2 Sheets--Sheet 1.

L. P. RIDER.

Improvement in Plow Mold-Boards.

No. 114,044. Patented April 25, 1871.

Fig. 1.

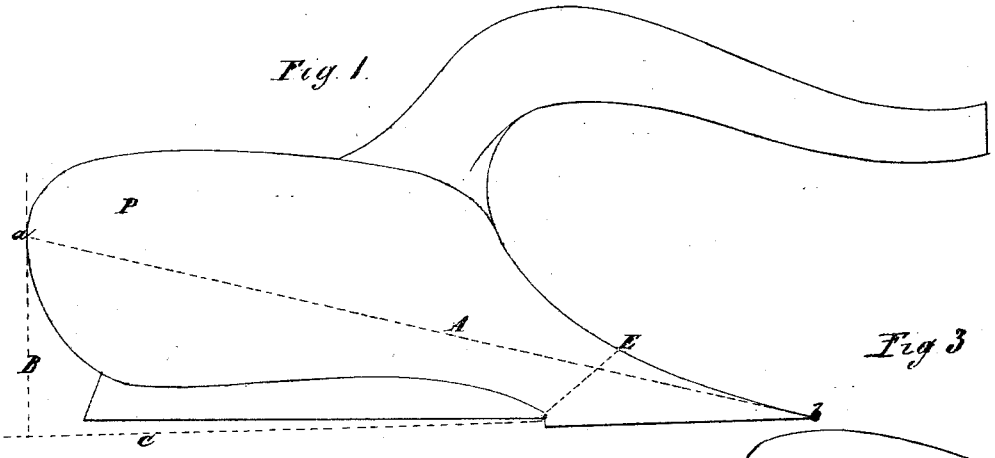


Fig 3

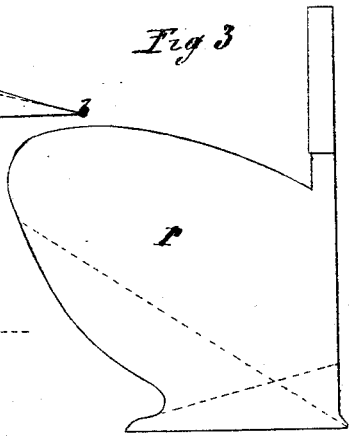


Fig 2

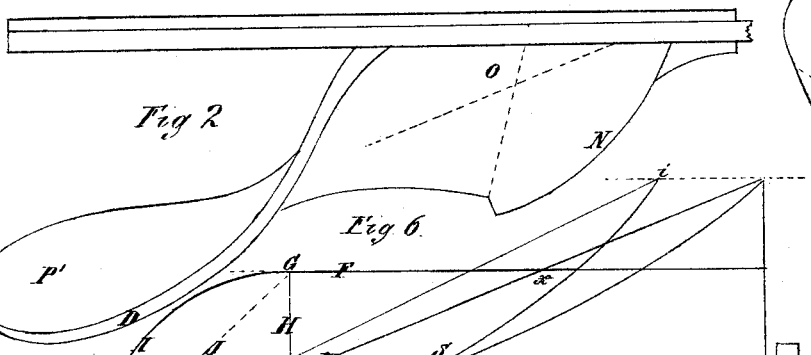


Fig 6.

Fig. 5.

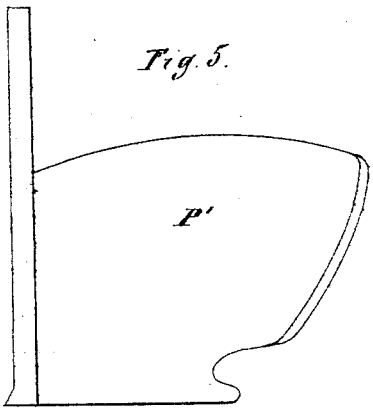
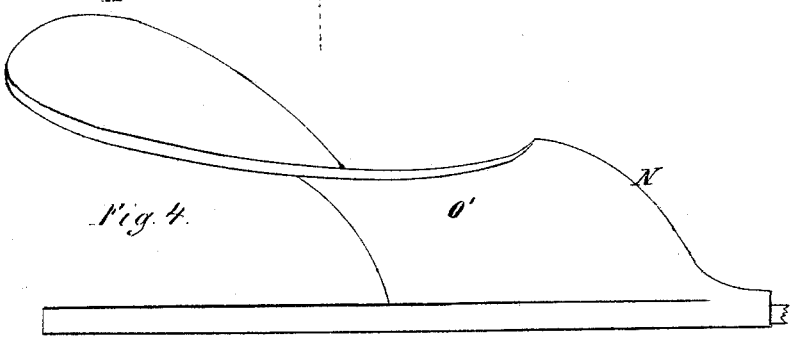


Fig. 4.



