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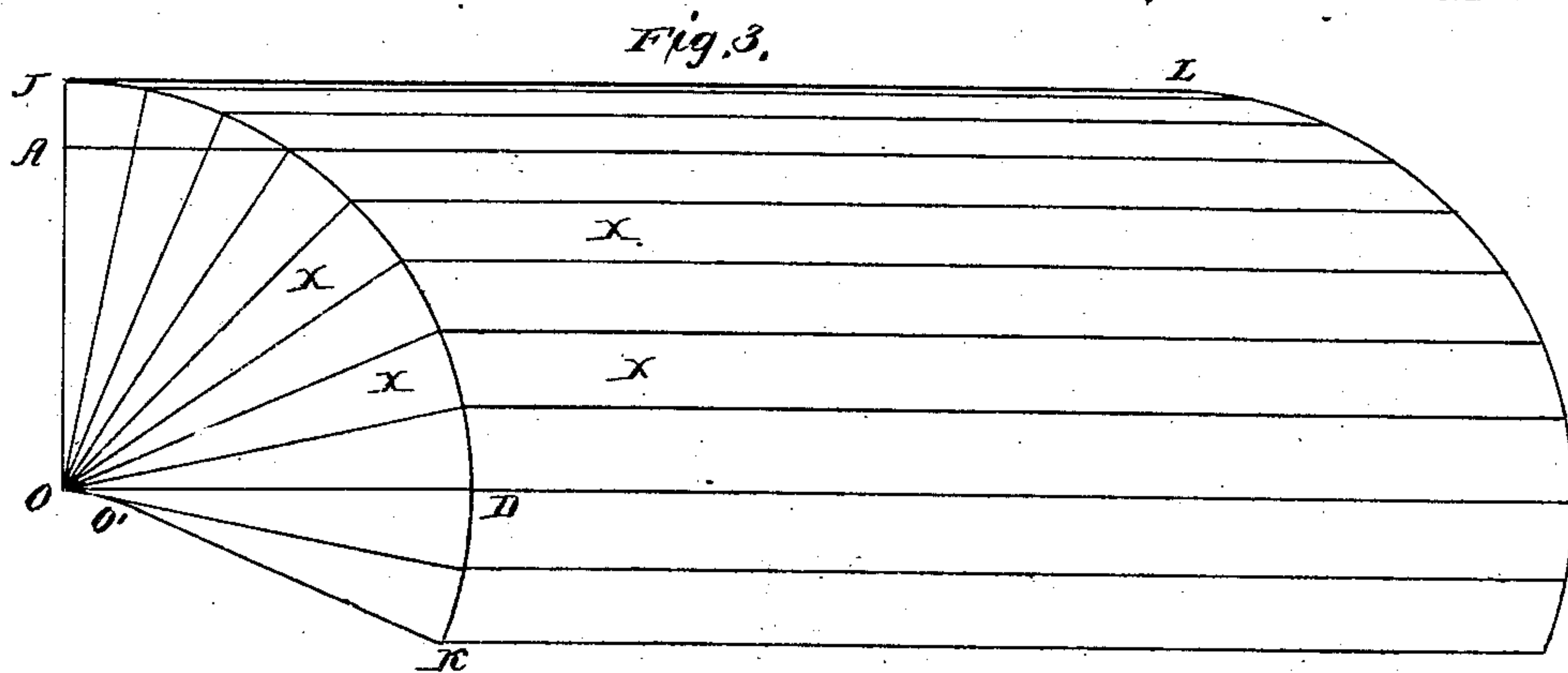
