(No Model.)

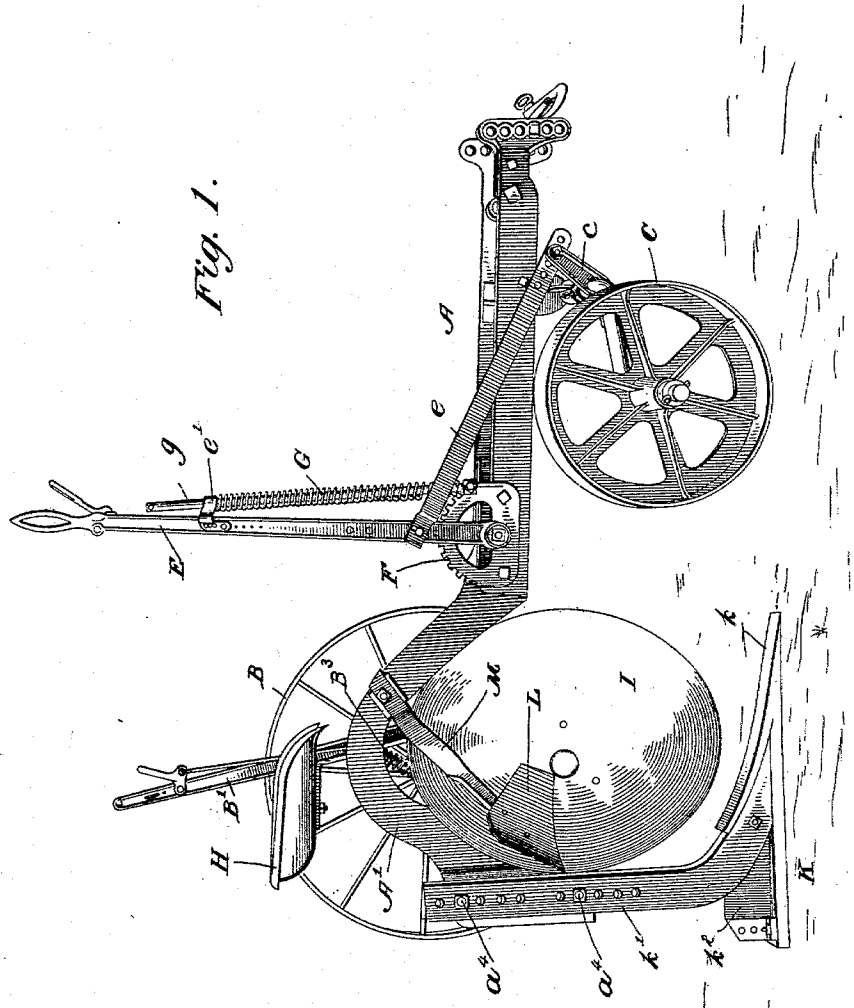
4 Sheets—Sheet 1.

S. D. POOLE.

DISK PLOW.

No. 548,590. Patented Oct. 22, 1895.

Fig. 1.



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(No Model.) 4 Sheets—Sheet 2.

S. D. POOLE.

DISK PLOW.