Witnesses:

A. M. Tanner

Thos. D. D. Durand

Inventor:

L. P. Rider

PER Munn & Co

Attorneys.

AM. PHOTO-LITHOGRAPHIC CO. N.Y. (OSBORNE'S PROCESS.)

2 Sheets--Sheet 2.

L. P. RIDER.

Improvement in Plow Mold-Boards.

No. 114,044. Patented April 25, 1871.

Fig. 7.

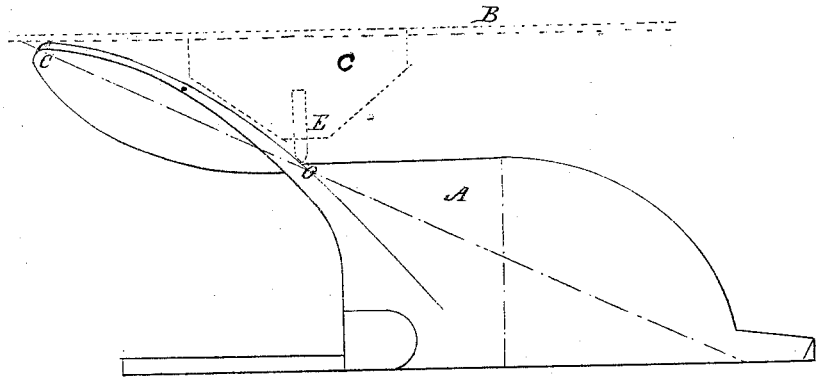
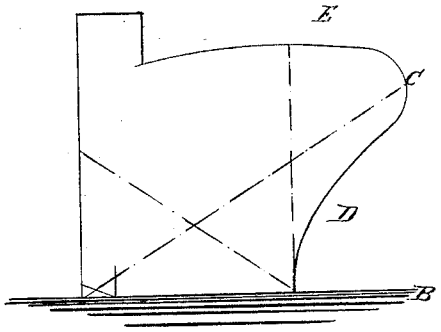


Fig. 8



Witnesses:

Chas. Nida.
D. S. Mabee

Inventor:

L. P. Rider

Per Munn & Co.

Attorneys.

AM. PHOTO-LITHOGRAPHIC CO. N.Y. (OSBORNE'S PROCESS)

UNITED STATES PATENT OFFICE.

LEMAN P. RIDER, OF PITTSBURG, PENNSYLVANIA, ASSIGNOR TO HIMSELF AND JAMES MARSHALL, OF SAME PLACE.

IMPROVEMENT IN PLOW MOLD-BOARDS.

Specification forming part of Letters Patent No. **114,044**, dated April 25, 1871; antedated April 12, 1871.

To all whom it may concern:

Be it known that I, LEMAN P. RIDER, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Constructing Plow Mold-Boards; 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 drawings, forming part of this specification.

My invention relates to mold-boards of plows, (as patented to me in England, July 25, 1867,) and my object is to produce a mold-board which will operate with a minimum of friction and a maximum of accuracy in turning the furrow.

This invention consists in making the mold-boards of plows of such a shape that the grade of the board will be a true inclined plane from the point to the extreme end of the wing where the greatest height of the plane terminates, at a point from the ground equal to the width of this plow, which may be supposed to be one foot.

In the accompanying drawings, Figure 1 is an outside view of the mold-board. Fig. 2 is a top view of the same. Fig. 3 is a front end view of the mold-board. Fig. 4 is an inside view of the same. Fig. 5 is an end view, and Fig. 6 is a diagram.