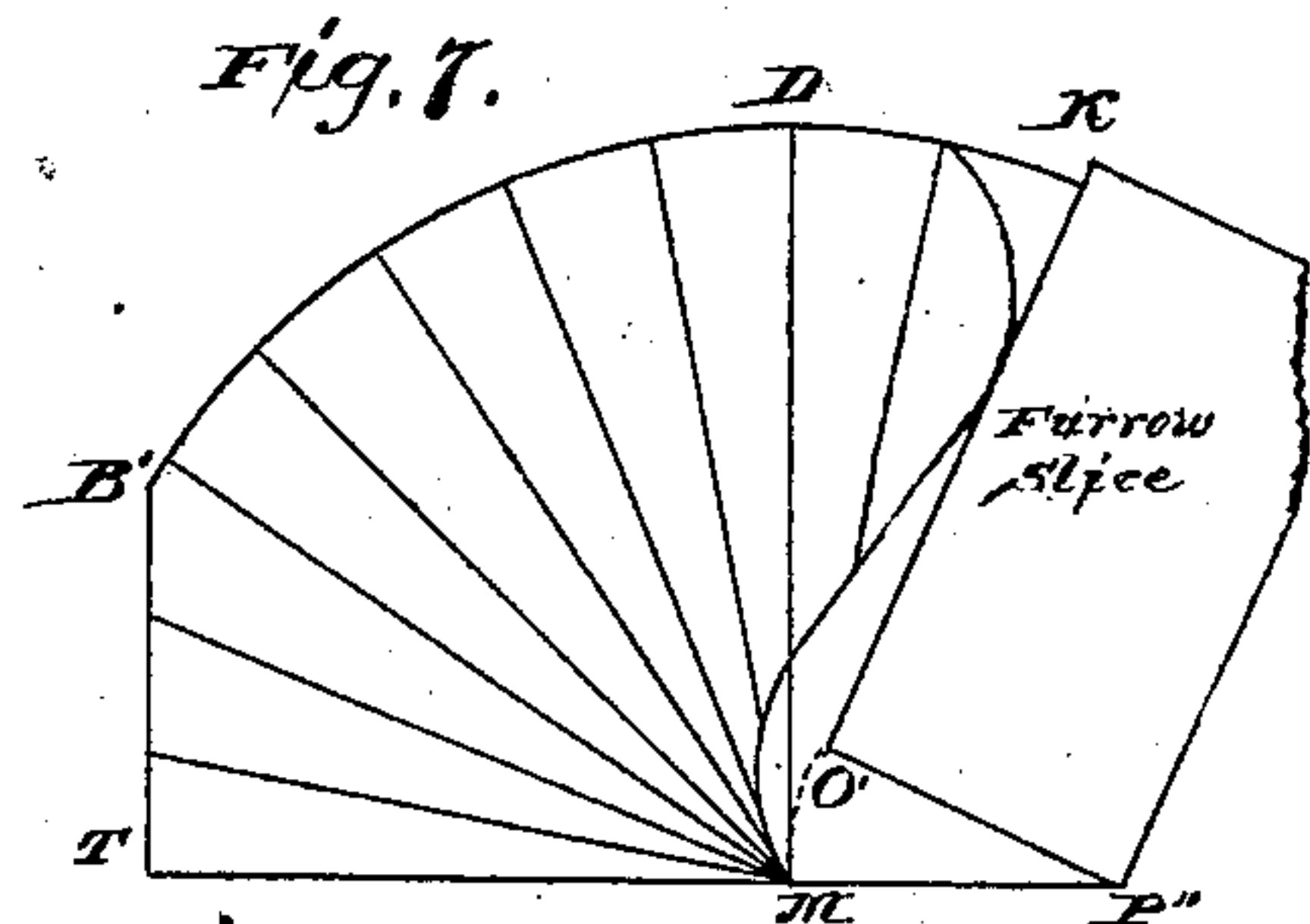
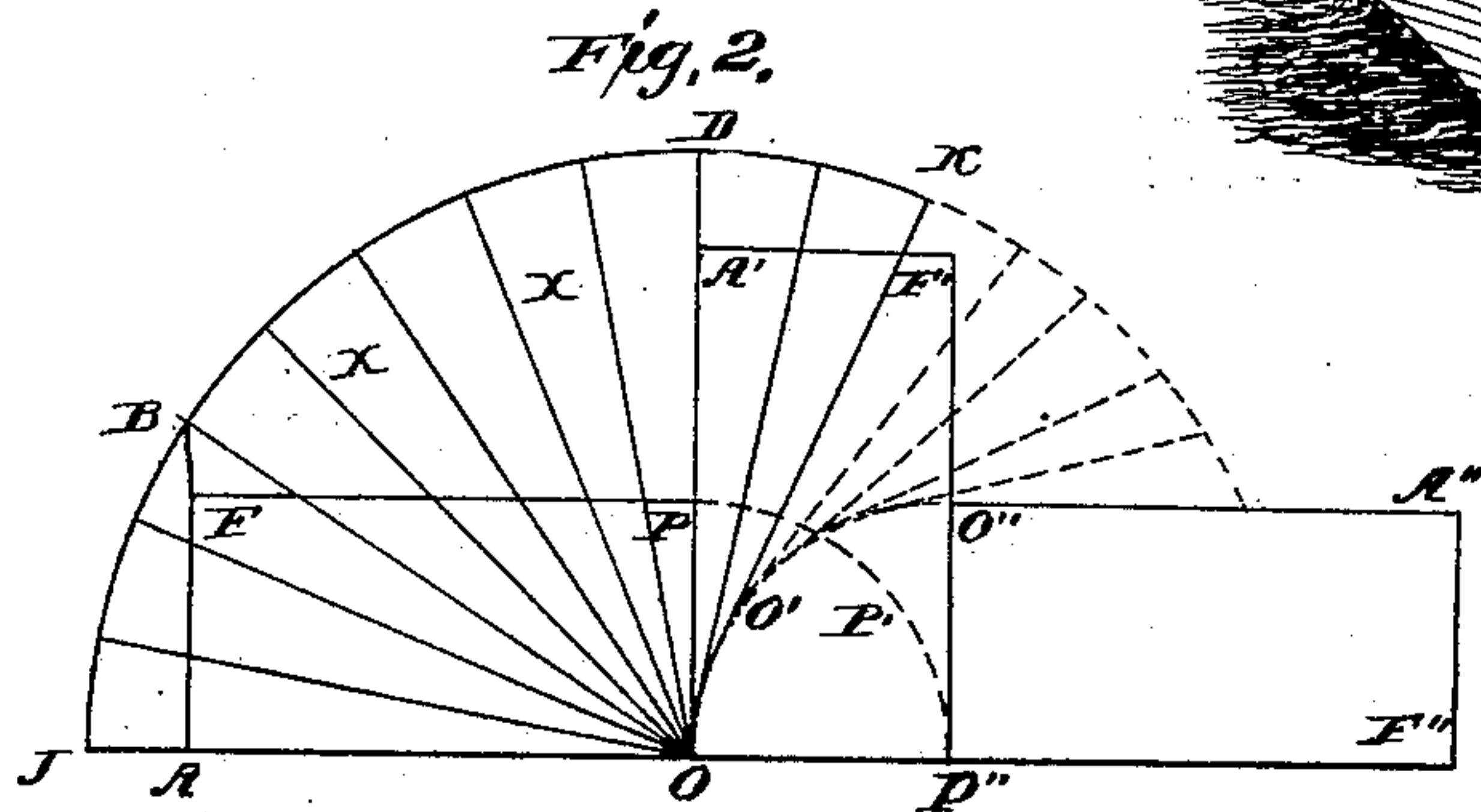