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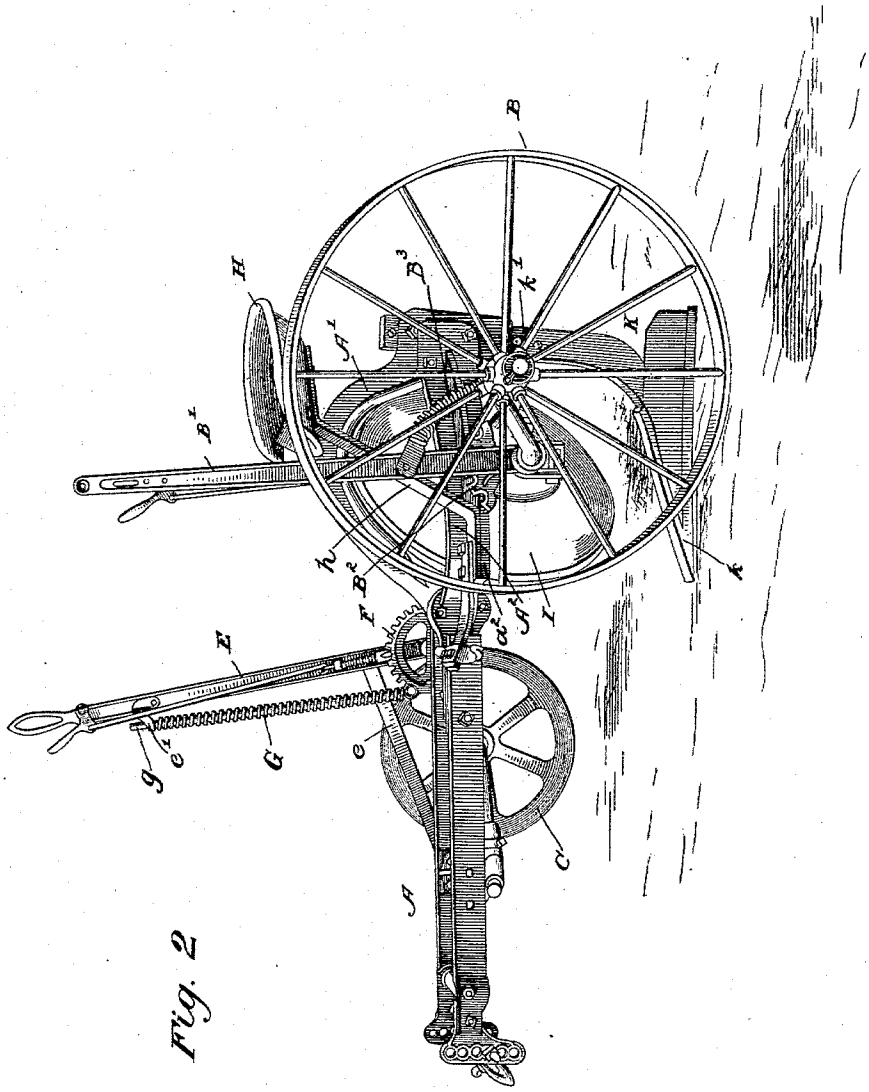

Fig. 2

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4 Sheets—Sheet 3.

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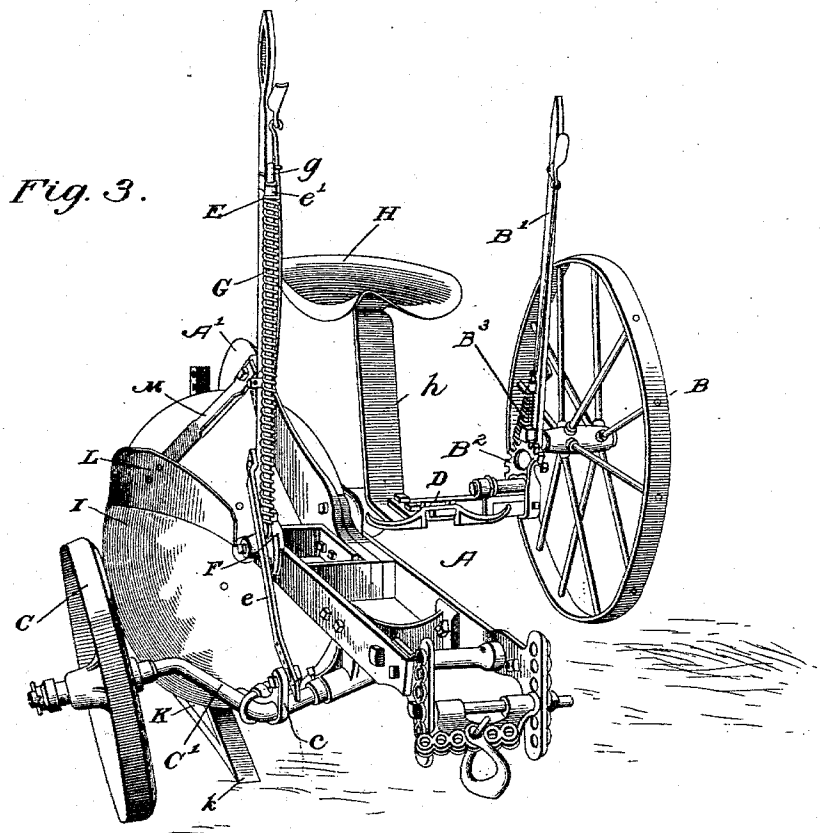
DISK PLOW.

