Feb. 18, 1941. J. C. WOOLEY ET AL 2,232,298

MACHINE FOR CONTOURING PASTURES AND THE LIKE

Filed Aug. 1, 1939 2 Sheets-Sheet 1

Fig. 1.

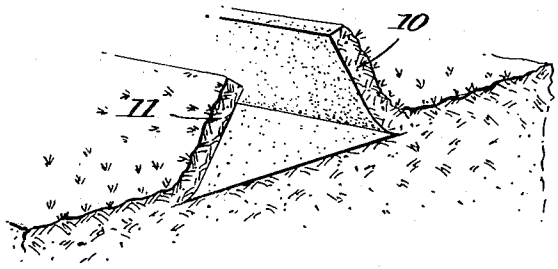


Fig. 2.

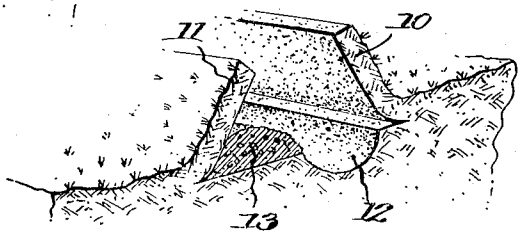
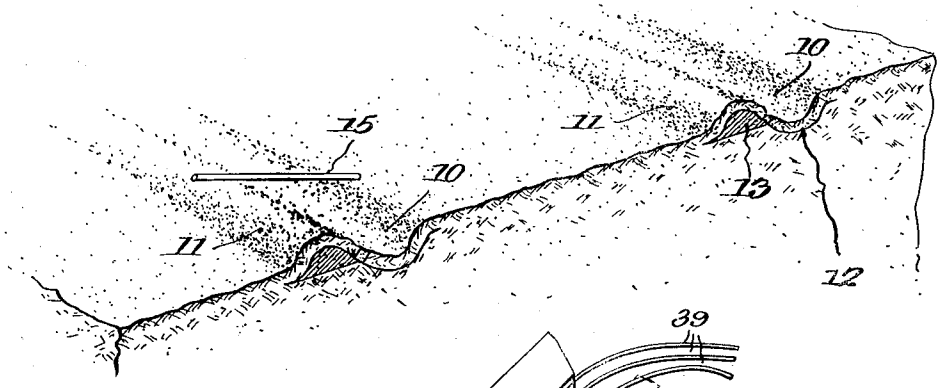


Fig. 3.



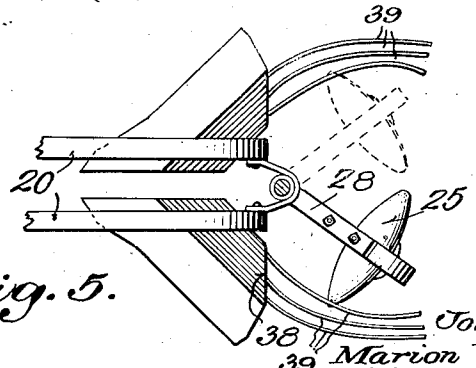


Fig. 5.

Inventors
John C. Wooley
Marion W. Clark,
Xzin McNeal,

By Bacon & Thomas
Their Attorneys

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Fig. 4.

