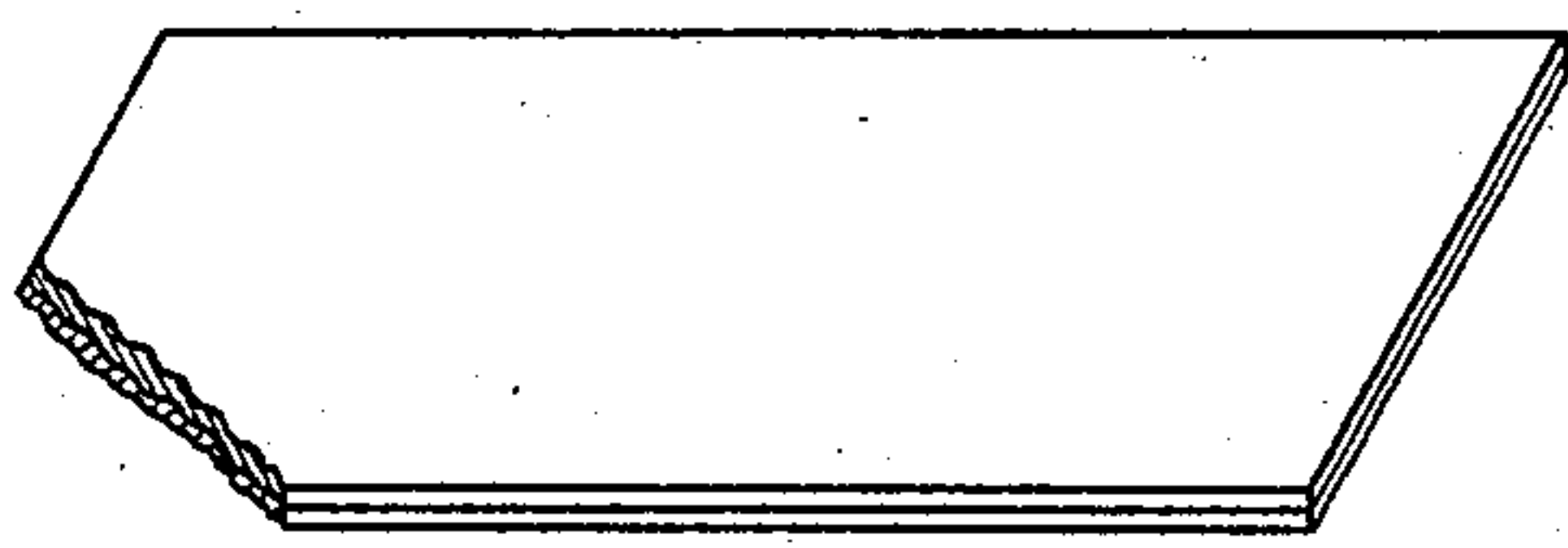


Fig. 7.



Fig. 8.



Fig. 9.

Witnesses.  
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J. Cooke

Inventor.  
John Pedder  
by James J. Hay  
Attorney

(No Model.)