No. 548,590. Patented Oct. 22, 1895.

Fig. 3.



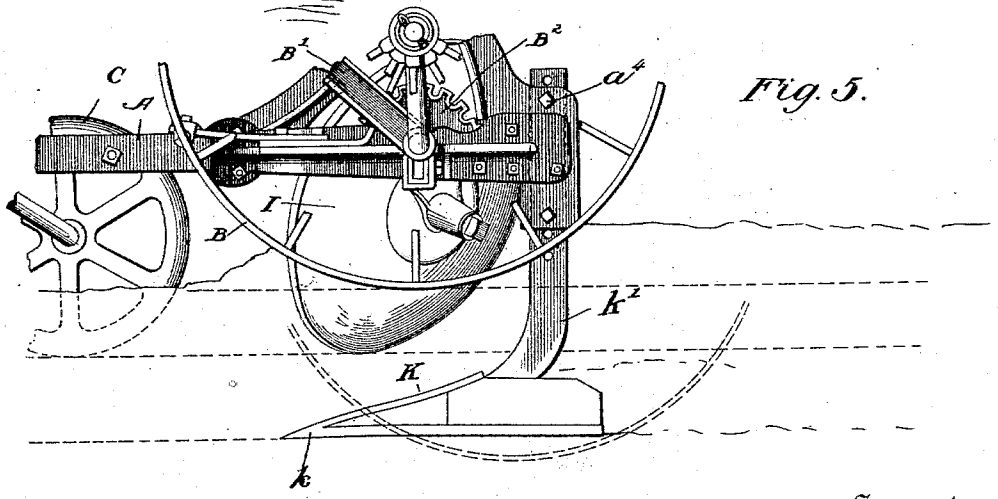


Fig. 5.

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(No Model.) 4 Sheets—Sheet 4.

S. D. POOLE.

DISK PLOW.

No. 548,590. Patented Oct. 22, 1895.

Fig. 4.

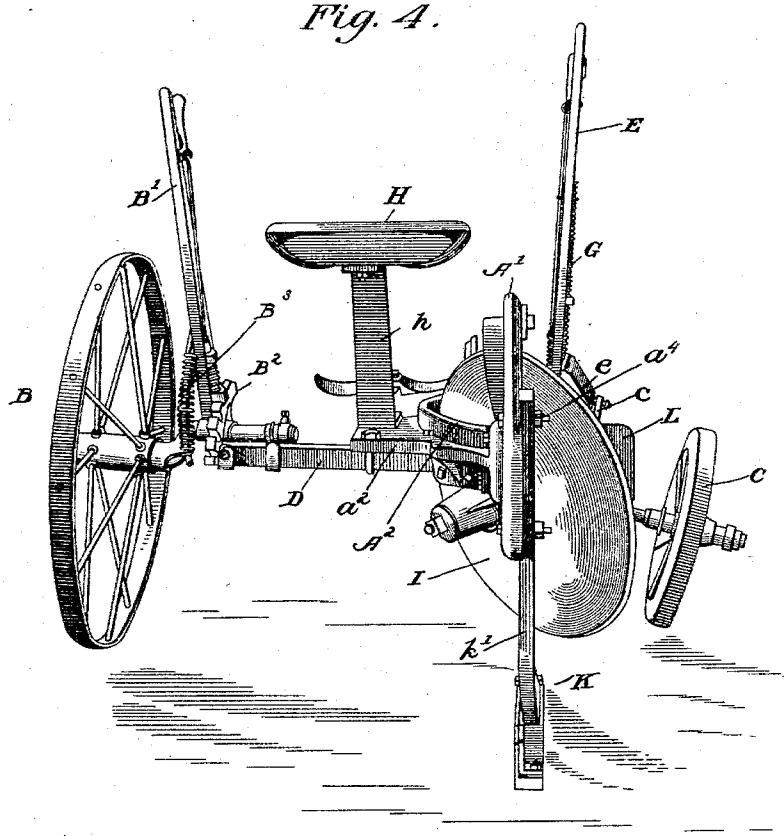
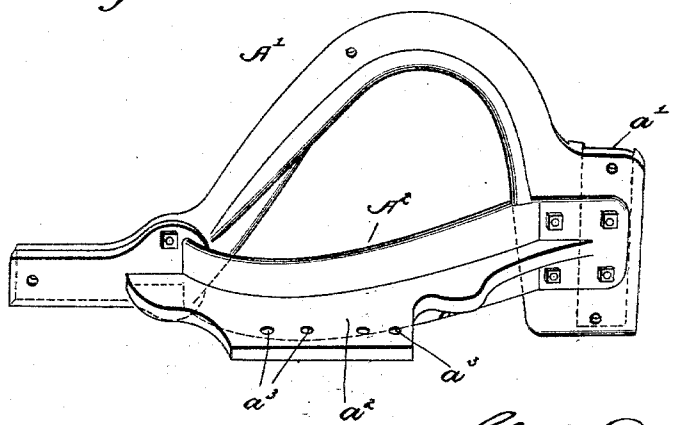


