E. M. KRAMER.

HARROW ATTACHMENT FOR PLOWS.

APPLICATION FILED DEC. 13, 1905.

963,587. **Patented July 5, 1910.**

Fig. 1.

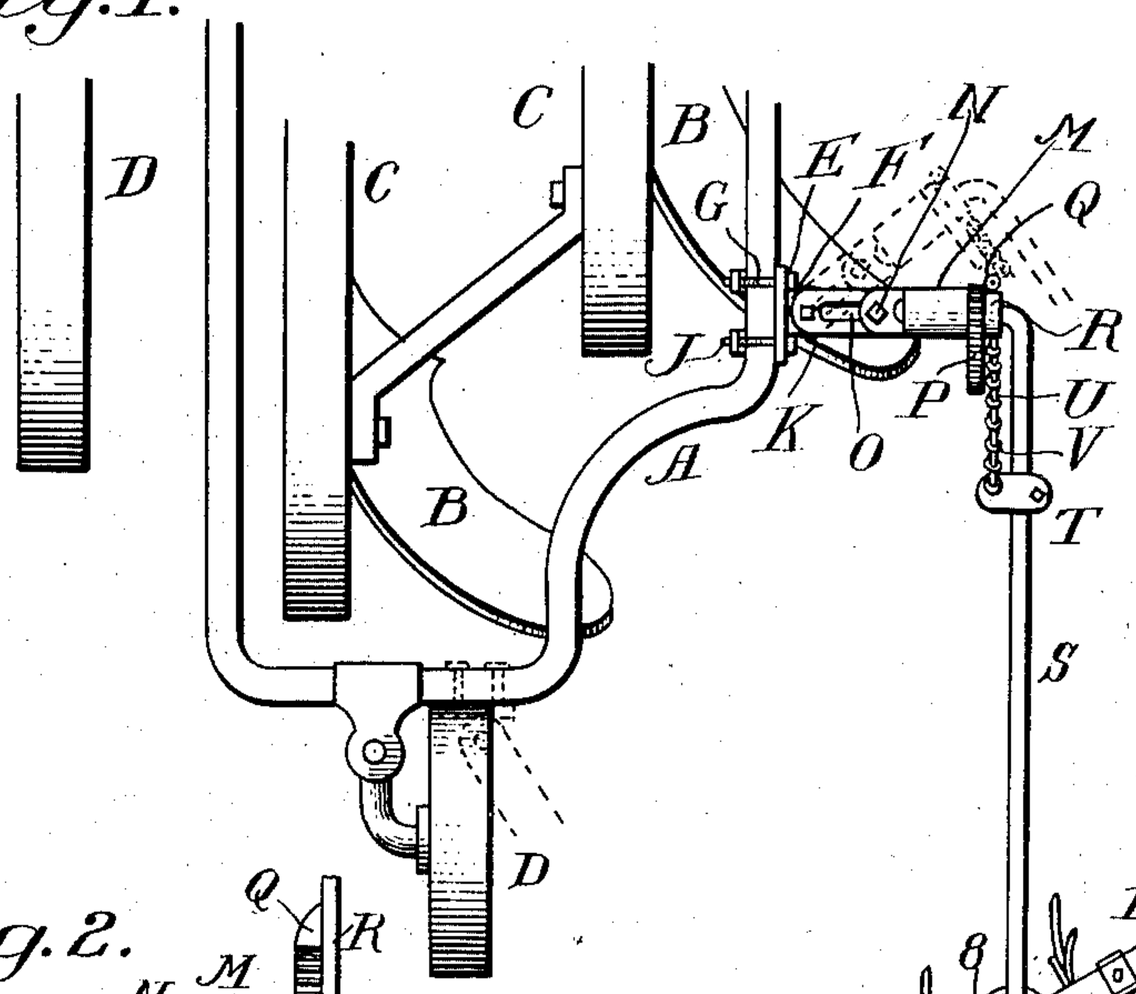
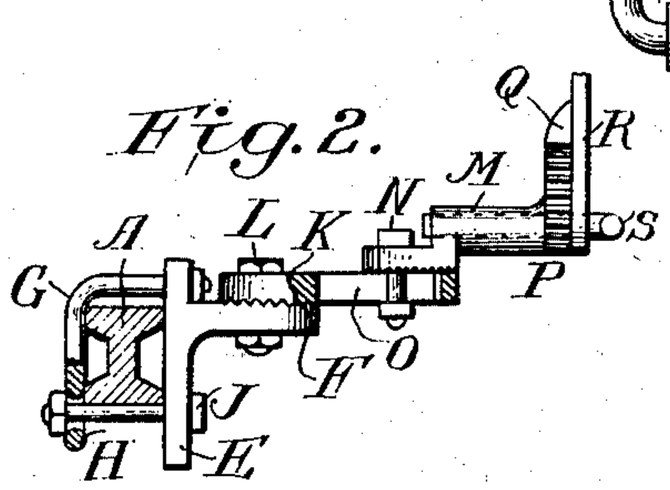


