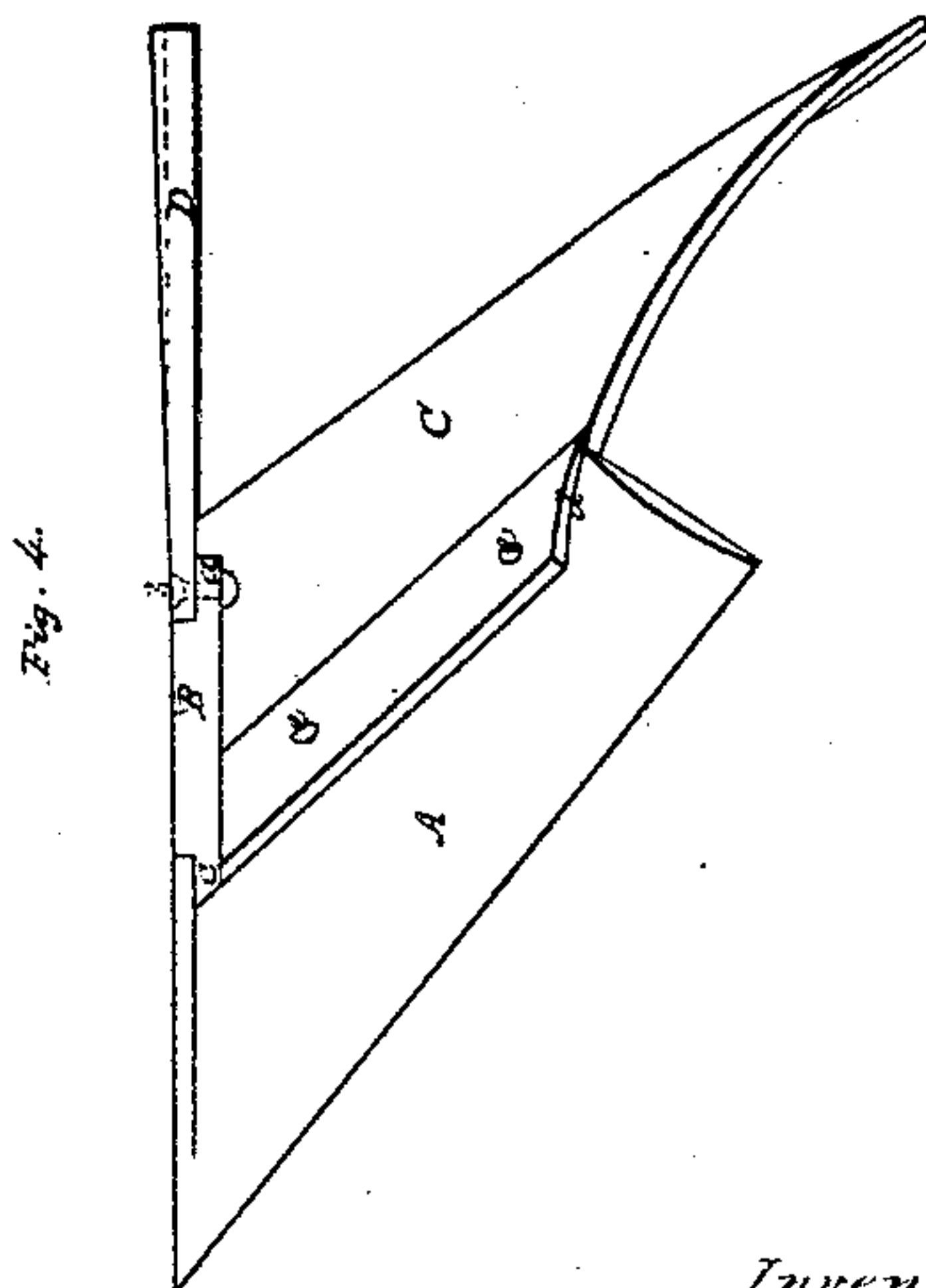