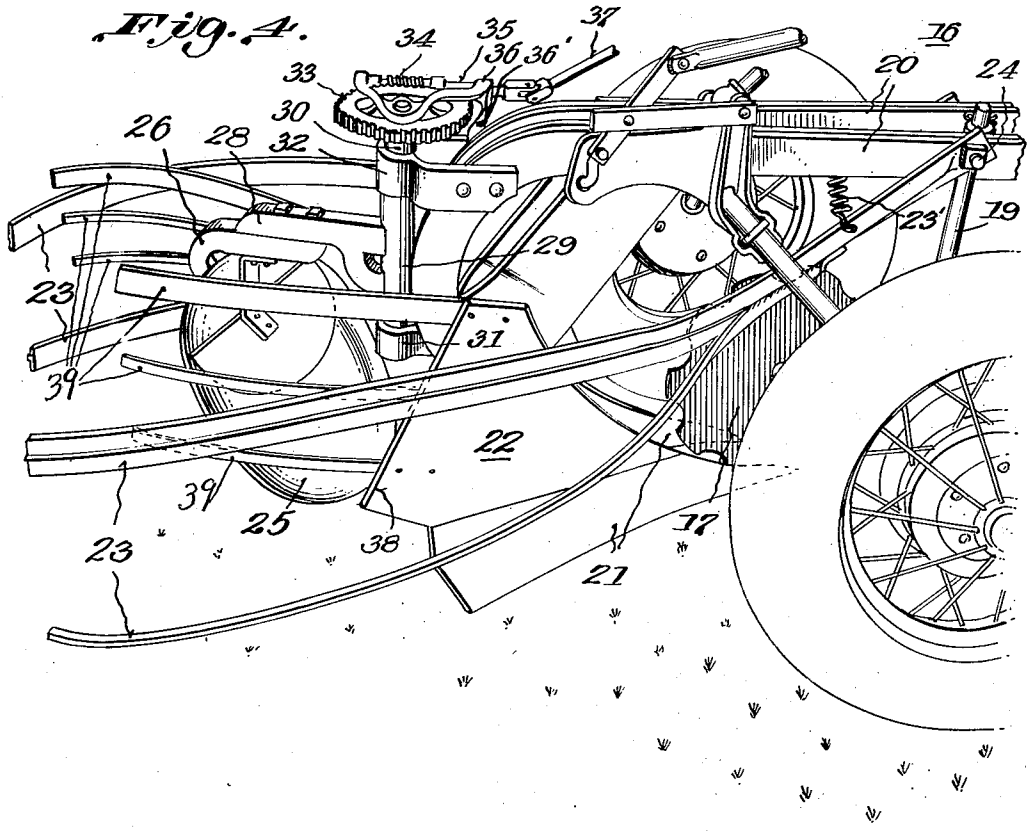
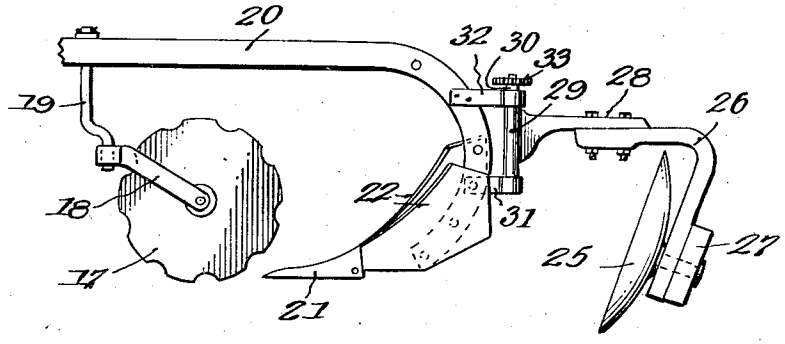


Fig. 6.



Inventors
John C. Wooley,
Marion W. Clark,
Xzvin Mc Neal,
By Bacon & Thomas
Their Attorneys

Patented Feb. 18, 1941 2,232,298

UNITED STATES PATENT OFFICE

2,232,298

MACHINE FOR CONTOURING PASTURES AND THE LIKE

John C. Wooley and Marion W. Clark, Columbia, Mo., and Xzin McNeal, Hot Springs, Ark.

Application August 1, 1939, Serial No. 287,840

4 Claims. (Cl. 97—225)

Our invention relates to a machine for contouring pastures and the like.

A general object of our invention is to so contour pastures and other parcels or areas of land having a sod covering or other more or less firm and coherent topsoil, and especially the slopes of hilly or rolling pastures and the like, as to prevent rapid and stream-like flows of water downwardly of the slopes tending to cause such erosion of the land as might otherwise occur after a heavy rainfall or fairly rapid melting of a snow covering.

Another general object of our invention is to so contour said pastures and the like as to conserve for said pastures or the like the water supplied thereto from rain or snow.

Still another general object of our invention is to so contour said pastures and the like that the produced contours may have all of the foregoing advantages or uses and may also be useful in artificially irrigating the land.

A more particular object of our invention is to build water-holding ditches across the slopes of rolling pastures, without destroying the sod or bringing subsoil to the surface.

The foregoing and other objects of our invention, and the principles of the invention, will more fully appear from a preferred embodiment of the invention hereinafter described and illustrated in the accompanying drawings.

