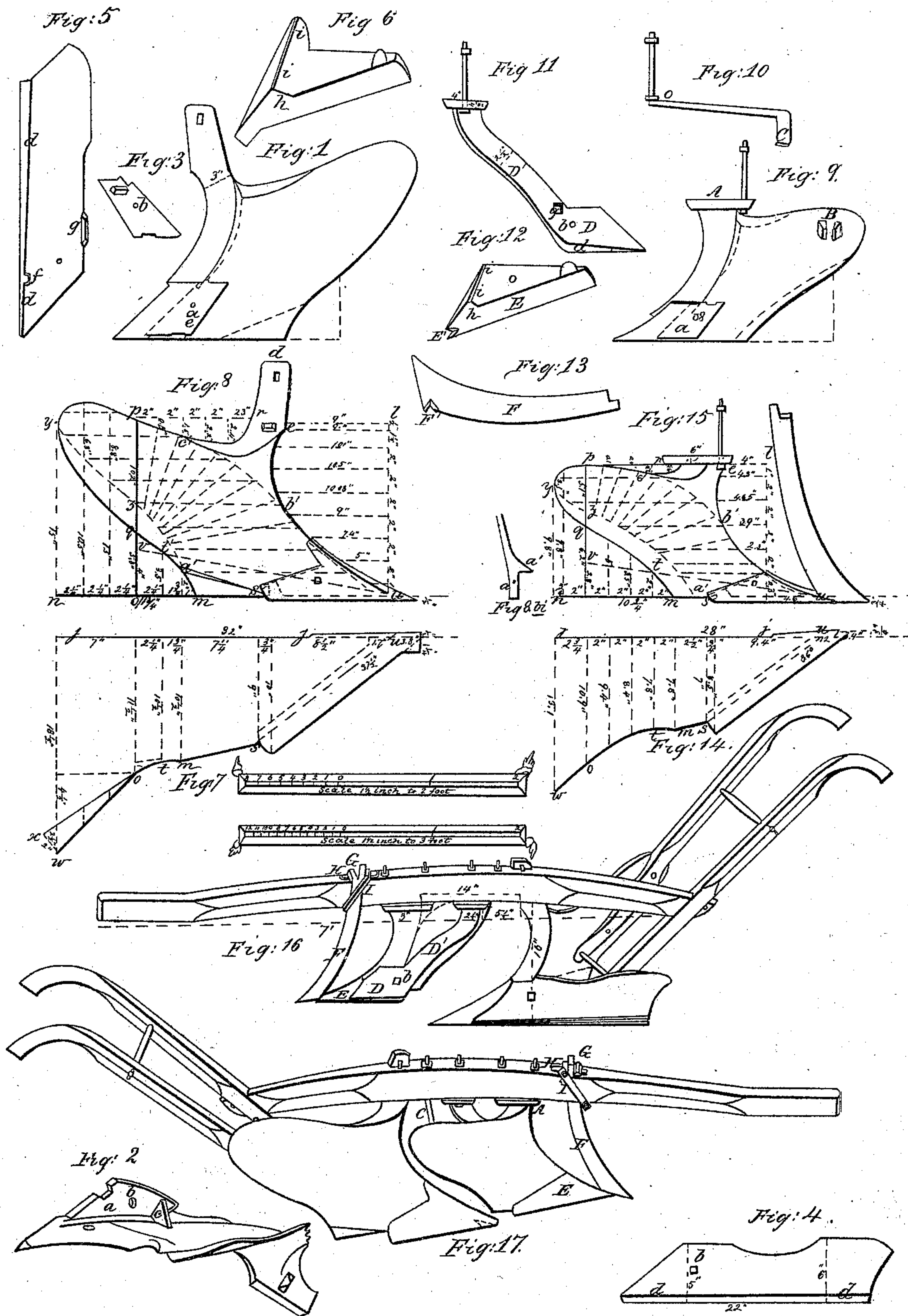


A. SMITH.

Plow.

No. 3,579.

Patented May 10, 1844.



UNITED STATES PATENT OFFICE.

AARON SMITH, OF BLOOMFIELD, MICHIGAN.

IMPROVEMENT IN DOUBLE PLOWS.

Specification forming part of Letters Patent No. 3,579, dated May 10, 1844.

To all whom it may concern:

Be it known that I, AARON SMITH, of Bloomfield, in the county of Oakland and State of Michigan, have invented certain new and useful Improvements in the Manner of Constructing a Double Plow for Subsoil Plowing; and I do hereby declare that the following is a full and exact description thereof.