Fig. 6.



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UNITED STATES PATENT OFFICE.

STALEY D. POOLE, OF MOLINE, ILLINOIS, ASSIGNOR TO THE DEERE & COMPANY, OF SAME PLACE.

DISK PLOW.

SPECIFICATION forming part of Letters Patent No. 548,590, dated October 22, 1895.

Application filed August 22, 1895. Serial No. 560,123. (No model.)

To all whom it may concern:

Be it known that I, STALEY D. POOLE, a citizen of the United States, residing at Moline, in the county of Rock Island and State of Illinois, have invented certain new and useful Improvements in Disk Plows; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to plows, but more particularly to that class of machines known as "disk" plows.

The primary object of the invention is to provide a plow of the character referred to which shall be capable of stirring up and loosening the soil and subsoil to a greater depth than is possible with plows in common use, and which shall not leave the earth over which it passes or bottom of the furrow so compact, smooth, and hard as to render the soil below the furrow-bottom practically impervious to water, as do the plows in common use, and which, at the same time, shall be light of draft, simple in construction, inexpensive in manufacture, and efficient and durable in use.

A further object is to provide means whereby the revolving disk shall be held down to its work without the use of weights or heavy and cumbersome frames, such as are required with disk plows in general use.

The invention will be first more particularly hereinafter described, and then pointed out in the claims at the end of the description.

According to common methods of plowing, the base of the furrow, owing to the downward pressure produced by the weight or draft of the team and the leverage of the plow-point against the furrow-bottom, is left hard and smooth, so that when a torrential rain-fall comes upon land thus plowed, particularly on rolling or hilly ground, the water, instead of percolating or sinking into the earth, to be there stored for subsequent use in nourishing vegetation, is allowed to run along the smooth impact surface of the furrow-bottom, carrying with it much of the fertile soil and thereby greatly impoverishing the land.

Furthermore, according to usual methods of plowing year after year at about the same depth, the main force of the team's strength is exhausted in pressing the bottom of the furrow into a polished trough for the conduction of rain down the side hills, and, in addition to this, the tread of the horses in the bottom of the furrow makes in a few seasons an almost impenetrable bed for water. As a natural sequence to this sort of tillage, a vast erosion of land has resulted, particularly in the Western States.

It has been estimated that in the State of Ohio alone a million or more of acres of land have been rendered utterly useless and infertile by reason of the washing and erosion of the soil due to common methods of tillage, and that the present inefficient and ill-resulting methods of plowing, especially upon undulating lands, costs the farmers of the United States two hundred and fifty thousand square miles of soil each year by erosion. This is especially true of Nebraska and other Western States, where torrential rain-falls are so frequent, the fertile soil being washed away down into gulches, valleys, and creeks, while the infertile soil remains impoverished and useless.

The main objects to be attained in the cultivation of the soil, particularly in the northwestern portions of the country, are to stir, separate, and pulverize or loosen the earth at a greater depth with the same plow than it is possible to stir and separate or loosen it with the contrivances or implements for plowing now in use, so as to provide, as it were, a reservoir for the rainfall, whereby the moisture which under the present system of shallow tillage is itself carried away, and with it much of the best loamy soils of the sloping lands, may be retained to afford food-nourishment to the vegetation, and whereby the plowed land is adapted at the same time to serve as a preventive of erosion and an insurance of remunerative crops.