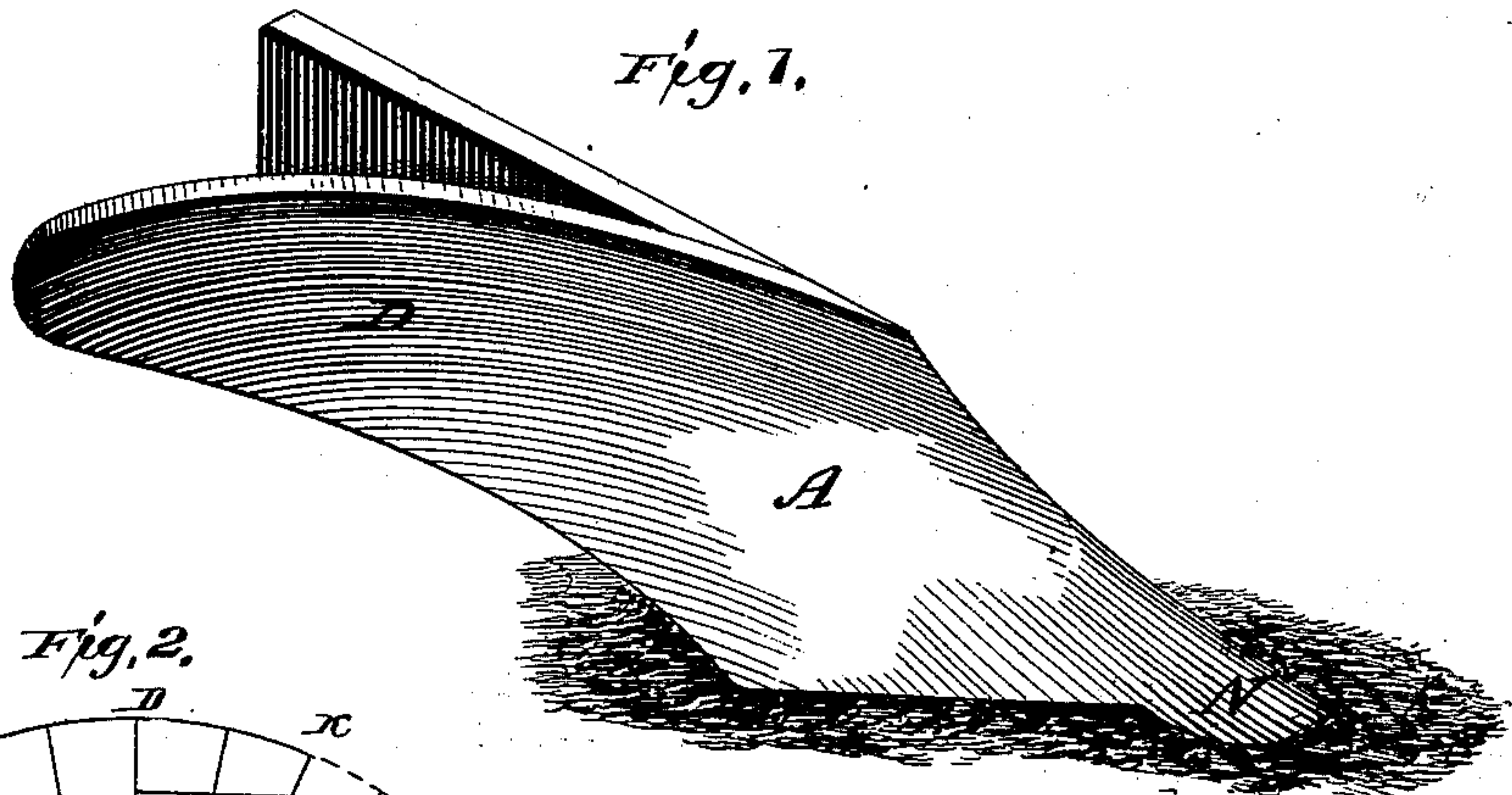
2 Sheets—Sheet 1.