My double subsoil-plow has two mold-boards and their proper appendages, placed one before the other on the same beam, the hind plow being so proportioned and arranged as to raise and lay its furrow-slice on that of the forward one.

In the accompanying drawings, Figures 1 to 8 represent the parts of the rear or hinder plow in detail. Figs. 9 to 15 represent the parts of the forward plow, also in detail. Figs. 16 and 17 show the plow when put together, Fig. 16 representing it on the land side and Fig. 17 on the opposite or mold-board side.

Fig. 1 represents the inner side of the mold-board, the landside and the share being removed for the purpose of showing the wing or head-piece *a*, by which the landside is connected to it. The head-piece or wing *a* is cast in one piece with the mold-board; but it is separate in the pattern for the purpose of molding it with convenience.

Fig. 2 is a view of the same parts, looking at the under side of the mold-board and wing or head, when cast. The head or wing *a* stands off from the mold-board at the proper angle to receive the landside on its face *a*; Fig. 1, the two parts being held together by a screw-bolt at *b*. A brace-piece at *c* serves to strengthen the wing by connecting it at its upper part with the mold-board.

Fig. 3 shows the inner side of the wing or head *a*.

Fig. 4 represents the outer face of the landside-plate, and Fig. 5 its inner side. A flange, *d*, extends the whole length of its lower edge, projecting out on each side. A notch, *e*, is cast in the lower edge of the wing *a*, into which a corresponding projecting piece, *f*, cast on the inner side of the landside, fits. There is also a flange or projecting fillet at *g*, on the inner side of the landside, and as the wing *a* fits in between the flanges *d* and *g*, these, with the screw-bolt at *b* and the piece *f*, hold the two parts together with great firmness.

Fig. 6 is a view of the sole of the share,

which is to be attached to the mold-board by means of a screw-nut and a lip, *h*, as in some other plows. When the share is in place its edge *i i* embraces the fore end of the landside.

Fig. 7 is a plan of the hinder plow as I draw it on my working-board when preparing to make a pattern. The numbers on the line *j j*, representing the landside, show the distances between the principal points of the varying outline of the mold-board, as marked by the dotted lines drawn at right angles to the landside and terminating in those principal points. The distances from the face of the landside to these principal points are marked on these dotted lines.

Fig. 8 is a right-hand or face view of the mold-board with the share attached, showing the outline of its respective sides. The line *u l* is erected perpendicularly from the point of the mold-board. The measurements on the dotted lines drawn horizontally from the perpendicular give the outline of the head of the board, said measurements being taken at the respective distances marked on the perpendicular. The line *m n* is drawn in the plane of the base of the mold-board, and the numbers on the perpendiculars drawn from the line give the outline of the lower side of the end of the board, and also of the top of it, as far as the line *o p*, and the measurements from the line *p r*, drawn through the point *p* parallel to the plane of the base of the board, give its remaining outline to the sheth.

The line *u b' c' p* is a guide-line in forming the face of the board. The manner of forming the curve *u b'* has already been given. That of *b' c' p* may be determined by the scale of one and a half inch to the foot, which is that to which the respective figures showing the parts in detail are drawn. The manner in which the line *u b' c' p* becomes a guide-line will presently be shown.

The line *o p* is a perpendicular, standing at the point where the furrow-slice is on its edge in a perpendicular position. The face of the mold-board at this point is exactly perpendicular, and the line *o p*, from *q* to *p*, is in it. *o p* is also one of the guide-lines in forming the face of the board.

By Fig. 7 it will be seen that the width from the face of the landside to the outside of the end of the mold-board is eighteen and one-half inches; at the point *o* of the perpendicular eleven and