The inclined plane above referred to is indicated by the dotted line A, Fig. 1, and the greatest height by the dotted line B. If the vertical line, which is at right angles with the bottom or sole of the plow, or rather with the dotted line C, be carried along toward the point of the plow, with the upper end all the time following the grade of the inclined line A, it will be found to strike the face of the board along the entire length of the line; or should the back of a square be placed against the base-line C, and the tongue of the square be allowed to reach the top of the board, (and thus moved along,) it will be found to strike the entire face of the mold-board, and will describe a curve, D, Fig. 2, which will form the upper edge of the board. Another curve, E, will form the colter-edge, Fig. 1, which will be indicated by laying a straight-edge upon the inclined line A. The straight-edge will touch the board the entire length of the line, or from the extreme end of the wing at the point *a* to the point *b*. Thus the lifting-power of the plow will be a true and uniform grade or inclined plane from the point *b* to the point *a*, *a* being the extreme height of the plane. It will be seen by this that the shape of the mold-board is thus governed by the straight line A of a central inclined plane. This will be illustrated by the diagram Fig. 6, which is supposed to be a block of wood of the width of the plow, and the edge of which is of the shape of the figure inclosed by the dotted lines in Fig. 1.

The parallel lines of the diagram F F′ represent the sides of the plow, the line F corresponding to the dotted line C in Fig. 1, and F′ to the line of the landside. From the point *b* of the diagram, which is the top of the share, and when measured from that point across is the true width of the plow, is drawn the line H, and from some point on this line is described the arc I. The curve of this arc is determined by the length of the diagonal line J, which, experience has shown, should exceed in length the width of the plow about one-fourth. For ordinary plowing in hard stiff soils, a larger curve is required; hence the diagonal must be lengthened. Therefore it will intersect the line F farther from the line H. Whatever the length may be, K is always taken as the point from which to describe the arc, which is drawn from some point on the line H, striking from the point K to the point G also. K is always taken as the point from which to draw the line L, which line corresponds with the dotted line A in Fig. 1, the central grade line.

Having thus established the rule of lines by which the shape of the mold-board is obtained, the application of the same is as follows: First, the corner of the block M is cut down to the line I. This gives the curve of the board at N, Fig. 2; then all the wood is cut away between the lines L and I and the line F downward to the lower side of the block, or to an edge, carefully preserving the line L, as it is the central grade line and by which the shape of the mold-board is governed. If this cutting has been properly done, the back of a square, if

placed on the line F, (let the line H be supposed to be such square,) will, if moved along in either direction toward the point and following the dotted line, be found to strike both lines L and I, and at the same time touch all the board between them; or, in other words, the tongue of the square will rest on the face of the board from line to line, and if the square be moved in the opposite direction, (still retaining the back of the square against the line F,) it will be found to strike the line L and all the board between the lines. At the point where the line L intersects the line F the square comes to a perpendicular to the base-line of the plow. From this point onward the direction of the curve is changed, and is now outward from the plow, forming the wing or throw of the mold-board. By this it will be seen that the curving of the board is governed by straight lines, (the lines L and F,) the line F being the ruling-line, all the board between the point *x* and the point K being the lifting-grade of the plow, as shown at O, Fig. 2, O′, Fig. (4, being the opposite side of O,) and all the board beyond the point *x* being the wing or throw of the plow, (shown at P, Fig. 4,) the opposite side of which is shown at P′, Fig. 2. The distance the wing or throw of the board curves beyond the width of the plow is governed by the depth of the furrow. Should the plow be calculated for plowing eight inches deep, the throw of the wing is set off at ten inches, allowing two inches for throwing the furrow beyond its vertical position.

Thus far has been described only the section embraced below line A, Fig. 1. The upper section is governed by the same rule of lines by which the lower section has been formed. Apply the square as before, (allowing it to extend above the line A,) and it will be found that the tongue of the square will describe the curve E, Fig. 1, and the curve of the wing D, Fig. 2—that is to say, if the back of the square be placed against the dotted line C, Fig. 1, and the tongue allowed to fall on the mold-board, it will follow the curves E and D, at the same time touch the board at all points between them, as above stated. By this shaped board the lifting of the furrow is on an inclined plane, which is uniform in grade from the point to the end of the wing. The mold-board thus described is adapted to the plowing of stiff hard soils, requiring sharp and thin plows.