Fig. 2.



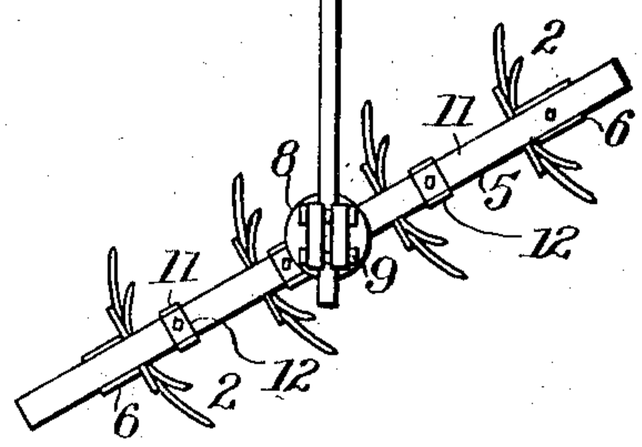


Fig. 3.

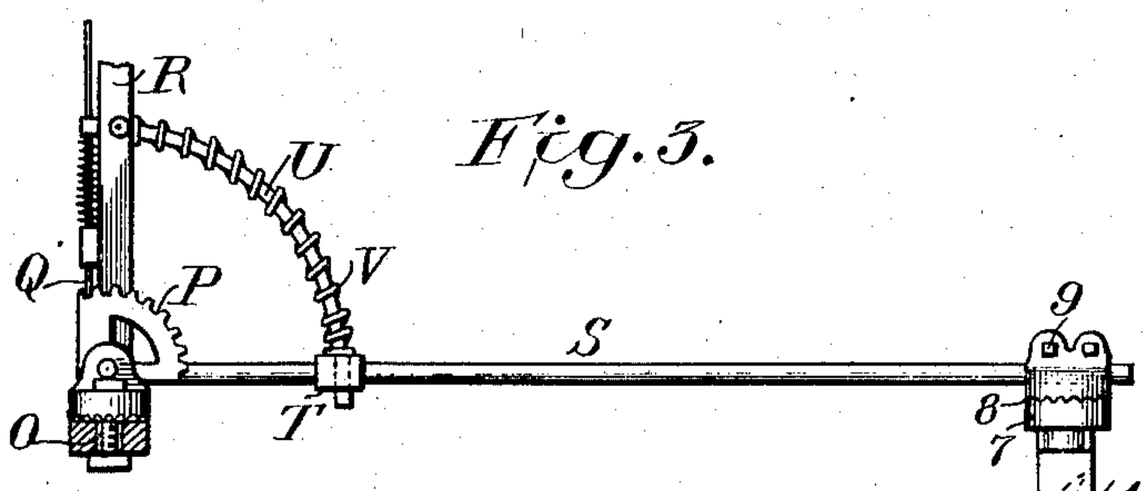
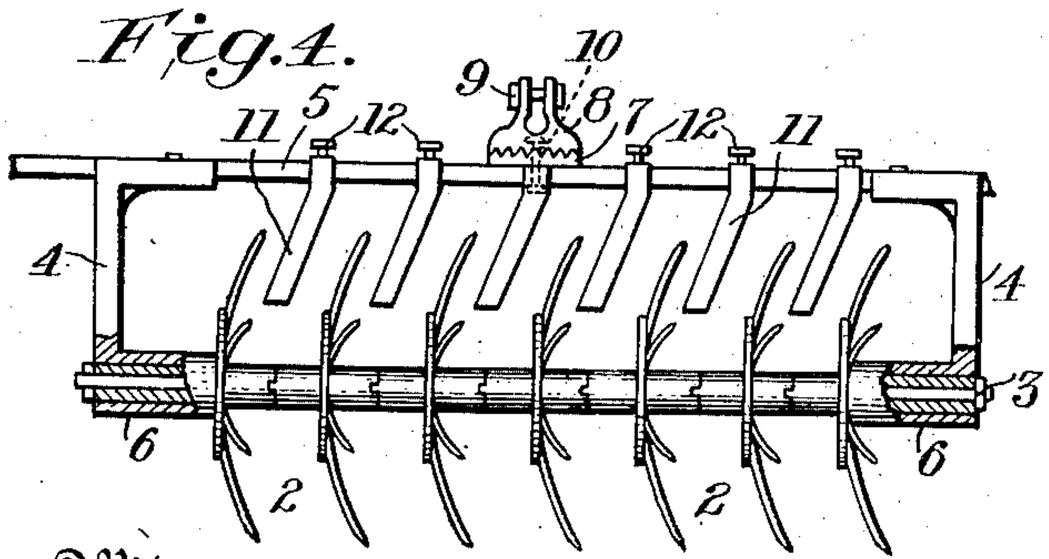