F. LA FAYETTE EZELL,

PLOW.

No. 272,223.

Patented Feb. 13, 1883.



WITNESSES:

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Francis La Fayette Ezell,
INVENTOR.

Louis Bagger & Co.

ATTORNEYS

(Model.)

F. LA FAYETTE EZELL.

2 Sheets—Sheet 2.

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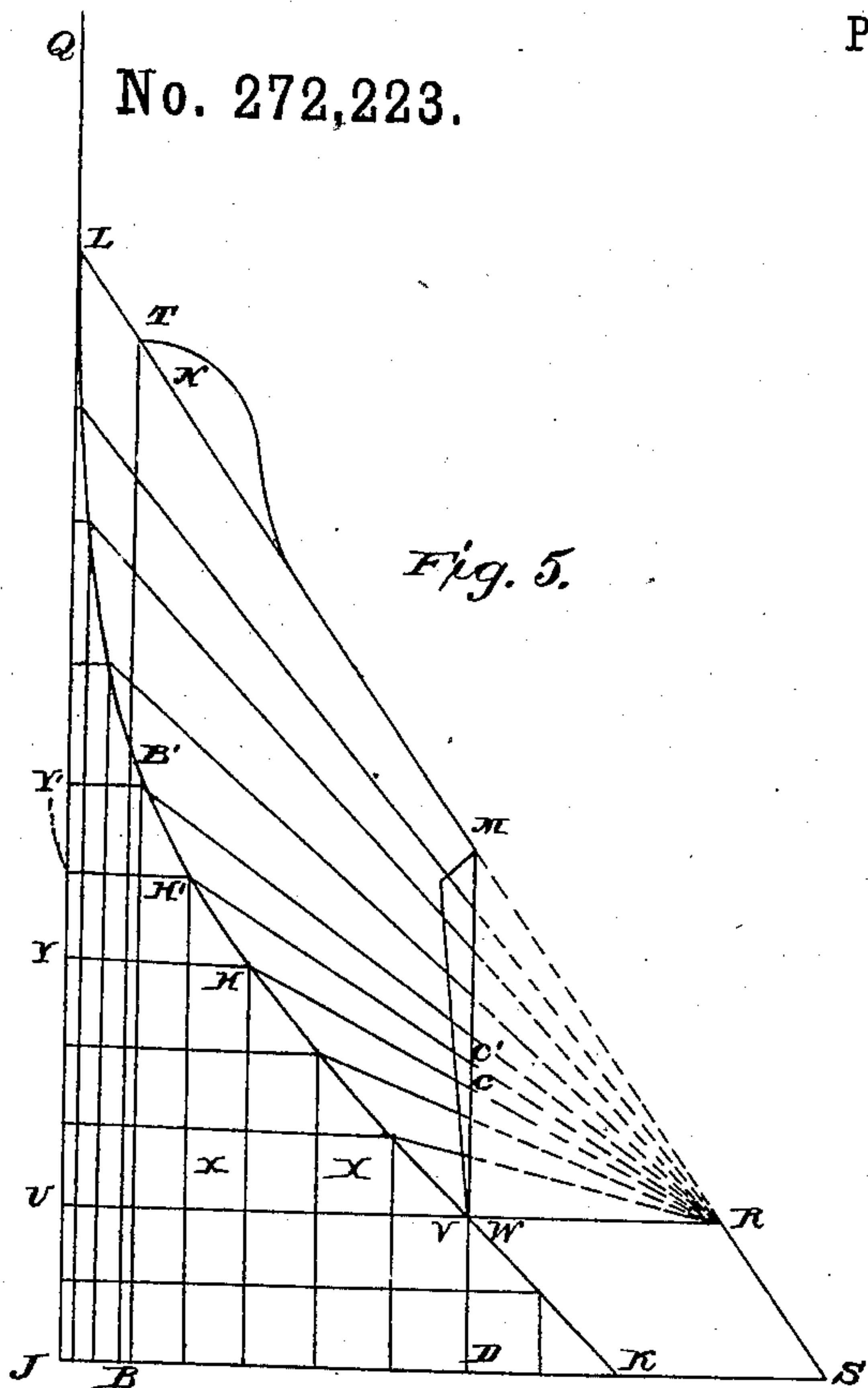