What has been said applies especially to the ordinary moldboard-plow. In this class of plows, owing to the fact that the wearing surfaces are sliding frictional surfaces, a great loss of power is occasioned by friction and by the adherence of sticky earth upon the surfaces of the moldboard and share. To over-

come these difficulties the rotary or disk plow has been resorted to, but with only partial success.

In the operation of an ordinary disk plow the soil is not lifted and carried as with a moldboard, and owing to the revolution of the disk there is a great diminution of friction, as compared with the moldboard-plow, and the disk is readily kept smooth and bright by the action of the soil thereon; and with the rotary plow the advantages of pulverization of the soil to a somewhat greater depth for the same expenditure of power than is obtained by the use of an ordinary moldboard-plow have been attained. Nevertheless, in order to effect the necessary penetration of the disks, the plow-frame has either been made very heavy or weighted, in order to keep the disks in the ground, and as a result of this the disks in loose ground will sink too deep and in hard soil will not penetrate deep enough, so that the results are unsatisfactory, and the additional weight required to effect the desired depth of penetration under ordinary conditions adds heavily to the draft and renders the plow heavy and difficult to handle. This difficulty of keeping the disk or disks in the ground and penetrating to the desired depth without heavily weighting the plow or providing a very heavy frame is a serious objection to such disk plows as have heretofore been proposed.

My invention is designed to overcome the foregoing and other objections incident to the use of both classes of plows referred to, and to combine the advantages of both in a light, easily handled, yet strong, efficient, and durable disk plow, which shall meet the requirements with respect to deep tillage without impacting and hardening the earth at the base of the furrows, so as to cause waste and impoverishment of the land by washing and erosion.

I have illustrated in the accompanying drawings, which form a part of this specification, a preferred form of my invention, in which the disk plow and parts co-operating therewith are arranged upon a sulky or wheeled frame; but it will be understood, of course, that the improvement is adapted to be used in other relations, either with or without a wheeled frame, and hence I do not desire to be restricted in the application of the invention to the particular form shown, nor to a wheel or sulky attachment.

Referring to the drawings, Figure 1 represents a perspective view of my improved disk plow applied to a wheel or sulky frame, such view being taken from the right-hand side of the machine. Fig. 2 is a similar view of the plow, taken from the opposite side thereof. Fig. 3 is a front perspective view, and Fig. 4 a rear perspective view, of the same. Fig. 5 is a side elevation of the plow with parts of the wheeled frame broken away, and illustrating in full and dotted lines the relative positions of the parts in plowing; and Fig. 6 is a detail perspective view, on a slightly enlarged scale, of the main castings of the disk-supporting beam or frame.

The letter A in the drawings may denote the plow beam or frame, which may be of the form shown or of any preferred construction, and has preferably secured thereto at one side the land-wheel B and at the opposite side the staggered or guide wheel C, each of said wheels being journaled upon a crank-axle which is fitted in suitable bearings attached to the axle or frame of the machine, so as to permit said wheels to be readily raised and lowered by means of suitable operating-levers for the purpose of varying the depth of penetration of the plow and for elevating the same upon the surface of the earth when it is desired to transport the plow from place to place.

The beam or frame-bars A may be provided with a clevis or draft connection of the form shown or of any preferred construction.

As shown, the axle of the land-wheel B has secured thereto a hand-lever B′, which is provided with a spring-actuated dog or detent adapted to engage a rack B^2, fixed to the axle or frame bar D, whereby the lever and crank-axle, with the wheel journaled thereon, may be adjusted and secured in different positions to vary the depth of cut and inclination of the plow-disk or to raise the same above the surface of the ground, said lever being provided with a thumb-lever and sliding rod, connecting the same with the spring-actuated dog, so that the latter may be released from engagement with the rack to permit the desired adjustment of the lever. A spring B^3, placed upon a rod which is pivoted at one end to the lever B′ and has its opposite end loosely and slidingly connected to the outer cranked portion of the axle which carries the land-wheel, holds said wheel yieldingly in whatever position it may be adjusted, so that the wheel may accommodate itself to irregularities in the surface of the earth, and may rise and fall, within certain limits, without affecting the plow.

