J. NOURSE & J. A. HOWE.

Plow.

No. 201,281. Patented March 12, 1878.

Fig. 1.

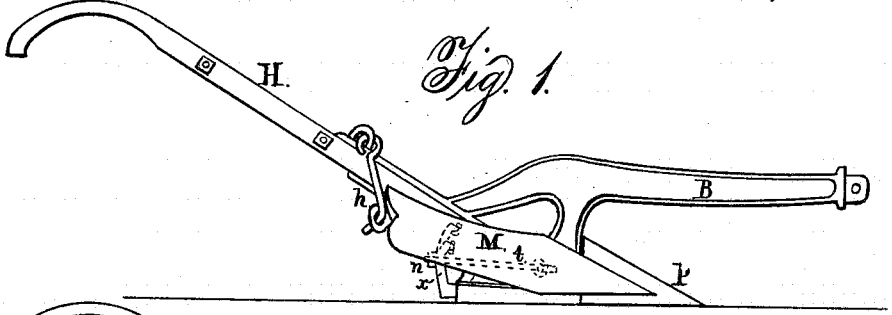


Fig. 2.

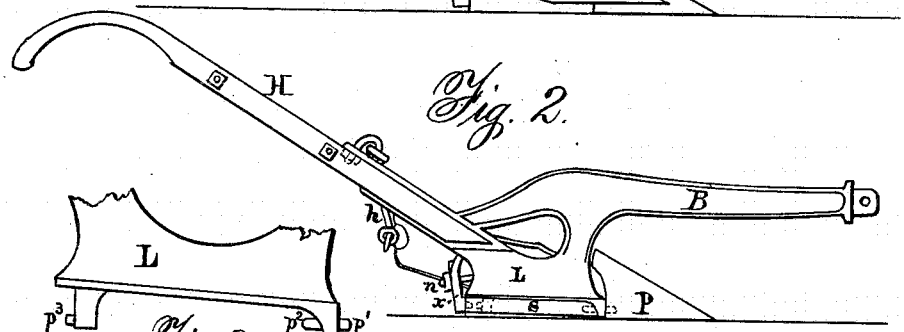


Fig. 3.

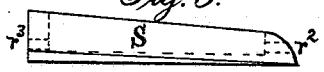


Fig. 4.

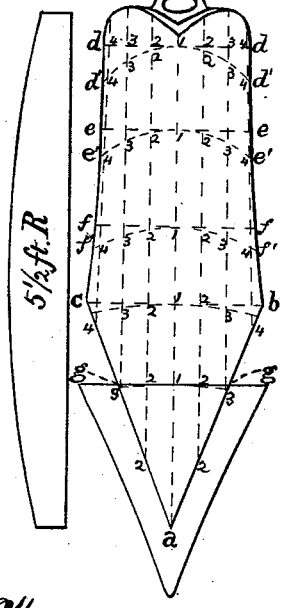


Fig. 5.

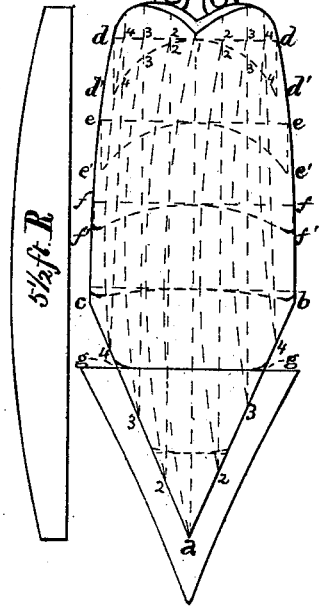
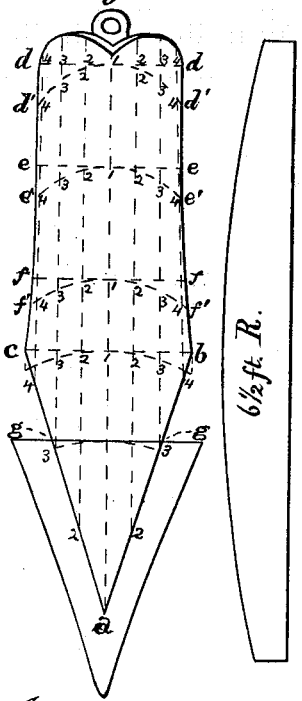


Fig. 6.



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JOEL NOURSE, OF BOSTON, AND JAMES A. HOWE, OF AYER, MASS.

IMPROVEMENT IN PLOWS.

Specification forming part of Letters Patent No. **201,281**, dated March 12, 1878; application filed February 26, 1877.

To all whom it may concern:

Be it known that we, JOEL NOURSE, of Boston, in the county of Suffolk and State of Massachusetts, and JAMES A. HOWE, of Ayer, in the county of Middlesex and State of Massachusetts, have invented certain Improvements in Plows, of which the following is a specification:

Our improvements relate especially to that class of plows known as "swivel-plows."