2 Sheets—Sheet 2.

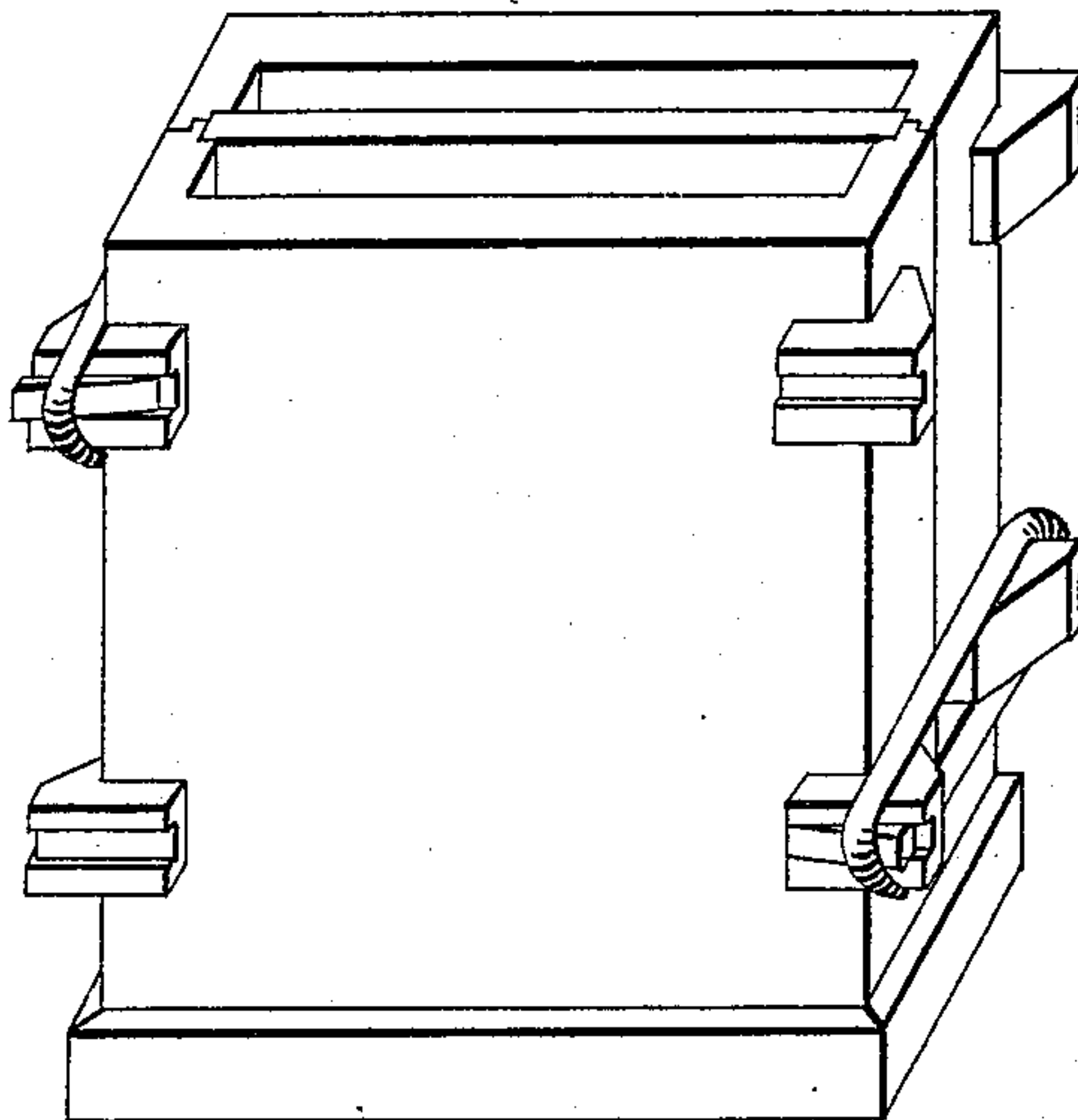
J. PEDDER.

MANUFACTURE OF COMBINED METAL PLATES.