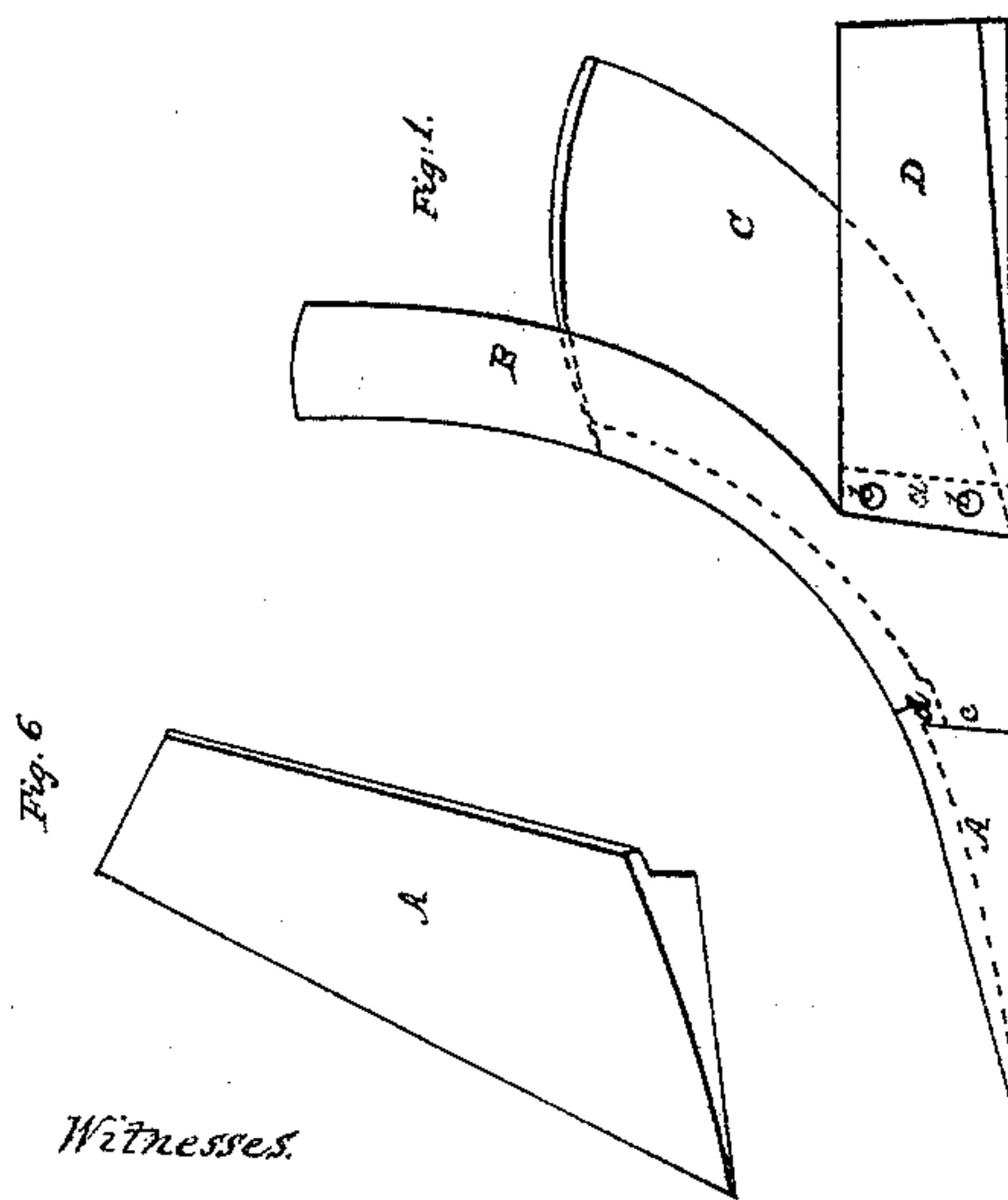