Fig. 5.

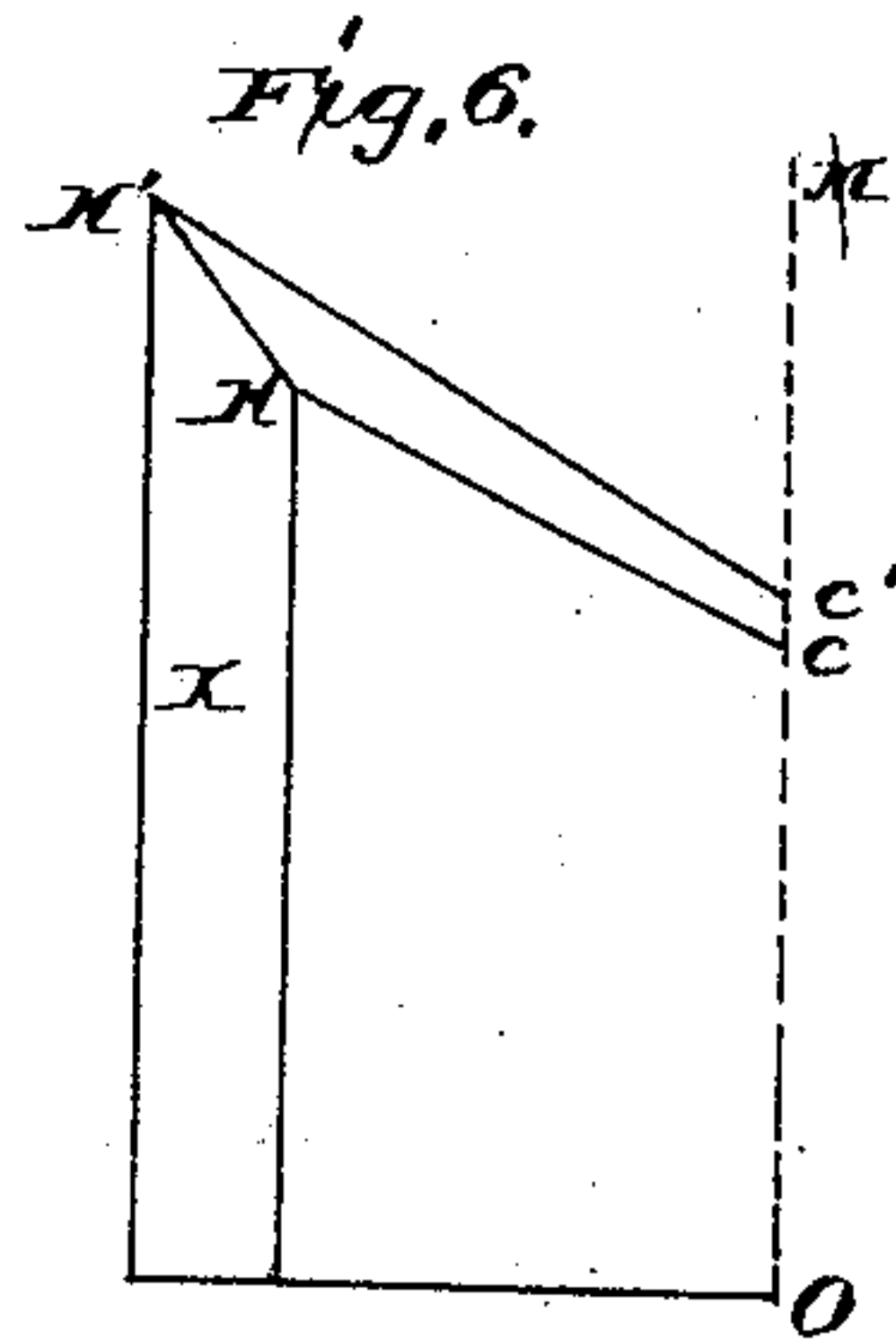
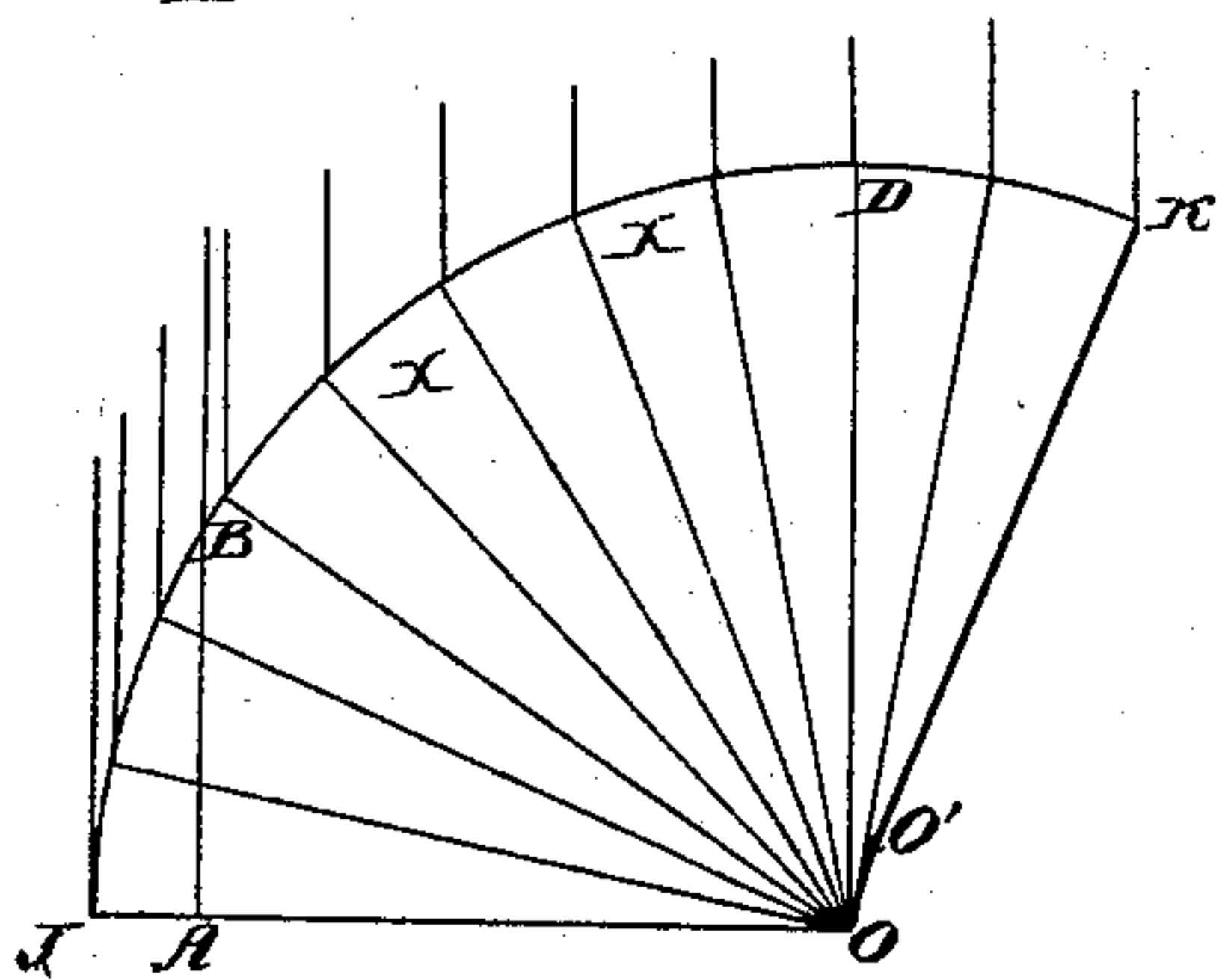


Fig. 6.



J A

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UNITED STATES PATENT OFFICE.

FRANCIS LA FAYETTE EZELL, OF NASHVILLE, TENNESSEE.

PLOW.

SPECIFICATION forming part of Letters Patent No. 272,223, dated February 13, 1883.

Application filed November 11, 1882. (Model.)