one-half inches; at the heel *s* of the feather of the share nine inches; at the heel of the mold board ten and one-half inches; and the same at the point *t*, this point corresponding to the point *t'* in Fig. 8. The rise of the line of the board from *a'* to *t'* is made at such rate, compared with the spread of the board, as will exactly preserve through that distance the same width of the plow as at the heel *a'*. From *t'* to the perpendicular the rise is such that the increased width of the plow, Fig. 7, is to the distance as one to two and one-fourth inches, and from the perpendicular to the end of the board these measurements are as one to one. The spread of the board is made very rapidly for the rise, for the purpose of carrying the furrow-slice a little way on that of the forward plow, so as to prevent it from falling back into the furrow. The point *t'* being where the action on the furrow-slice following that of the heel *a'* commences, I make that a point through which to draw a line from the point of the mold-board *u* to the perpendicular. This line also lies in the surface of the board, and is a guide-line. The lines *vp* and *vu* both being in the surface of the board, the one where the furrow-slice is nearly horizontal and the other where it is perpendicular, the point *v*, Fig. 8, I take as a radiating-point, and from it I draw a series of lines which are to touch the curve *u b' c' p*. A straight-edge is to lie in each of these radiating lines so as to fit the actual mold-board. The same figure also exhibits another series of lines which lie in the surface of the board. These are parallel to the forward part of the base *us* of the board, and touch the curve *u b' c' p* and the perpendicular *op*. They possess the same character with the radiating lines of being fitted by a straight-edge. The angle formed by the base of the landside and the line *us* is one of about thirty-seven and a half degrees. There are other lines in the figure between the perpendicular and the end of the mold-board; but these touch it only at its upper edge, as between these points the board overhangs. In other words, the plane perpendicular to the base, which touches its upper edge, cuts the line *ow*, Fig. 7, and the plane that touches its surface from the top to the line *yz* cuts the line *ox*, the declension of the latter being at the end and base of the board just two inches. From the dotted lines *yz a'* to the edge of the board *yq a'* its face is chamfered or rounded off at the rate of about one-fourth of an inch to the inch, the widest part being about three inches.

The triangular space *a' s m* represents the heel of the mold-board, which is so formed as to cause it to lift or carry up the furrow-slice to the top of that of the forward plow, which is from three to three and one-half inches. The form of this part is shown in Fig. 8^{bis}, which is an end view of the heel, looking at it from the rear end of the plow. The line *a' s* is formed by the termination of the curving out of the mold-board, as seen at *a'*, Fig. 8^{bis}, the part *a''*

in the same figure being a vertical continuation of the body of the mold-board down to the sole, by which particular form this part is removed entirely out of the way of the furrow-slice of the forward plow. The slice cut off by the fore plow may be about two and one-half or three inches in thickness, and it is turned over by it into the furrow last made. The rear plow cuts a slice, say, four or five inches deeper, and this last slice is lifted by the mold-board, so that its outer edge rises against that turned over by the fore plow, and, passing above the curved edge *a'*, is turned over and deposited upon it. The plane *a' s' m* clears the slice first laid over, and the desired end is thus attained. The points which I have aimed at in this form of the mold-board are to raise the furrow-slice in the easiest manner and turn it from left to right exactly upon that of the forward plow. The horizontal lines on the board show the rise of the slice and the radiating ones the manner of its turning as it rises until it falls over.

Fig. 9 is a left-hand view of the mold-board of the forward plow separated from the share and landside. It is formed with a wing or head-piece, *a*, to which to fasten the landside in the same manner with that of the rear plow. It has no sheth; but instead of this it is furnished with a flange or cap-plate, *A*, through which it is bolted to the beam by two bolts, as seen in Figs. 16 and 17. Near to the end of the board there are two projecting pieces, (shown at *B*,) that form a dovetail gain to receive the foot *c'* of a brace, *C*, Fig. 10. The other end of this brace constitutes a screw-bolt which passes through the beam.

D, Fig. 11, is a plate which forms the landside of and constitutes a brace to this plow. It is seen in place in Fig. 16. Its lower part, *D*, constitutes the landside, and *D'* the brace, on the upper end of which there is a flange or cap, by which it is bolted to the beam in the same manner with the mold-board. It is fastened to the wing *a* of the mold-board by a bolt, *b*, said wing being received between a flange or fillet, *d*, at the bottom of the landside-plate and a projecting piece, *g*.

E, Fig. 12, is the share. (Seen in place in Figs. 16 and 17.) It is made with a notch in its point, as shown at *E'*, both sides of which slope under. Into this notch so formed the lower end, *F'*, of the colter *F*, Fig. 13, fits as a hook.

Figs. 16 and 17 show the manner in which the parts of the forward plow are fastened to the beam. The bolt next to the sheth of the hind plow is that of the brace of the mold-board. The next is that of the brace of the landside. The others are those which fasten the mold-board to the beam. This plow is made to be raised and lowered on the beam for the purpose of varying the depth of the furrow cut by the hind plow. This is done by means of the bolts and the movable plates between the cap-plates and the beam. The colter also may be varied in like manner, the upper end of it being

split into two parts, one of which, G, Figs. 16 and 17, is bent over upon the beam, so that by the wedge H it is raised or lowered. It is held to the beam by the band I, which consists of two parts fitted together by screws and nuts, so as to be tightened or loosened. This manner of attaching the colter has several advantages. The colter may be moved forward or backward on the beam, so as to be more or less oblique. It may be raised or lowered, and it strengthens instead of weakening both the share and the beam.