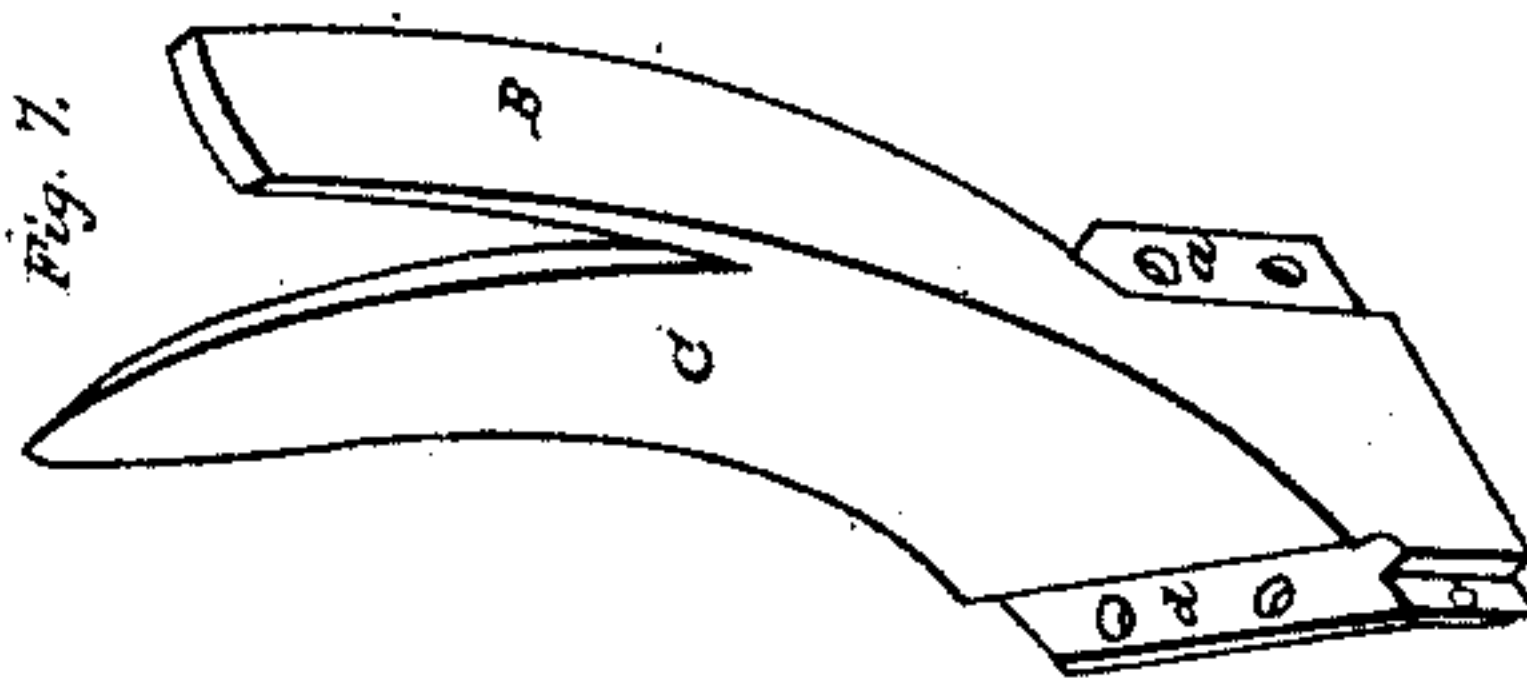
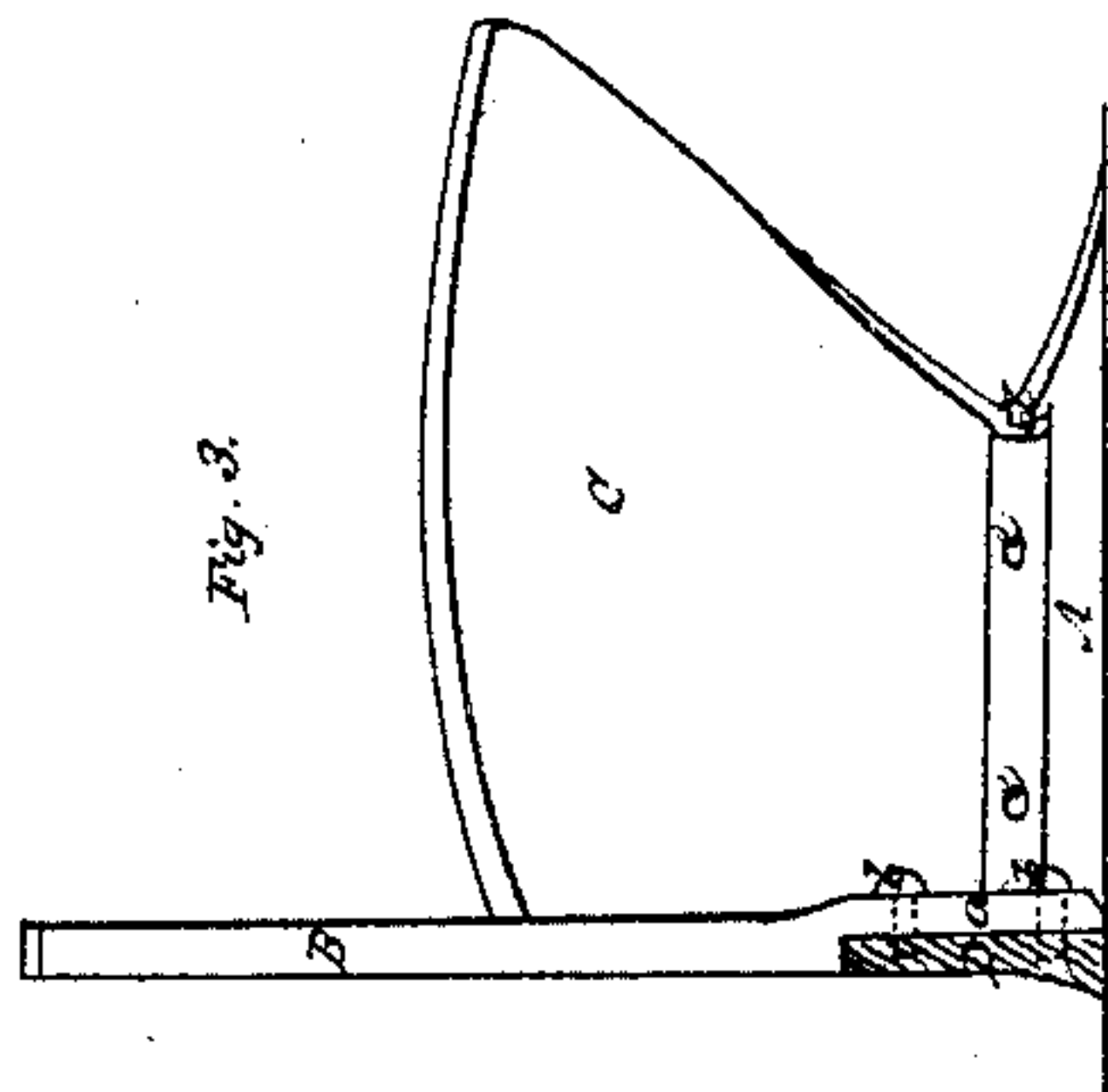