As shown, the staggered or guide wheel C is journaled upon the spindle of the crank-axle in such relation to the revolving disk as to adapt the wheel to run in the last preceding furrow turned by the disk, with its peripheral portion bearing against the landside portion of the furrow, so as to assist in keeping the plow in line and to resist the tendency of the disk to run to land, as usual with stagger-wheels. To the axle C′ of the guide-wheel C is secured an angle-bar *c*, the upright arm of which is adjustably connected by means of a bar or rod *e* with a hand-lever E. The lever E is pivotally mounted upon the frame A adjacent to a rack F, the teeth of which are engaged by a spring-actuated dog or detent upon said lever, by which the lever may be locked in different positions, so as to hold the stagger-wheel at different elevations, said dog or detent being controlled by a thumb-lever

pivoted to the hand-lever and connected with said dog in the usual well-known manner. In conjunction with the lever E, I may also employ, as shown, a coiled or other suitable spring G, which is adapted to normally resist the movement of the lever E when thrown forward, but assists the rearward movement thereof, so that in lowering the guide-wheel and thereby raising the plow the spring will assist the operation, while the weight of the frame and of the driver mounted thereon assist the movement of the lever in the opposite direction opposing the force of the spring. This spring surrounds a rod or bar *g*, the lower end of which is pivoted upon the frame A, while its upper end projects through an eye-piece *e'*, carried by the lever E, said spring being interposed between the pivot of the rod and the eye-piece on the hand-lever in such manner as to accomplish the desired effect in raising the plow. The eye-piece *e'* is adapted to be adjusted and secured in different positions upon the lever for the purpose of varying the tension or power of the spring. The connecting-rod *e* is also preferably provided with a series of perforations at one or both ends thereof, so as to permit its point of connection with the crank-lever or the hand-lever to be shifted to vary the relative positions of the guide-wheel and its operating-lever, as may be desired.

The hand-levers B' and E are arranged near enough to the driver's seat H to enable the driver to grasp and operate either lever at will for controlling the action of the plow in operation, and for raising and lowering the same in going off or onto the land to be plowed.

At the rear end of the beam or frame-bars A are secured the castings A' A^2, which support the disk plow I and the subsoiler K. These castings are bowed or arched and secured together at their front and rear ends in such position that the bowed or arched portion of the part A' occupies a vertical position substantially at right angles to the horizontally-arranged portion A^2, thus providing an unobstructed space between the two castings for the attachment of the revolving disk crosswise of the beam or support and at an angle thereto, with its axial line in the plane of the vertical arch and its convex surface extended at one side thereof in proximity to the concave face of the horizontal casting. The casting A^2 is formed or provided on its convex surface with a flange or plate a^2, which is perforated at a^3 a^3 to receive the fastening-bolts by which it is secured to the axle or frame-piece D, and also the bolts by which the standard *h* of the driver's seat H is secured thereto. To the casting A^2 may be secured the pendent arm or bracket which supports the bearings in which the axle or spindle of the revolving disk I is journaled.

The disk I set at an angle approaching that of the share and moldboard of an ordinary plow, and its tendency is to run in the direction of this angle, and in order to cut and turn a furrow of the required width and depth it must be moved in substantially a straight line. This has heretofore been ineffectually accomplished by means of stagger-wheels and weights or by the use of a heavy cumbersome frame, which in some soils may produce tolerably fair results. To avoid the necessity for weights or for weighting the disk to hold it to its work, I employ what may be termed a "wedge-shaped" shoe or hook, which performs the double function of drawing and holding the disk down to its work, so as to effect the desired penetration, and at the same time serves as a subsoiler for loosening up the bottom of the furrow below the cut of the disk, whereby the penetration of the disk is facilitated and the ground is left in such condition as to prevent washing and wasting of the plowed soil on undulating lands. This subsoiler consists preferably of a wedge-shaped shoe *k*, arranged to penetrate the earth below the disk and having its point or toe projected underneath the disk, while its heel projects slightly rearward of the cutting-edge thereof, said shoe being secured to or formed integrally with a standard *k'*, which depends from the rear portion of the plow beam or casting A'. As shown, the standard *k'* is provided with a series of perforations by which it is bolted to the rear end of the casting A' and may be secured thereto at different elevations for causing the shoe or subsoiler to penetrate to a greater or less depth below the depth of cut of the revolving-disk, so as to meet the various requirements to which it may be put. The shoe may be otherwise positioned, however, and may have its toe placed in front or in rear of the position shown and may be used either with or without the heel-piece and landside portion without departing from the spirit of my invention, the essential feature of the arrangement being to adapt the shoe to penetrate and loosen the earth below the cut of the disk and to draw the disk down to the desired depth and hold it to its work. The standard *k'* is adapted to fit snugly in a recess or guideway *a'*, provided therefor at the rear end of the casting A', to which it is secured by bolts a^4, passing through perforations in both the casting and the standard, the latter being provided with a series of perforations to permit the standard to be raised or lowered to vary the depth of penetration of the shoe in plowing different varieties of soil and to meet other requirements in use.