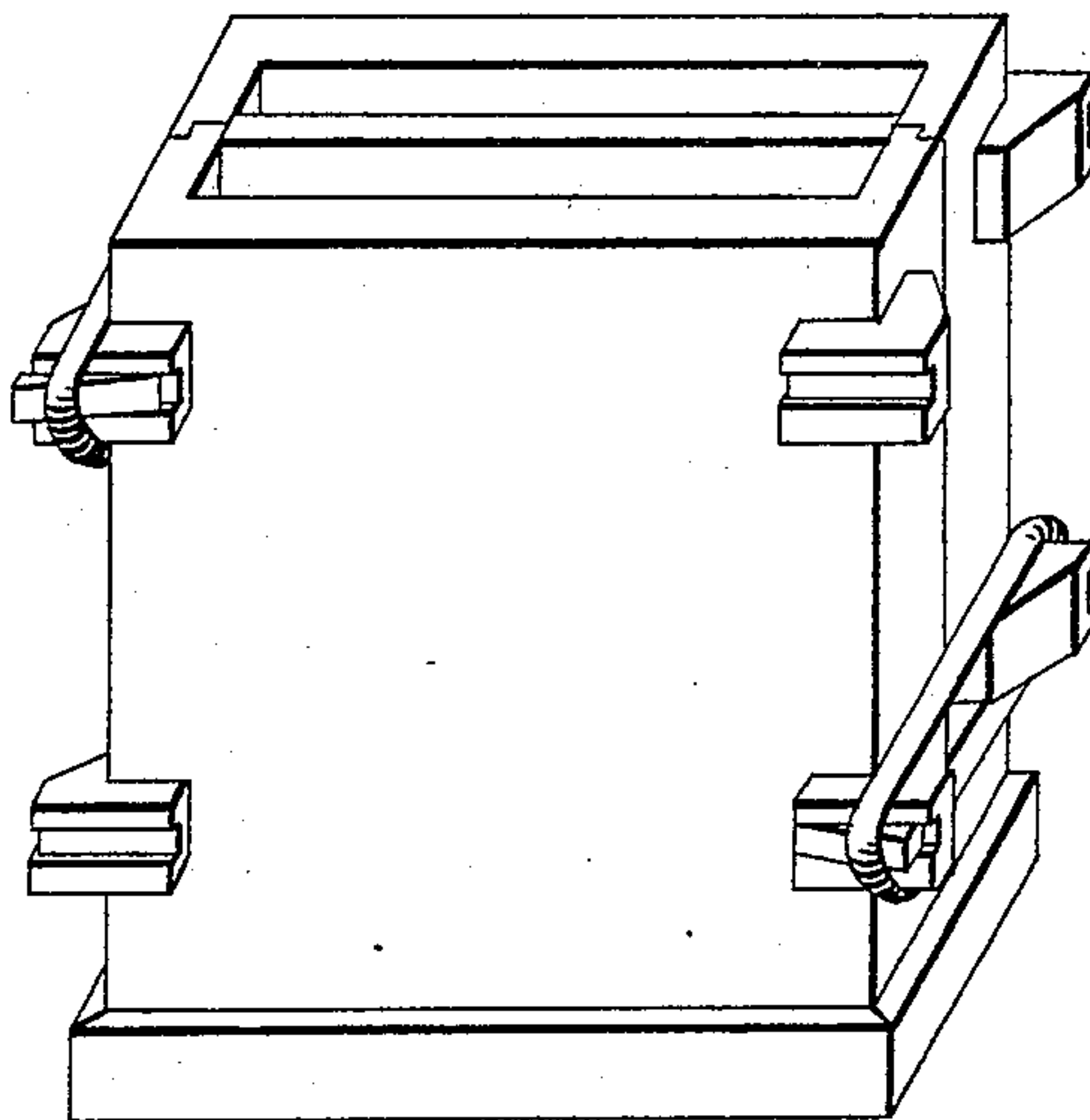
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*Fig. 10.*



*Fig. 11.*



*Witnesses:*

*P. F. Lagle*  
*W. M. Evans.*

*Inventor:*

*John Pedder*  
*by James S. Ray*  
*Attorney*



# UNITED STATES PATENT OFFICE.

JOHN PEDDER, OF PITTSBURG, PENNSYLVANIA.

## MANUFACTURE OF COMBINED METAL PLATES.

SPECIFICATION forming part of Letters Patent No. 300,730, dated June 17, 1884.

Application filed December 5, 1883. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN PEDDER, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and  
5 useful Improvement in Manufacture of Plates or Bars Having Layers of Metals of Different Carbons; and I do hereby declare the following to be a full, clear, and exact description thereof.