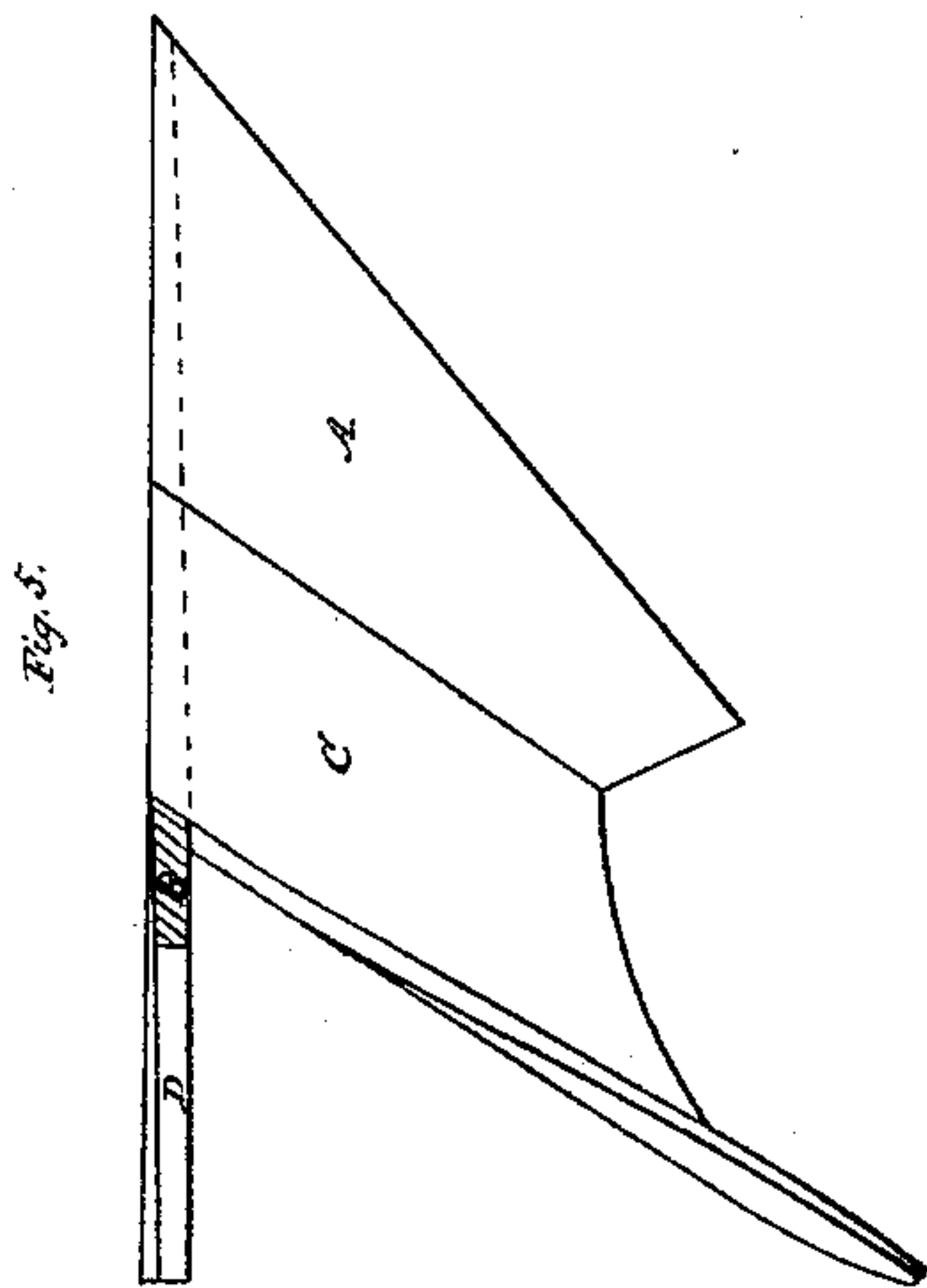