In said drawings:

Fig. 1 is a combined vertical sectional and perspective view, more or less diagrammatic, through and along the sod or other topsoil and the subsoil, of a portion of a pasture or the like on a slope thereof, and with the sectional view taken transversely of a contour ditch in an initial stage of formation according to our invention;

Fig. 2 is a view similar to Fig. 1 but showing a further stage of formation of the contour ditch according to our invention;

Fig. 3 is a view, of the general character of the views of Figs. 1 and 2 but on a somewhat smaller scale, looking downwardly upon two completed contour ditches made according to our invention;

Fig. 4 is a perspective view of a preferred embodiment of the machine of our invention looking toward the rear end of the machine and showing only the rear-end portion of the wheeled vehicle upon which are mounted the combination of machine instrumentalities more directly concerned in carrying out our invention;

Fig. 5 is a top plan view of the major portion of the assembly of instrumentalities shown in Fig. 4, but with certain of those instrumentalities omitted in Fig. 5 for clearness, and with Fig. 5 also showing the assembly of instrumentalities in somewhat diagrammatic form for further clearness of showing their cooperative arrangement and functions; and

Fig. 6 is a side elevational view, of the general character of Fig. 5, of the assembly of instrumentalities shown in Fig. 5, but with some of those instrumentalities omitted for clearness of showing the cooperative arrangement of the remaining instrumentalities intended to be shown in Fig. 6.

For the building of each of any desired number of contour ditches across a pasture, for example, our invention contemplates an initial cutting through the sod on a line extending in the direction intended for the contour ditch. Then, the sod is lifted in strip-like form on each side of said line of cut in a manner presenting opposed strips of sod upturned from their attached base lines spaced from the initial line of cut and exposing the subsoil beneath and between them. Then, subsoil is removed from beneath one of said upturned strips of sod and deposited beneath the other in a manner to form a cut in the subsoil beneath the first-mentioned upturned strip of sod and a fill beneath the other, with said cut and fill extending in parallel longitudinally and with the inner downslope of the fill and the inner upslope of the cut merging on a line between the opposed upturned strips of sod, and also with said cut and fill preferably having curved transverse contours. The contour ditch as a whole is then completed by returning the upturned strips of sod to their full length engagements with the subsoil beneath them, one in the cut and the other on the fill.

The more or less diagrammatic views of Figs. 1, 2 and 3 illustrate the application of our invention to the building of one or more water-holding contour ditches across a slope of a rolling pasture. When the invention is thus employed, the sod or other coherent topsoil is cut through on a predetermined line of cut and lifted in opposed strips 10 and 11 in the manner already described; and subsoil is then removed from beneath the upturned strip of sod 10 on the upslope side of the initial line of cut and deposited beneath the upturned strip of sod 11 on the downslope side of the initial line of cut to form the cut 12 and the fill 13.

When the strips of sod 10 and 11 are returned to their full length engagements with the subsoil, one in the cut 12 and the other on the fill

13, as shown in Fig. 3, they do not, of course, come into actual marginal contact, due to the increased surface of subsoil over which they extend because of the contouring. However, even at the completion of the contour ditch, the strips of sod do approach so nearly to marginal contact as to leave but a narrow strip of subsoil exposed and that is soon covered by the normal growth of the sod, so that a water-holding contour ditch is produced without destroying the sod or bringing subsoil to the surface, as illustrated in the perspective view of Fig. 3, in which view the level rod 15 laid across the contour ditch indicates in a general way its water-holding capacity.

Any suitable hand or power operated implements may be employed in carrying out the foregoing described and illustrated method of contouring, including so simple a hand-operated implement as a spade. However, our invention is particularly directed to a power-driven machine comprising a combination of several instrumentalities which in their cooperative arrangement and functioning render the machine particularly adapted to carry out said method with maximum speed and efficiency.

The machine of our invention is one travelling over the land to be contoured preferably by a power drive and which travel effects all the operations of the instrumentalities in carrying out the method of our invention when those instrumentalities are adjusted or set in operative position. In general, that machine comprises a cutting implement for making the initial cut through the topsoil, associated topsoil separating and turning means to separate and lift the topsoil from the subsoil in two strips on opposite sides of the line of cut in the manner characterizing the method of our invention as already described, means cooperating with the topsoil separating and turning means to temporarily retain the opposed strips of topsoil in their upturned positions, and then to cause them to drop to positions of engagement along their full lengths and breadths with the soil beneath them, and earth engaging implement means for making the cut under one of said upturned strips of topsoil and the fill under the other while said strips of topsoil are retained in their upturned positions.