The nature of our invention consists, first, in the construction of the mold-board in swivel-plows, whereby we are enabled to produce swivel-plows which shall more effectually do the work required of such plows, and in which the mold-boards are constructed on a uniform system for all sizes and for all kinds of work; second, in so constructing the shoe on the land-side of the plow that it can be held in position by the brace extending to the mold-board, and by the shape of the frame onto which it is fitted.

In the accompanying drawings, Figure 1 represents a side view of our improved swivel-plow with mold-board attached for lap-furrow plowing. Fig. 2 represents same plow as shown in Fig. 1, with mold-board reversed to the other side of the main frame. Fig. 3 represents our improved shoe, and the lower portion of the land-side or main frame to which the shoe is secured. Fig. 4 represents a mold-board constructed on our plan for flat-furrow plowing. Fig. 5 represents a mold-board constructed on our principle for stubble-plowing. Fig. 6 represents a mold-board constructed according to our principle for lap-furrow plowing.

Like letters represent like parts in all the figures.

B represents the beam of the plow. H represents the handles. M represents the reversible or swivel mold-board. P represents the point of the mold-board. L represents the land-side of the plow, and S represents the shoe. p^3 and p^2 are dowels which hold the shoe S in position, and p^1 and the pivot-pin on the lower portion of the brace x form the pivots upon which the mold-board is reversed.

In Figs. 4, 5, and 6, the letters used in construction will be referred to hereinafter.

In swivel-plows the mold-boards require to be of peculiar construction, it being absolutely essential that one half of the mold-board should be the counterpart of the other half, so that the mold-board can be reversed to work on either side of the plow.

It will therefore be found that the usual methods of construction for other mold-boards will not answer in mold-boards for swivel-plows.

In Figs. 4, 5, and 6 the peculiar construction of our mold-board is shown. Take, for instance, Fig. 4, to illustrate. Near the rear end of the mold-board we form the circle or arc of a circle, *d d*. This circle, for convenience, can first be struck on the rear end of the block from which the mold-board is to be worked. The radius of this circle can be varied for different kinds of work, and any desired length of arc can be taken.

We form a ruler of any desired curve, as shown in this case by the curved ruler marked 5½ ft. R, five and one-half feet being the radius of the circle of which this is an arc in the full-sized plow.

We do not limit the curve of this ruler to any particular radius, as a ruler but slightly curved might be used, or even a straight-edge under some circumstances. We next form the mold-board along the line *a* 1, to fit the curved side of the ruler R. The base and land-side faces—*i. e.*, the two base-faces of the mold-board—having been formed to give the mold-board the desired rise and width of furrow, we strike the line *g g*, and form it into a concave or convex arc of any desired radius; or a straight line may here be used from the point marked 3 on one side to the point marked 3 on the other side, the points marked 3 on either side being the extreme width of the mold-board on its face on this line *g g*. The points 3 3 are also at equal distances from the two base-faces of the mold-board.

We next form the straight lines *a c* and *a b*, passing through the point *a* and through the points 3 3, or through the ends of that portion of the line *g g* which lies in the face of the mold-board. The curved arc referred to on the line *g g* is shown revolved into the plane of our drawing by the dotted line.

We divide the arc *d d* and the arc in the line *g g* into equal spaces, marked 2, 3, 4,

&c., each way from the axis-line 1. Holding the face of the ruler R parallel to a line normal to the face of the mold-board on its axis-line, and placing the curved edge of the ruler on the point 2 in the line *a b*, and on the point 2 on the arc *d d*, the curved edge of the ruler will rest upon the point 2 in the arc *g g*. We then form the mold-board to the edge of the ruler along the whole line 2 2 2 2. In a similar manner we rest the curved ruler on the point 3 on the arc *g g*, on the point 3 on the arc *d d*, and on the point 3 in the line *a b*, and fit the mold-board to the ruler at all intermediate points. In a similar manner the mold-board is fitted to the ruler along all the lines 4, &c., as far as the mold-board may be carried, and in a similar manner along the lines 2, 3, 4, &c., on the other side of the axis-line. The arc *d d* is shown in its true form when revolved into the plane of our drawing, and shown by the dotted arc *d' d'*.

If, after the mold-board has been formed as above described, its face be cut by planes perpendicular to the axis-line *a* 1 on the lines *e e*, *f f*, *c b*, &c., the curves thus formed will all be arcs of circles, each having a different radius. These arcs, being rotated into the plane of our drawing, are shown in their true form by the dotted arcs *e' e'*, *f' f'*, &c. These arcs have the smallest radius at the rear end of the mold-board, and the radii of these arcs gradually increase as they approach the forty-five-degree angle, or front edge of the standard, until at or near this point the cross-section of the mold-board becomes a straight line, and in front of said straight line the face of the mold-board presents reversed arcs as cross-sections, forming in front of the straight line a concave surface. The cross-section of the mold-board, forming a straight line, is worked front or back from the forty-five-degree angle whenever it is desired to secure a more convex or concave mold-board.

The mold-board shown in Fig. 4 is designed for flat-furrow plowing. In Fig. 5 the same ruler R was used as in Fig. 4; but the circle *d d* has a different radius, as shown by revolving it into the plane of the drawing in the arc *d' d'*.