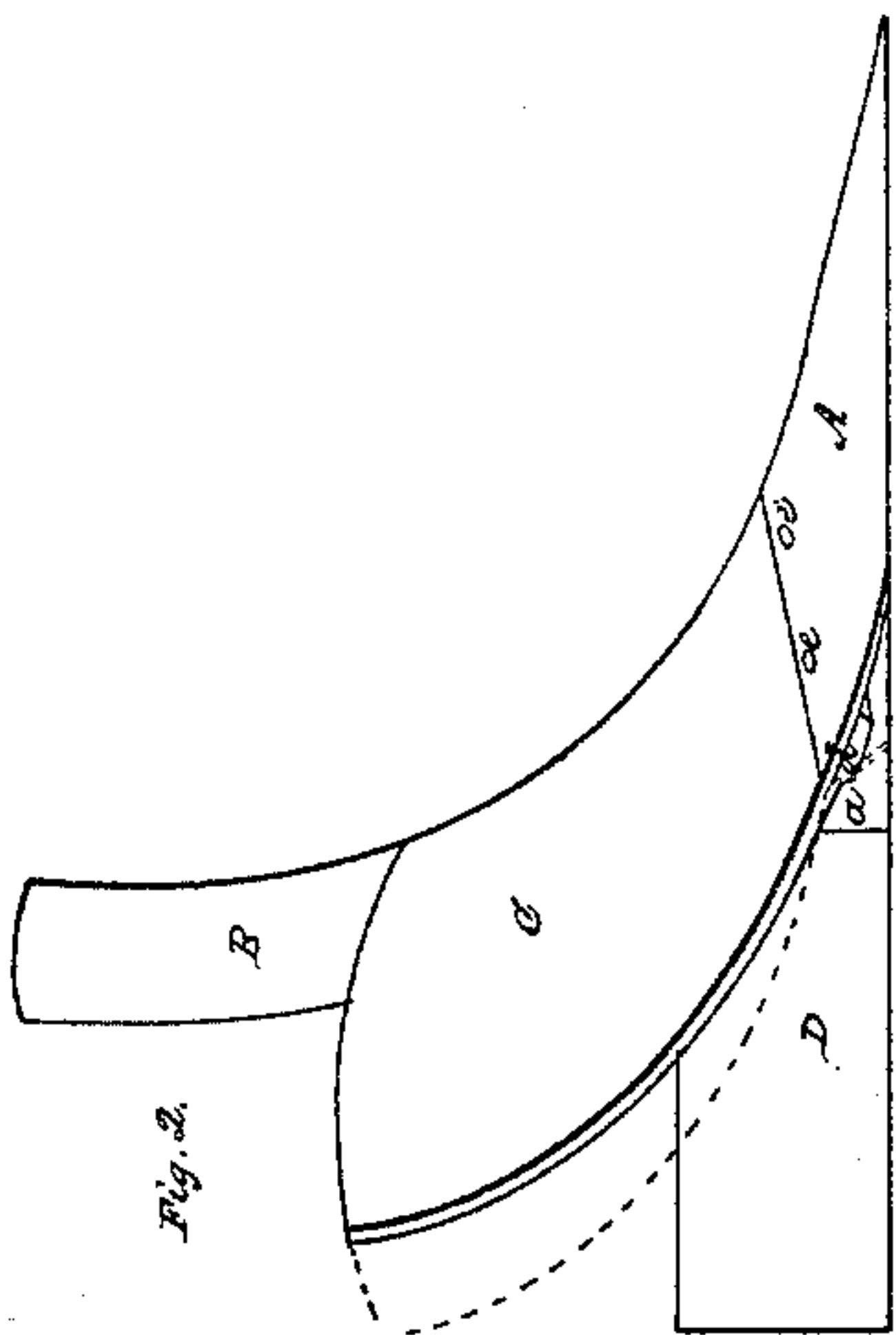