The shoe *k* is preferably of the wedge-shaped form shown in the drawings, having a landside-bar k^2, which tends to cause the plow to run in a straight line and resists the sidewise draft of the disk or its tendency to run to land.

In plowing soil of a sticky or plastic nature a scraper L may be employed to keep the surface of the disk clear and bright, said scraper being arranged to bear yieldingly upon the concave face of the disk, rearward of the axis

thereof, and secured to the pendent end of a spring bar or arm M, having its opposite end secured to the casting A'.

The operation of the invention will be readily understood from the foregoing description, taken in connection with the accompanying drawings. As is well understood, the tendency of the disk is to run in the direction of the angle at which it is set, or diagonally to the line of draft, and to cut and turn a furrow of the required uniform width it must be moved in a straight line, giving it a revolving scraping cut. The wedge-shaped point or shoe is peculiarly adapted to penetrate and loosen the ground to the required depth permitted, under limitations imposed by the adjustment of the supporting-wheels, and the full draft of the team, less the power required to draw the light sulky-frame over the ground, is expended in this direction, while the suction of the wedge or shoe is exerted in drawing or "pulling" the disk into the ground already partially broken or loosened by the wedge, the land and stagger wheel serving to gage the depth of penetration and prevent the disk from running too far to land.

The cutting-angle of the edge of the disk tends to wear it to a sharp edge on the under side, while the shedding of the soil from its opposite face wears the reverse inner edge of the disk and preserves a sharp cutting-edge at all times. About one-quarter of the circle described by the disk does the cutting and another quarter the turning, and by the combined action of the disk and subsoil device the soil is effectually pulverized and left in such condition as to permit of absorption of moisture to afford food nourishment to the plants and to prevent loss of fertile soil by washing and erosion. The disk also serves as a corn-stalk cutter and dispenses with the use of that implement.

The usual method of subsoiling is to follow the ordinary turning-plow with a subsoil-plow, which loosens up the ground below the depth of cut of the preceding plow; but with my improved combination of rotary disk and wedge-point, the latter to insure penetration of the disk in the hardest ground, both operations are performed at one and the same time, the disk cutting and turning over the top furrow and being held to its work by the subsoil device, which penetrates to a greater depth, crumbling the furrow bottom and comminuting it so as to serve as a porous foundation for the mold or soil which is turned upon it by the disk in its next furrow.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In a disk-plow, the combination of the revolving disk adapted to independently cut and turn a furrow, with the subsoil device arranged to penetrate and loosen up the soil below the depth of cut of the disk, and adapted to draw the disk into the soil and hold it down to its work, substantially as described.

2. In a disk plow, the combination of the plow-beam, the rotary disk arranged to revolve diagonally to the line of draft, and to independently cut and turn a furrow, and the wedge-shaped shoe supported below the cutting edge of the disk and having its toe extended under the disk, so as to loosen up the soil below the depth of cut of the disk and to draw and hold the disk down to its work, substantially as described.

3. A subsoil plow comprising a suitable beam, an independent revolving furrow-cutting and turning disk arranged at an angle to said beam, and a wedge-shaped subsoil device arranged below the cutting edge of the disk and adapted to draw and hold the disk down to its work, substantially as described.