10 My invention relates to what is known as iron or soft-steel center or side plates or bars, being plates or bars formed of layers of iron or steel or steels of different carbons. These  
15 plates or bars are largely employed in the manufacture of agricultural implements where an exceedingly hard surface is desired, and yet the plate must be sufficiently tough and strong to resist the shocks or blows upon the  
20 implement, as well as in the manufacture of safes, where a comparatively soft outer surface and a very hard inner surface are desired in the same plate—the one to resist the shocks and blows and the other to resist any boring or cutting tools in breaking open the safe.  
25 These plates or bars are formed from ingots, and where three or more layers or strata of different metals or steels of different carbons are required, one or more suitable plates are supported across the ingot-molds, and the  
30 molten steel is poured around and on either side of the plate or plates, the plate being held in its desired position by wedges, and the molten steel running entirely around the side edges of the plate, or the edges of the plate  
35 fitting against the ends of the mold or in grooves therein, and the steel being poured on either side thereof, and the several strata being thus united. Where only two layers are required, the plate is secured at one side of the mold  
40 and the steel poured against it. A suitable ingot is thus formed, from which the finished plate having layers of metals of different carbon can be rolled, and the usual practice heretofore has been to heat the ingot and roll it  
45 between flat-faced rolls to the desired thickness, the ingot being fed sidewise to the rolls to widen it, and lengthwise thereto to roll it to the desired length. In rolling these ingots, as the edges of the steel were not perfectly welded to the center or side plate, and the steel generally extended over the edges of the plate,

in side rolling, to widen the plate, the steel was drawn over the edges of the center or side plate and ragged or uneven edges formed along the sides of the finished plate, the cast-  
55 steel in the finished plate for these reasons extending beyond the center or side plate to which it was cast. It was necessary, after rolling these plates, to cut off a portion of the plate in order to form even edges and to reach  
60 the center or side-plate, and the loss or waste thus occasioned was generally over ten per cent. of the plate. It was also necessary to remove these overlapping edges on the finished  
65 plate, because any steel extending over the center or side plate in the plates cut to shape would crack or break from the plate in tempering or when submitted to use, rendering the plate useless. As the edges of the ingot  
70 were not sufficiently compressed when at a high heat, it was also found that the metal along the sides or edges of the finished plate was imperfect and filled with cracks or seams.

The object of my invention is to overcome these difficulties in the manufacture of these  
75 plates having layers or strata of metals of different carbons, and to also form these plates with perfect and evenly-rolled edges properly united, in which the different layers extend out to the edges of the rolled plate. 80

It consists, essentially, in making these plates with side edges that without shearing shall  
85 expose to view the edges, severally, of the different metals or strata employed, by preparing the ingot of combined iron and steel, or of steels of different carbons, in the process of  
uniting the strata of metals in a manner to even the side edges of the several strata, and afterward, in the reduction of the ingot by  
90 rolling, presenting the same to the rolls edge-wise as well as flatwise.

It also consists in a rolled plate of combined iron and steel, or of steels of different carbons, the rolled but uncut edges of which shall  
95 present to view the several strata of different metals.

To enable others skilled in the art to practice my invention, I will describe the same more fully, referring to the accompanying  
100 drawings, in which—

Figures 1, 2, and 3 are perspective views of ingots, from which the said plates are rolled.



Fig. 4 is a cross-section of rolls suitable for edge-rolling the ingot or plate. Fig. 5 is a side view of rolls for flat-rolling the plate. Figs. 6 and 7 are perspective views, partly broken away, of my improved rolled plate. Fig. 8 is a cross-section of the plates as formerly rolled. Fig. 9 is a cross-section of my improved rolled plate. Fig. 10 is a perspective view of the mold employed in casting the ingot shown in Fig. 2, and Fig. 11 is a perspective view of the means employed in casting the ingot shown in Fig. 3.

Like letters of reference indicate like parts in each.

In carrying out my invention the ingots are cast in suitable molds, those shown in Letters Patent granted to me May 29, 1883, being suitable for the purpose. In forming iron center, soft-steel center, or hard-steel center ingots the plate to which the metal is to be cast is either fitted in a groove in the mold, as shown in Fig. 10, or so fitted in the mold that its side edges fit tightly against the ends of the mold, as shown in Fig. 11, so that the metal cast thereto will have no opportunity to lap over the side edges of the plate in casting, the ingots being thus cast so that the several strata of metal are united with their side edges even, or substantially even. Where the steel is to be cast only on one side of the plate, the plate is supported in any suitable manner in the mold, against one side thereof, the edges extending into slots or fitting tightly against the ends of the mold, so that the steel cannot lap over said edges in casting.