To all whom it may concern:

Be it known that I, FRANCIS LA FAYETTE EZELL, of Nashville, in the county of Davidson and State of Tennessee, have invented certain new and useful Improvements in Plows; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification, and in which—

Figure 1 is a perspective view of the mold-board of a plow of my improved construction. Fig. 2 is a diagram illustrating the manner of operation of my improved mold-board. Fig. 3 is a geometrical projection of the block or pattern from which I deduct the lines, straight and curvilinear, on the basis of which I construct my improved mold-board. Fig. 4 is a diagram of the principle used in laying out the lines on the pattern-block shown in Fig. 3. Fig. 5 is a diagram illustrating the application of the principle involved in the diagram Fig. 4 upon the pattern-block, Fig. 3. Fig. 6 represents one section of the diagram shown in Fig. 5, and Fig. 7 is a vertical projection of the mold-board shown in perspective in Fig. 1.

Like letters of reference indicate corresponding parts in all the figures.

My invention contemplates an improved construction of the mold-board of plows, having for its object to reduce friction between the sod and the mold-board, and turning over and laying the furrow-slices in the manner best adapted to the best plowing. To this end my improvement pertains to the geometrical principle or design involved in the construction of the mold-board, and has no reference to the tongue, beams, or handles, which may be of any desired or approved construction.

T B', Figs. 5 and 7, represent the construction-lines for the landside of the plow.

N is the point of the plowshare, and D the flare or wing of the mold-board A, while M T represent the width of the share where it merges into the mold-board; or, in other words, the distance between these two points represents the full width of the furrow-slice.

Before entering upon a detailed description of the construction of the mold-board I shall briefly invite attention to the three chief elements which are essential to the construction of a mold-board constructed upon strictly scientific principles. These are: First the cutting-edge of the share and of the landside should form an acute angle at the point of the plow, and the mold-board A be shaped accordingly; second, while the plane upon which the plow sits should be tangential to the upper or inclined edge of the mold-board at its point, the said edge should be described by a curved line diminishing in curvature at a regular geometrical ratio as it recedes from the point of the plow, as seen at Q L K in the diagrams Figs. 4 and 5, and the lower edge should be parallel to the landside, so as not to disturb that edge of the sod as it passes by it, as will be seen by reference to M W O in diagram Fig. 4 and M W in diagram Fig. 5; third, the entire face of the mold-board should be so shaped or constructed as to give that direction to the furrow-slice which will invert it with the least expenditure of power; and to this end the aforesaid curvilinear line, representing the upper edge of the mold-board, must be of such a curvature as will by the advance of the plow push or tilt the furrow-slice past the center of motion, or beyond equilibrium, to a falling position, as shown in Fig. 7. In other words, the "flare" of the mold-board must be sufficient to push the point K of the furrow-slice beyond its resting or balancing point P".

On the pattern-block, Fig. 3, the bottom line, A O, represents the width of the plow on its under side, and O O' K the flare or pitch of the mold-board. Imaginary straight lines are drawn through the pattern-block from the point representing the upper curved edge of the mold-board to the straight line representing the lower edge of the same, beginning at the point of the plow, as with the line L T M on diagram Fig. 5, and receding, as shown by the lines H' O' and H C, until the line V W is reached, which line represents the vertical portion of the mold-board, with the point V at the top and W at the bottom. The lines to the rear of this vertical line, passing, from points in the curved line located between the points V and K, through the block, are so pro-

jected as to be tangential to the arc $O O' O''$, (shown in diagram Fig. 2,) which are is described by the edge of the furrow-slice while passing from a vertical position to its final resting position. The next step to arrive at the pattern for the mold-board A is to cut away all that part of the pattern-block in front of the imaginary lines above referred to, so as to expose said lines to view on the face of the plow, as seen by the lines before referred to, as represented by $H' C' H C$, &c., in the diagram Fig. 5. Now, inasmuch as these several lines drawn across the face of the mold-board from its upper to its lower edge are straight lines, and its lower edge is also straight and parallel to the landside, with only its upper edge properly curved, it follows that there is no force spent against the furrow-slice, save what is requisite to rotate it at right angles to the line of the plow's direction, for if said lines represented either concave or convex surfaces, instead of planes, a certain amount of force would be expended in changing the natural shape of the furrow-slice to enable it to pass over such concave or convex surfaces. Again, if the lower edge of the mold-board were not parallel to the landside, force would be spent in unnecessarily moving the furrow-slice outward at the bottom, or else the face of the mold-board, save the extreme upper edge, would recede from the furrow-slice, and thereby fail to perform its work. Finally, by this specific construction of the face of the plow the rapidity with which the furrow-slice is rotated or turned as it climbs the plow will be found to increase at the same ratio as the cosine of the arc through which the furrow-slice is passing diminishes, thus equalizing the pressure of the furrow-slice against the plow all along its entire length, and it follows that the furrow-slice is rotated with a minimum expenditure of force. Were this not so, sharp curves, or even angles, in the line of its path over the face of the plow would be commendable.