4. A combined turn-plow and subsoiler comprising a suitable beam, a revolving disk journaled in bearings at an angle to the line of draft, and adapted to independently cut and turn a furrow, and a wedge-shaped shoe arranged below the plane of the disk and having its toe extended underneath the disk; said shoe being adapted to penetrate and loosen the soil below the depth of cut of the disk and at the same time to draw and hold the disk down to its work, substantially as described

5. A combined turn-plow and subsoiler comprising a suitable beam, a revolving disk journaled in bearings at an angle to the line of draft, and a vertically adjustable wedge-shaped shoe arranged below the plane of the disk and having its toe extended underneath the disk beyond its forward cutting edge; said shoe being adapted to penetrate and loosen the soil below the depth of cut of the disk and at the same time to draw and hold the disk down to its work, substantially as described.

6. A combined turn-plow and subsoiler comprising a suitable beam, a revolving disk carried by said beam so as to revolve at an angle to the line of draft, a standard depending from said beam directly in rear of the revolving disk, and a wedge-shaped shoe at the foot of said standard having its point extended underneath and below the disk beyond its forward cutting edge; said shoe being adapted to hold the disk to its work and to loosen the soil below the depth of cut of the disk, substantially as described.

7. A disk-plow and subsoiler combined, comprising a sulky frame, a revolving disk carried by said frame, and means for raising and lowering the disk so as to gage the depth of penetration thereof, together with a wedge-shaped shoe depending from the plow-beam or frame in the rear of the disk and extending to a point underneath the disk beyond its forward cutting edge; said shoe being adapted to penetrate the earth and loosen up the soil below the depth of cut of the disk, and to draw and hold the disk down to its work, substantially as described.

8. In combination with the plow frame, or beam, the revolving disk journaled in suitable bearings so as to revolve at an angle to

the line of draft; said beam carrying at its rear end a subsoil attachment consisting of a wedge-shaped shoe the toe of which extends underneath and below the cutting edge of the disk; said shoe being provided with a land-side bar which extends rearwardly of the disk, whereby the soil is loosened up below the depth of penetration of the disk and the disk held down to its work while the plow is held parallel to the line of draft, substantially as described.

9. In combination with the arched plow-beam and the revolving disk carried thereby underneath the arch, the subsoil device consisting of a wedge-shaped shoe secured to the foot of a vertically adjustable standard arranged in rear of the disk and having a land-side portion to hold the plow in line and an elongated toe or point extending underneath the disk so as to draw the latter down and hold it to its work, substantially as described.

10. A combined disk-plow and subsoiler comprising a suitable frame, a disk journaled in bearings carried by said frame and arranged to revolve at an angle to the line of draft, a standard secured to the plow-frame directly in the rear of the disk, and a wedge-shaped shoe secured to the foot of said standard and having its point extended forward of the axial line of the disk and below the lower edge thereof; said shoe being provided with a land-side portion extending rearward of the disk, whereby the disk is drawn down and held to its work and also held in the line of draft, while the soil is loosened below the depth of cut of the disk, substantially as described.

11. In a disk-plow the plow-frame or beam proper and the disk-supporting castings secured thereto, consisting of a pair of bowed or arched pieces secured together at both ends, one of said pieces having the arch thereof arranged in a vertical plane parallel with the draft beam proper and the other in a horizontal plane substantially at right angles to the vertical portion, and a revolving disk journaled underneath the upper arch diagonally to the line of draft so that its upper portion may revolve in the clearance provided by the bowed portions of the castings, substantially as described.

12. In combination with a plow-beam or frame proper, the disk-supporting castings consisting of two arched or bowed portions secured together at their ends and having their united front ends secured to said frame or draft beam proper; the bow of one portion being horizontally arranged and the bow of the other portion vertically arranged substantially at right angles to the horizontal portion, the latter portion having a lateral perforated plate or flange projecting from its outer convex surface, for the attachment thereto of the wheeled frame or beam, and the vertical portion having at its rear end a recess for the attachment of the upright or standard of a subsoil device; said castings being adapted to afford support for a disk adapted to revolve with its upper portion arranged in the clearance provided by the bows of the castings, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

STALEY D. POOLE.

Witnesses:
FRED H. COOPER,
JOHN GALT.