Fig. 14 is the plan of the length and width of this plow, corresponding to Fig. 7 of the hind plow; but it is much narrower and shorter, and shows the point of the perpendicular to be much nearer the end of the mold-board.

Fig. 15 is a right-hand view of the mold-board, share, and colter as combined for use. The corresponding parts of Figs. 14 and 15 are designated by the same letters as those of Figs. 7 and 8. The manner of finding the form and surface of this mold-board is precisely the same, it will be seen, as that of the hind plow; but the outline of its sides and the turn of its surface are different. This plow is designed to run just beneath the upper soil or sward, and is made with a long, narrow, tapering point. It is to cut a furrow-slice of about three inches in thickness and to lay it in the bottom of the previous furrow, and is made two and one-half inches narrower across the heel than the hind plow, in order that the right-hand side of the slice may adhere and be kept from slipping into the furrow while the other side is raised and carried over. The perpendicular is located nearer the end of the board than the rise and spread of the board may be more moderate and the tendency to crowd the furrow-slice off diminished; and from the perpendicular to the end of the board its surface continues perpendicular, so as not to throw the slice over into the furrow, but simply to cause it to drop there. The surface of the board as it approaches the heel is rounded off from the dotted line $a'z y$ to the edge, as in the hind plow. The forward plow is sufficiently in advance of the hind one to be free from the action of its furrow-slice. Its position on the beam is shown by measurements given in Fig. 16. A roller may be used on the end of the beam to regulate the depth of the forward furrow.

I temper my plow for our Michigan soils, so that the forward one shall cut a furrow of about three inches and the hind one a furrow of about five inches, or an entire furrow of eight inches; but in this respect the plow is so made that the plowman can temper it to suit his soil.

The form and turn of the boards and the dimensions of the respective parts of the plow, as herein described, I have adopted as a basis, and in varying the size of the plow I preserve the same form and turn of boards and the same ratio of parts.

In the construction of this kind of plow I

have had in view these important objects: first, to separate the mellow soil from the turf or vegetable matter, whether living or decaying; and, secondly, to place the former on the surface in condition to receive with the least labor the seed for the crops, and the latter under the surface, where it will decay the most rapidly, and where the gases from its decomposition will not only tend to incorporate themselves with and enrich the soil, but as they rise to the surface will come in contact with the roots of the plants; but, under the practice as at present prevailing, when a sward field is to be put into crop the ground is to be broken up in the spring and plowed once or twice and dragged intermediate to seeding in the fall. This costs a great deal of labor, and the summer's use of the ground is lost, as is also a great deal in the richness of the soil by the surface decomposition of the vegetable matter.

I do not in this patent make any claim to the manner in which I attach the landside and mold-board to each other; nor do I herein make any claim to the particular manner in which I form the face of the mold-board, although these are fully represented and described in this specification, these improvements having been made the subjects of claims in an application for a patent for improvements in plows of cast-iron, the oath appended to which application is dated on the 20th day of February in the present year, (1844;) nor do I claim the placing of two mold-boards upon one beam, nor the causing of the rear plow to throw its furrow-slice upon that of the fore plow, these having been effected by a plow for trenching; but having ascertained by varied experiments that not only the special form of the outline of the two boards in their relationship to each other, as well as that of the turn of their surfaces, are points of great importance, I do claim the special form given to the two boards in their outlines, as designated by the numbers on their vertical and horizontal lines in Figs. 8 and 15, and on the lines showing the width in Figs. 7 and 14, these numbers, however, being taken as relative, as the size of the whole plow may be varied. It will be manifest that in making this claim I cannot intend that these measurements should be taken with mathematical exactness, but that the outlines and proportions should be substantially the same with those set forth.

I claim—

The particular form given to the heel of the hinder mold-board, as shown by the triangular space $a' s m$, Fig. 8, and the hind view of this part in Fig. 8^{bis}, by which form the slice deposited by the fore plow is left undisturbed and that cut by the hind plow is raised preparatory to its being deposited upon it.

AARON SMITH.

Witnesses:

GEO. H. SATTERLEE,
JAS. GROW.