In Figs. 1, 2, and 3 the plate *a* represents the plate to which the metal is cast, and the layers *b* represent the layers of steel cast thereto, either on one or both sides of the plate, the side edges, *a'*, thereof extending out to or beyond the layers of steel. The rolls preferred by me for edge-rolling these ingots are suitably-grooved rolls, as shown in Fig. 4, the grooves being arranged in the first pass, at least, to properly compress the sides along the edges, on account of the binding of the rolls, as well as to compress the ingot edgewise, and thus, while the ingot is at a high heat, to properly compact and unite the layers thereof. The pass *c* in the rolls *C* is suitable for this purpose, and the other passes, *c'* *c''* *c'''*, are suitable for edge-rolling the sheet during the process of reduction, and may be made of any width or depth desired, according to the width or thickness of the finished plate. The rolls *D*, shown in Fig. 5, are the ordinary flat-faced sheet or plate rolls generally employed in reducing these iron center plates, the rolls being adjusted according to the thickness of the ingot, so as to give the proper reduction at each pass. These rolls *C* and *D* are supported in suitable housings, *E F*, and are provided with the usual devices for adjusting the rolls from and toward each other. The ingot, cast as above described, is then brought to a high heat in a suitable furnace. In order to properly unite the several layers or strata it is then prefer-

ably given one pass lengthwise through the flat-faced rolls *D*, and is then edge-rolled, in order to compact the edges of the plate and to form even edges on the ingot, as well as to unite the different layers of the ingot more perfectly, the rolls for this purpose preferred by me having such a pass as that shown at *c* in Fig. 4. The plate thus compacted and united, and having the layers of metal brought to practically an even edge along the side edges thereof, is then reduced by flat-rolling, being widened by passing it sidewise through the plate-rolls, and lengthened by passing it lengthwise through said rolls; and it is found that as the edges are properly compacted and brought together the several layers of the plate will draw out together, and the difficulty of the steel cast to the plate rolling over and beyond the side edges thereof is entirely overcome. As it is desired to roll the plate with a true and even edge during its reduction, I prefer to edge-roll it three or four times, and thus true up the edges of the plate and form a finished plate having a straight edge, which requires no cutting or trimming whatever. In carrying out my improved method, however, one edge-rolling of the ingot while at a high heat is all that is necessary, the other edge-rolling being simply employed to keep the edges true and even.

The method herein described may be carried out upon any ordinary universal mill, as well as upon the rolls illustrated in the drawings, the edge-rolling being accomplished by the vertical rolls; or the edge-rolling of the plate may be accomplished on the ordinary flat plate rolls, which are opened out to the proper width.

The plate formed has the finished edge, with the central or side layer or stratum formed of the iron or steel plate, to which the molten metal is cast, extending out to the edge of the finished plate, so that it is not necessary to cut off any portion whatever of the plate in order to reach the iron or steel center or side plate thereof, and for this reason all the loss heretofore occasioned in the rolling of these plates of different layers or strata is entirely overcome, the entire plate being suitable for cutting the agricultural plates up to the edges of the rolled plate. As the plate is properly compressed and united along the edges, and the layers drawn out together, the rolled edges formed are found to be much freer from the cracks, seams, or other imperfections found in the ordinary rolled plate, so that the agricultural plate may be cut close to the edges of the finished rolled plate, and there is little or no liability of their being spoiled or marred by any such cracks, seams, or imperfections.

What I claim as my invention, and desire to obtain by Letters Patent, is—

1. The herein-described improvement in the art of manufacturing plates of combined iron and steel, or of steels of different carbons, with side edges that, without shearing, shall expose to view the edges of the several strata em-



ployed, consisting in preparing the ingot of combined iron and steel, or of steels of different carbons, in the process of casting, in a manner to even the side edges of the several strata employed, and afterward, in the reduction of the ingot by rolling, presenting the same to the rolls edgewise as well as flatwise, substantially as and for the purposes set forth.

2. As an improved manufacture, a rolled plate of combined iron and steel, or of steels

of different carbons, the rolled but uncut side edges of which present to view the several strata of different metals employed, substantially as described.

In testimony whereof I, the said JOHN PEDDER, have hereunto set my hand.

JOHN PEDDER.

Witnesses:

JAMES I. KAY,  
J. N. COOKE.