The preferred embodiment of the machine of our invention illustrated in Figs. 4, 5 and 6 of the accompanying drawings, comprises a wheeled and power driven vehicle indicated generally at 16 in Fig. 4, only the rear end portion of such a vehicle being there shown as sufficient to indicate the nature of the means for mounting the combination of instrumentalities with which our machine invention is more particularly concerned. It is to be understood, of course, that the vehicle may be one having mounted thereon an internal combustion engine or other suitable motor and such associated transmission mechanism and other mechanisms as would render the machine self propelling. In the present example, however, the machine is not self propelled but is pulled along by a tractor in the manner customary with many farm machines.

In this machine, the implement means for making the initial cut through the topsoil as the machine is power driven as by a tractor over the ground takes the form of a cutting disc 17 journaled for rotation in a bracket arm 18, suspended by rod 19 from the beam 20 forming a part of or secured to the wheeled vehicle, as shown more particularly in Figs. 4 and 6.

In this machine, also, the means for separating and lifting topsoil from subsoil along marginal areas on each side of the initial line of cut effected by the disc 17, takes the form of a double mold board plow, one right and the other left, similar to a so-called middle buster or lister, but with the mold boards having a substantially decreased curvature to secure more of a lifting action on the topsoil and less turning action than plows normally have. The shares of the thus modified plow are shown at 21 in Figs. 4 and 6 and the mold boards at 22.

In this embodiment of the machine of our invention, the means to temporarily retain the strips of topsoil in their upturned or lifted positions and then to cause them to drop into engagement with the subsoil beneath them, takes the form of metallic strips or rails 39 extending rearwardly from the mold boards 22, and two pairs of metallic finger-like elements 23, one pair on each side of the machine, with the pairs of fingers having wrist-portions mounted at 24 on the beams 20 so as to extend the fingers 23 along and to the rear of the mold boards 22 and the rails 39.

The pairs of fingers 23 have their free terminal portions, rearwardly of the terminals of the extension rails 39 of the mold boards, slightly curved inwardly or toward the median vertical longitudinal plane of the machine, and a coil spring 23' extends between, and has its opposite ends fixed to, the wrist portions of the opposed pairs of fingers 23, and thereby the spring tends to draw the free terminal portions of the opposed pairs of fingers 23 inwardly. However, the formation and mounting of the fingers 23 on the beams 20 are such that, notwithstanding the action of the spring 23, those fingers are spaced, on opposite sides of the machine, from the adjacent mold boards and their extension rails 39, so that the upturned strips of topsoil are freely received between the fingers 23 and the mold boards and their extension rails 39. The extension rails 39 of the mold boards then retain the strips of topsoil in their upturned positions to the rear of the advance of the mold boards in the forward travel of the machine until the rearward extremities of those rails have themselves advanced beyond retaining engagement with the strips of topsoil at any particular point in the travel of the machine. Then the lifted strips of topsoil, thus left to the rear of the extension rails 39 of the mold boards, are engaged by the rearward end portions of the fingers 23 with sufficient force and in the inward direction, under the action of the spring 23', to cause the lifted strips of topsoil to drop downwardly into engagement with the subsoil beneath them.

In this machine, also, the means for making the cut under one of the upturned strips of topsoil and the fill under the other, may take the form of a rotatable disc or a stationary blade, that is, a blade whose only movement is one of advancement with the forward travel of the machine. Preferably, however, and as shown at 25 in Figs. 4, 5 and 6, a rotatable disc is employed. That disc is mounted to the rear of and at a lower soil-engaging level than the mold boards or topsoil lifters but forwardly of the rear terminals of the extension rails 39 of the mold boards, and the mounting for the disc is such as to provide for an adjustable setting of the disc from one side position to the other over the subsoil surface exposed by the topsoil lifters, and also to provide for an adjustable setting of

the plane of the disc at differing inclinations to the vertical and to the line of travel of the machine, so as to enable the rotating disc to function most advantageously in forming a longitudinally extending groove or furrow in the exposed subsoil on whichever side of the median longitudinal line between the lifted strips of topsoil is desired and to deposit the subsoil removed by that furrowing in a longitudinally extending fill or ridge under the other lifted strip of topsoil.