I shall now proceed to elucidate the principle on which I construct my plow, and in illustration thereof refer to the several diagrams on the annexed drawings.

Let $O A$, Fig. 2, represent the width of the furrow-slice and $A F$ its depth or thickness. Now, extend line $A F$ to the point B . Then, with the point O as the center, raise the edge $A F$ of the furrow-slice until it assumes the position indicated by the parallelogram $O A' F' P''$. From this position it will turn on the point P'' , as its pivotal point or center of motion, to its final position, (represented by the parallelogram $P'' O'' A'' F''$), from which it will be seen that the bottom edge, $O A$, of the furrow-slice, while being inverted, will assume the several positions indicated by the lines radiating from the center of motion, O , until the point D is reached, and then form a tangent to the arc $O O' O''$, said radial lines $X X$, when projected upon the pattern-block, Fig. 3, dividing

this into a corresponding number of sections radiating from the axis or center line of the block. Now, diagram Fig. 2, or so much thereof as is comprised between or bounded by the lines connecting the points $O O' K J$, is simply an end view of the pattern-block, Fig. 3, and to construct diagram Fig. 4, which is simply to aid in laying off the plow, we draw the indefinite line $S K$ and raise upon it in perpendicular $A T$ of a height equal to the length which the plow is to have. Now, set off the distance from A to $O = A O$ in Fig. 2,—that is, the exact width of the furrow-slice—and draw line $O M$ parallel to $A T$, intersecting a line drawn between the points $T S$. Now, mark off line $O J = O J$ in Fig. 2, and draw line $J L Q$ also parallel to $A T$ and extend line $S T$ to L , after which set off $J K = J K$ —i. e., the arc—in Fig. 2, and divide this line into as many spaces or sections as there are sectors formed by the radial lines $X X$ in Fig. 2, letting the distance $J D$ be equal to the length of the arch $J B D$ in Fig. 2, and from each of these points draw a series of lines parallel to each other and to the center line, $J L Q$, until said lines intersect the curved line $K L$ at the points marked respectively $V H H' B'$, &c., and from these points of intersection draw lines parallel to the base-line $K S$ and intersecting line $J Q$, respectively, at the points marked $U Y Y'$, &c., and connect these points with the focal point at R . Line $J Q$ forms a tangent to the curved line $L K$ at the point L , and said curved line $L K$ decreases in curvature from L to K in regular geometrical ratio, as above stated. Now, place the pattern-block on the plane or area represented by $O J L M$ and mark the block at the points $U Y Y' L$ and other points of intersection of line $J Q$ by the series of parallel horizontal lines $V U$, &c., and also at the points $W C C' M$ and other points of intersection of line $O M$ by the series of focal lines $U R$, &c. Turn triangle $L J K$ up over the block and dot or mark the block at the points marked $V H H' L$ and other points of intersection of the curved line $K L$ by the series of parallel horizontal lines $V U$, &c., and describe on the block the curvilinear line $L K$, as shown in the diagram Fig. 5. We thus obtain the points from which our imaginary lines are drawn through the block from the upper to the lower edge of the mold-board, as indicated by lines $C H C' H'$, &c., in diagrams Figs. 5 and 6; and to form the landside, cut away all that part of the block indicated by $J A B$ on diagram—that is, radius $J O \div J A$ —following the length of the block parallel with its edge $J L$, Figs. 3 and 5, terminating at T , (in other words, following line $A T$, Figs. 4 and 5,) which makes T the point of the plow and the line $T B' B$ the vertical cutting-edge of the same. To strengthen the plow-point, a reinforcing lip, N , is swaged onto it, after which, if desired, the plow may be lightened by cutting away a portion of the lower edge and

rounding the rear end of the mold-board, which does not affect the working-surface of the plow.

5 Having thus described my invention, I claim and desire to secure by Letters Patent of the United States—

10 The plow mold board A, having its form according to the top line, T B' K, and the base line, T M, Figs. 4 and 5, and having a gradual rising surface on straight lines, Figs. 2 and 7,

all constructed according to the lines herein shown and described.

In testimony that I claim the foregoing as my own I have hereunto affixed my signature in presence of two witnesses.

FRANCIS LA FAYETTE EZELL.

Witnesses:

HENRY TRANERNICHT,
LEOPOLD WENZLER.