*F. F. Smith,*  
*Making Plow Plates,*  
*No 30, 691,* *Patented Nov. 20, 1860.*



Witnesses.  
*J. W. Coombs*  
*R. S. Spurr*

Inventor  
*F. F. Smith*  
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# UNITED STATES PATENT OFFICE.

F. F. SMITH, OF MOMENCE, ILLINOIS.

## IMPROVEMENT IN MAKING PLOW-PLATES FROM MOLTEN STEEL.

Specification forming part of Letters Patent No. **30,691**, dated November 20, 1860.

*To all whom it may concern:*

Be it known that I, F. F. SMITH, of Momence, in the county of Kankakee and State of Illinois, have invented a new and useful Improvement in Steel Plows; 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 part of this specification.

All steel plows heretofore known or used have been made of plate or rolled steel worked into shape by bending, welding, and other forging operations, and owing to the difficulties which present themselves in this mode of manufacturing them have not only had many serious defects, but have been very expensive. One of the greatest defects has been that the parts have been made of nearly equal thickness, and as the wear comes most on the bottom and point those parts have been frequently worn out by use, while the mold-board has been barely polished. Another defect has arisen from the difficulty of fashioning the parts to the exact shape desired, owing to their having been of necessity formed by hand, no system of dies having been found suitable for the purpose.

The object of my invention is to make a steel plow free from such defects at a greatly reduced cost; and to this end my invention consists in the manufacture of the plow—that is to say, those parts of it commonly made of steel—viz., the share, the landside, and the mold-board—by pouring the steel in a molten state into molds of the required shape, by which process I am enabled to proportion the thickness of the several parts to the work and wear to which they are subject, and to obtain exactly and infallibly the form desired.

In the manufacture of the molded steel plow I propose, for the sake of greater convenience of casting, as well as of insuring the greater solidity of the metal and freedom from “honey-comb,” to make it of two or more castings.

The accompanying drawings represent a plow whose share A is made of one casting, its mold-board B and standard C of another, and its landside D of a third.