The line in which the mold-board is formed along the line *g g* is a straight line in this case, instead of being curved, as shown in the other two mold-boards. The arcs formed on the lines *a* 1, 2 2, 3 3, &c., are in this case shown by the dotted lines as revolved up into the plane of the drawing. This mold-board is designed for plowing stubble land. In this mold-board the edges are carried out very wide or broad, and these extended edges are slightly concaved along the edge of the mold-board for a short distance back from the front of the standard. (See Fig. 5.) This concaved edge has been found to assist the mold-board in controlling the furrow-slice, and with it a very broad mold-board can be constructed, and a large portion of the face of the mold-board can be used to control the furrow-slice.

Fig. 6 is constructed on the same principle, varying in the angle of the straight lines *a c* and *a b*, in the radius of the arcs *d d* and *g g*, and in the radius of the arc of the ruler R', which in this case is formed, in a full-sized plow, on a radius of six and one-half feet. Fig. 6 represents a mold-board formed for lap-furrow plowing.

By adopting this rule for forming mold-boards to swivel-plows, various patterns can be adapted to various kinds of work, and any desired size of plow can be obtained. The mold-boards can be formed accurate and true throughout their entire surface, and can be duplicated by forming a new pattern on the same lines and arcs, and by using the same arc-ruler as used in the original pattern. When the mold-board is formed on the above plan—that is, so that the ruler R will fit the mold-board along all the lines *a* 1, 2 2, 3 3, &c., while resting on the lines *a b* and *a c*, and on the arcs *g g* and *d d*—any height, length, and width of mold-board can be obtained, and the mold-board forms a regular surface, over which the furrow-slice passes in a free and unobstructed manner, controlling and operating the furrow-slice in a superior manner, doing the work thoroughly and well, and making a plow that will give a very easy draft in doing the work.

The curved ruler R can be formed of any curve desired, but usually being the arc of some circle; or it may even, for some forms, be of so large a radius as to come nearly or quite to a straight line.

The arc *d d* can also be of any desired radius, and the center from which this arc is struck can be placed at any required distance from the planes of the base-faces of the plow, thereby giving any desired height and width of mold-board.

The radius and length of the arc *g g* can also be varied to form concave or convex faces, or a straight line may here be used; but still, with all these changes, the general principle of construction in our mold-boards remains the same. Mold-boards formed on this plan for swivel-plows present to the furrow-slice a very large controlling-surface, utilizing more of the face of the mold-board than can be done in most swivel-plows.

The mold-boards shown in Figs. 4, 5, and 6 are each adapted to different kinds of work, and are all fitted onto the same land-side and standard, and give the purchaser swivel-plows for different kinds of plowing, by simply purchasing different forms of mold-board and a single main frame, land-side, and handles.

To change the mold-boards it is only necessary to loosen the nut *n* on the brace-rod *t*, (see Fig. 1,) and to remove the brace *x* from the rear of the shoe S and from the mold-board.

All the mold-boards are also fitted to the same brace *x*, and are provided with a recess, into which the pivot *p'* fits, as shown in Figs. 2 and 3.

Any of the other mold-boards can be replaced

upon the standard, and the brace x put into its place, and the nut n on the brace-rod t tightened, and the plow is ready for its new kind of work.

The shoe S has usually been fastened to the land-side L by a bolt or bolts passing up through the shoe, and having a nut or nuts in recesses formed above in the land-side. These recesses for the nuts were an injury to the land-side, as they filled with soil and obstructed the proper working of the land-side, which should present a smooth and continuous surface to the land side of the furrow. To avoid this difficulty, we construct our land-side L with arms, which pass into the shoe, and are provided with dowel-pins p^3 and p^2. (See Fig. 3.) The shoe S is also provided with recesses r^3 and r^2, into which the dowel-pins p^3 and p^2 fit.

When the shoe is placed in position on the lower portion of the land-side L, a dowel on the brace x fits into the rear portion of the recess r^3 on the shoe. When the mold-board, shoe, brace-rod, and brace are all in their proper position, the single nut n holds them all in position.

Having thus described the nature and operation of our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. The construction of the mold-board for swivel-plows, in which the face is formed to fit the same curved ruler on the face of the mold-board along the lines a 1 and 2 2, 3 3, &c., on both sides of the axis-line, said lines being at equal distances apart on the face of the mold-board at each end, substantially as described.

2. The construction of the mold-board for swivel-plows, in which, if the face be cut by planes perpendicular to the axis-line, the resulting curve at the rear end of the mold-board shall be an arc of a circle, and the section at or near the forty-five-degree angle or front edge of the standard shall be a straight line, the curves varying in regular succession, forming arcs of circles of gradually-increasing radii from the arc at the rear to the straight line in front, substantially as described.

3. The mold-board for swivel-plows formed with convex center and concaved extreme edges for a short distance back from the standard, substantially as described.

4. The shoe S, when constructed to be held in position only by the lower portion of the land-side L, upon which it is fitted with projections and recesses within the shoe, and by the brace extended from the heel of the shoe to the mold-board, substantially as described.

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