Mold-boards for lighter soils are constructed on the same general principle of a central grade, but slightly modified. In order to illustrate the application of the rule to this kind of plows, reference will again be had to the diagram. In light soils it is necessary to shorten the plow, in order to obtain a shorter curving of the mold-board. To do this we change the governing-line L, which, as above said, corresponds with the line A in Fig. 1, from a straight into a curved line, S, Fig. 6. By setting off, at the point *f*, the chamber *f h* of such length as may be judged the nearest right, and then, by an easy geometrical construction, the center is found, from which a circular arc can be stretched through the three points, K *h i*. The construction of the mold-board then proceeds as before, carefully preserving the curved line S until the same result is produced—viz., that discovered by the use of the square as applied to the base-line C, Fig. 1, or as applied to the line F of the diagram. It will be found to conform to the line of central grade, the grade being in this case more abrupt and shorter, which is the object desired; hence by this means can be obtained any length of mold-board and of any desired grade, according to the nature of the soil, at the same time preserving the general principle of the central grade line.

Of the many advantages derived from this peculiar mold-board may be instanced the following: a large reduction of friction on the land side, also at the heel of the mold-board. The beam is nearly in a straight line with the land side; hence the draft of the plow will be more direct, thereby avoiding the side draft common to many plows. By the application of this rule of lines a plow can be constructed to suit any kind of soil, giving to the edge of the plow a position for shaving or scraping, as the nature of the ground may require. It also raises the furrow to its edge without any abrupt changes of direction, over a uniform and direct inclined plane, thereby preventing any unnecessary twisting or turning or breaking. The lifting of the furrow is effected by the upper curve of the mold-board, so that the purchase or leverage is applied to the land side of the furrow, and is thereby more easily raised or turned from a horizontal to a vertical position.

Another improvement consists in the application of a gage corresponding in thickness to the depth of furrow required, such gage being moved on a certain base-line at the bottom of a vertical plane which is parallel with the land side of the plow and touches the rear end of the mold-board, so that a blade attached to the gage and in contact with the face of the mold-board will, as the gage is moved along and reaches a central point, *a**, Fig. 7, cause the latter to turn or move outward on its outer edge, the gage, previous to reaching such point, turning on its inner edge, and being in a vertical position when it reaches the point *a**. The pattern for the mold-board, if made from this movement of the gage, will cause the mold-board in practice to turn a furrow corresponding precisely to the turning movement of the gage, and of a depth corresponding to the thickness of the same, which may be varied or changed for different plows, as circumstances may require.

Fig. 7 is a plan or top view of the mold-board, and Fig. 8 is a front view of the same.

A is the mold-board, and B a base-line parallel with the land side of the plow and at the bottom of a vertical plane, which just touches the extreme rear of the mold-board, as indi-

cated at *b**, or is set off from the mold-board a distance equal to the thickness of furrow required.

C is a gage, the thickness of which is made to correspond with the desired depth of furrow designed to be turned by the mold-board. This gage has a blade, D, attached to it at right angles with the bottom or base of the gage. This gage is moved along with the outer edge of its base in contact with the base-line B, and the mold-board is or must be of such a form that its blade D will be in contact with its whole width or depth—that is to say, every part of the inner edge of the blade will be in contact with the mold-board from the lever to the upper edge thereof. At the commencement of the movement of the gage, which is from the point of the share, the gage rests upon the inner edge of the same, and in the progress of its movement it gradually assumes a vertical position, which is attained at the central point, *a**, and from this point the gage turns outward on the outer edge of the base.

The pattern being made in such a manner that the conditions of the movement of the gage, as described, will be fulfilled, a mold-board may be obtained to plow a furrow of any required depth.

Having now described all that is necessary to a clear and full understanding of my invention, what I esteem to be new, and desire to protect by Letters Patent, is—

The mold-board constructed with the grade of the board in a true inclined plane extending from the point to the extreme end of the wing, and with the greatest height of said plane equal to the width of the plow, as and for the purpose described.

LEMAN P. RIDER.

Witnesses:

J. H. HILLERMAN,

C. H. LOVE.