Figures 1 and 2 are opposite side views of the plow. Fig. 3 is a back view of the same. Fig. 4 is a bottom view of the same. Fig. 5 is a top view of the same. Fig. 6 is a perspective view of the share A separate from

the other parts. Fig. 7 is a perspective view of the casting constituting the mold-board C and standard B. Fig. 8 is a perspective view of the landside D.

The casting B C is made with a flange, *a*, at the foot and back of the standard for the attachment of the landside D by rivets or bolts *b b*, countersunk on the outside of D, said flange being thrown back under the mold-board, as shown in Figs. 3 and 4, to enable the landside to be brought flush with the standard and corresponding edge of the share. The said casting B C is also made with a flange, *c*, of similar character to *a* in front of the standard, and has a rabbet, *d*, (see Figs. 2, 3, and 4,) formed along its front or lower edge, that the back or upper edge of the share may lap over it in such manner that the faces of the mold-board and share come together with a flush joint. The share is secured by rivets or bolts *e e* passing through the rabbet *d* and countersunk on the outside. Each casting is made by pouring the molten steel from a crucible or other vessel into a mold whose cavity is of the desired form. The molds are made of cast-iron.

I do not consider it necessary for the instruction of those skilled in the art of casting metals to explain the form and construction of these iron-molds further than to make the following remarks, viz: first, that the tube formed for the reception of the molten steel and its conveyance to the cavity of the mold should be so arranged that the steel will not strike upon the interior surface of the cavity, but will flow into it from one side, for in striking upon any portion of the interior surface it will cut or melt away that portion and render the mold worthless after one or two castings have been made; second, that the ventilation of the mold should be made by extremely narrow openings, which will prevent the steel escaping, but yet permit the escape of the air. These openings I make by placing pieces of thin hoop-iron between the joints of the mold or by making very shallow grooves in the faces of the joints.

The molded cast-steel plow, when the casting is effected in iron molds, possesses another advantage not stated in the commencement of this specification—that is to say, by being chilled in the casting it becomes so hard as to be capable of wearing for a very long



time. It is necessary, as soon as the steel is poured into the molds, and before the metal has cooled enough to contract, to open the molds and detach the casting from the sprue, because if not detached before the shrinkage takes place the plate is apt to crack. The flanges and undercut parts of the plates, too, cling to the parts of the molds where they receive their peculiar forms, and not being able to shrink in all directions in cooling require the utmost care in freeing the casting from the sprue and molds. The molds themselves being of iron cannot yield to compensate for shrinkage, and hence I open the molds as soon as the metal is poured into them. It is important, also, that the molds be ventilated to allow the gases to escape. This I accomplish either by the permanent openings at the joints of the mold or by driving in thin pieces of metal or other material at the joint to raise or separate the molds slightly. The clamps for securing the molds should be so made and united as to be readily detached, as the utmost expedition must be had in raising the mold to detach the sprue from the plate.

The steel used may be that of commerce, and in case of its being of a "high quality" it may be reduced by mixing with it a portion of iron.

To determine when the steel is sufficiently limped or fluid to pour into the molds, a rod of iron is inserted in the molten steel, and by the quantity of steel that adheres to the rod its fluidity may be correctly ascertained, the smaller the quantity of steel that adheres to

the rod the more suitable its condition for being poured into the molds. It will thus be seen from the nicety with which each and every operation must be watched and attended to that the casting of steel plates for plows, which have varied forms and thicknesses, is entirely different from that of casting iron in molds.

Heretofore in casting articles of steel in iron molds the molds were first highly heated, and after the metal was poured into them they were, with their metal in them, put into an oven or furnace and heated up to a cherry-red heat, and then allowed to cool gradually to prevent cracking by shrinkage. This process so anneals and softens the steel as to make it comparatively of little value for plow-plates, while it greatly adds to the expense of making the plates. The contour of the mold gives the form to the plow-plate, and this form may be varied to suit the fashion of the plows to be made, or the particular parts thereof that are to be made of steel.

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

Making plow-plates of irregular forms and of variable thicknesses by pouring molten steel into iron molds in the manner and for the purposes herein set forth.

F. F. SMITH.

Witnesses:

NOAH R. L. BRISTOL,  
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