In the illustrative machine, that mounting comprises an angle bracket **26** (Fig. 4) having a depending leg which may be reinforced by a removably secured journal block **27** for the axle of the disc **25** so that the disc is rotated as it engages the subsoil under the power drive of the machine. The upper leg of the angle bracket **26** is removably secured to the rearward free end portion of an arm **28**, which may be horizontal or somewhat downwardly inclined toward its free end, and which arm is provided at its other end with a vertically extending sleeve **29** keyed to a vertical shaft **30** extending through the sleeve (Figs. 4, 5 and 6), so that the arm **28** and its sleeve **29** turn with the shaft **30**.

In the above described and illustrated mounting of the rotatable disc **25**, it is to be noted that that disc is forwardly inclined in the downward direction due to the shapes of the arm **28** and the angle bracket **26**; and that inclination may be adjustably varied either by substitution for the angle bracket **26** of one having legs subtending a more obtuse or more acute angle, or by other means well known in the art, including the insertion of wedge members between the bracket **26** and the arm **28**.

The vertical shaft **30** has a thrust bearing **31** in a bracket extending from secured position on the beams **20**, and an upper journal bearing in a bracket **32** bolted to the beams **20** somewhat below the upper end of the shaft **30**. Keyed to the end portion of the vertical shaft **30** above its journal bearing in the bracket **32** is a spur gear **33** which meshes with a worm gear **34** on a short horizontal shaft **35** journaled in a bracket **36**, and which bracket has a downwardly extending portion **36'** mounting the bracket on one of the beams **20**. The short worm-gear shaft **35** has coupled thereto a shaft **37** which extends forwardly at an upward inclination and is provided at its forward end with a crank, not shown, positioned near the seat of the driver of the tractor so as to enable manual turning at will of the shaft **37** and thereby of the worm-gear shaft **35** and, through the worm gear **34** and spur gear **33**, vertical shaft **30**, sleeve **29** and arm **28**, an adjustment of the rotatable disc **25** from one side position to the other over the surface of the sub-soil exposed between the opposed lifted strips of topsoil, as indicated by the full and dotted line positions of the arm **28** and disc **25** in Fig. 5.

Such adjustment of the body position of the disc **25** not only enables the furrow to be made on whichever side of the median longitudinal line between the lifted strips of topsoil is desired and the fill or ridge on the other, but also enables the tractor driver to reverse the machine while turning at the end of a furrow and thereby to produce the same character of contour furrowing on the opposite direction of travel of the machine, which is of considerable advantage especially in the building, by opposite directions of travel of the machine, of a plurality of water-holding contour ditches across the same slope of a rolling pasture since the cut, groove or furrow in each should be on the upslope side and the fill or ridge on the down slope side. In other words, the rotating disc **25** and the means for changing its position from one side to the other over the exposed surface of the subsoil provide the machine with a reversible disc plow functioning to make the furrow in the exposed strip of subsoil on the uphill side portion of that strip and throw the removed subsoil on the downhill side portion of that strip when the machine is advanced in either direction across the pasture slope.

As hereinbefore pointed out, in the illustrative machine of our invention, the curve of the mold boards is decreased to secure more lifting action on the topsoil and less turning action than plows usually have. Also, the mold boards are cut off or shortened at the rear, as indicated at **38**, in Fig. 5, and that shortening of the mold boards, together with the arrangement of the rigid metal extension rails **39** secured to the mold boards and extending rearwardly therefrom, give the required room for the rotating disc **25** in the extreme positions of its opposite side adjustments.

In the operation of the machine under its power drive as by a tractor, the rotating disc **17** makes the initial cut in the direction of the line of travel of the machine, the double plow shares and modified mold boards separate and lift the sod or other coherent topsoil along marginal areas on each side of said initial line of cut and present opposed strips of topsoil still attached to the subsoil along base lines spaced from said initial line of cut and upturned therefrom so that the subsoil is exposed between said upturned strips. The extension rails **39** of the mold boards retain the strips of topsoil in their upturned or lifted positions until after the rotating disc **25** has formed the cut, groove or furrow in the subsoil on one side beneath a lifted strip of topsoil and the fill or ridge beneath the opposed lifted strip of topsoil. Then, as the extension rails **39** of the mold boards advance from point to point in the continued travel of the machine beyond engagement with the opposed lifted strips of topsoil, those strips are released at those points from the retaining or upholding action of the rails **39**, and may fall by gravity, and are, with certainty, caused by the tips of the fingers **23**, under the action of the spring **23'**, to fall into place, one strip of topsoil in the cut, groove or furrow, and the other on the fill or ridge formed by the rotating disc **25**, and the contour ditch is thus completed.

As is usual in power-driven earth working machines, means are provided in our machine for bodily elevating the earth engaging implements from their working positions, and some of the mechanical elements of such means are shown in Fig. 4; but as such means form no part of our present invention, it is deemed unnecessary to completely show such means as are employed in our machine or to refer thereto in any detail.

It is to be further understood that while we have described and shown in the accompanying drawings a preferred embodiment of the machine of our invention, that example is not to be taken as limiting the scope of the invention, the invention being of such greater scope as may be indicated by the appended claims.

We claim:

1. A machine for contour furrowing pastures and the like areas of land by advancement of the machine thereover, said machine comprising topsoil-lifting means automatically operating by

advancement of said machine over said land to separate and lift topsoil from subsoil in a manner presenting opposed strips of topsoil upturned from spaced base lines of their remaining attachment to the subsoil, retaining means adapted in the travel of said machine to engage said upturned strips of topsoil and thereby retain them in their upturned positions and then to pass from said engagement, pressure means adapted to engage upon said upturned strips of topsoil before substantial downward movement of said strips and to press thereon in a direction tending to cause their downward movement upon the subsoil beneath them after said retaining means has passed from engagement with said upturned strips, and subsoil engaging means automatically operating by the travel of said machine during said engagement of said retaining means with said upturned strips of topsoil to form a longitudinally extending cut or groove in the subsoil beneath one of said upturned strips of topsoil and a longitudinally extending ridge on the subsoil beneath the other upturned strip of topsoil.

2. A machine as defined in claim 1 and further characterized by said topsoil-lifting means comprising a double mold board plow, said retaining means comprising strips or rails of metal or other suitable material forming rearward extensions of said mold boards, and said pressure means comprising a plurality of fingerlike elements of metal or other suitable material extending from a frame portion of the machine along said mold boards and said rail extensions of said mold boards to terminals rearwardly of said rail extensions, and spring means adapted to press said terminals of said fingerlike elements against the upturned strips of topsoil in directions tending to cause downward movement of said upturned strips of topsoil.

3. A machine for contour furrowing pastures and the like areas of land by advancement of the machine thereover, said machine comprising topsoil lifting means automatically operating by advancement of said machine over said land to separate and lift topsoil from subsoil in a manner presenting opposed strips of topsoil upturned through an angle of less than 90 degrees from spaced base lines of their remaining attachment to the subsoil, retaining means adapted in the travel of said machine to engage said upturned strips of topsoil and thereby retain them in their upturned positions and then to pass from said engagement and thereby so free said strips of topsoil as to enable them to drop upon the subsoil beneath them, and subsoil engaging means automatically operating by the travel of said machine during said engagement of said retaining means with said upturned strips of topsoil to form a longitudinally extending cut or groove in the subsoil beneath one of said upturned strips of topsoil and a longitudinally extending ridge on the subsoil beneath the other upturned strip of topsoil, said subsoil engaging means comprising a disc plow reversible between opposite side positions so as to form as a furrowing operation said cut or groove in said subsoil on the uphill side and said ridge on the down hill side of the median longitudinal line between said opposed upturned strips of topsoil when advancing the machine in either direction across a slope of a pasture or the like area of rolling land.

4. A machine for contour furrowing pastures and like areas of land by advancement of the machine thereover, said machine comprising a frame, a cutter carried by said frame for cutting through the top soil of the pasture land on a line of cut in the direction of advancement of the machine, a double mold board plow carried by said frame to the rear of said cutter and provided with shares operating at substantially the same lowermost soil engaging level on opposite sides of said line of cut and with rearward extensions of the mold boards adapting said plow to elevate in elongated strip-like form the opposite adjacent cut edge portions of said topsoil and support them in elevated positions until said mold board extensions advance beyond said elevated portions of said topsoil, and subsoil furrowing implement means carried by said frame between the opposite rearward extensions of said mold boards to the rear of said plow shares and operable at a lower soil engaging level than said plow shares and reversible between opposite side positions for forming a furrow in the subsoil beneath the upturned topsoil on one and the same side of said line of cut and a ridge beneath the upturned topsoil on the other side of said line of cut when advancing the machine in either of two opposite directions across said pasture land.

JOHN C. WOOLEY.
MARION W. CLARK.
XZIN McNEAL.