Fig. 4.



Witnesses

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UNITED STATES PATENT OFFICE.

EMIL M. KRAMER, OF CISSNA PARK, ILLINOIS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO E. M. KRAMER COMPANY, A COPARTNERSHIP COMPOSED OF EMIL M. KRAMER, SAMUEL A. KAUFMANN, AND BENJAMIN R. YERGLER.

HARROW ATTACHMENT FOR PLOWS.

963,587. Specification of Letters Patent. Patented July 5, 1910.

Application filed December 13, 1905. Serial No. 291,639.

To all whom it may concern:

Be it known that I, EMIL M. KRAMER, citizen of the United States, residing at Cissna Park, in the county of Iroquois and State of Illinois, have invented certain new and useful Improvements in Harrow Attachments for Plows; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to harrow attachments for plows and more particularly to an attachment designed to employ a rotary form of harrow.

It also particularly relates to improvements upon the device patented to me and Joseph Kramer on the 21st day of March, 1905, by Letters Patent No. 785,223.

The objects of my invention are to provide in combination with a freely rocking spring pressed rotary harrow member means for attaching the member to the frame of a plow by a simple and strong connection at a single point permitting of the adjustmeht of the member at such connection in various directions in a substantially horizontal plane for the purpose of accommodating the attachment to varying types of plows or to shift the position of the harrow member relative to the mold board, and to also provide means at the connection between the supporting rocking arm and the harrow member proper for permitting of the angular adjustment of such member relative to its rocking arm to thereby change the angle of the ground engaging members of the harrow to the line of draft, such attaching means both at the plow and between the harrow members proper and its rocking arm being of such character that in addition to the clamping action obtained by the movable bolts or similar securing means a positive locking action against horizontal displacement is obtained and such means also being of such character as to enable a simple and strong support for the rocking arm to be employed and the rocking arm so positioned that in its various adjustments it will not interfere with the operation of the plow or the various parts thereof.

To these ends my invention is embodied in preferable form in the device shown in the accompanying drawings and hereinafter described.

In the appended drawings, Figure 1 is a plan view of a portion of a riding gang-plow showing my improvements attached thereto; Fig. 2 is a view in elevation partly in vertical section of the adjustable bracket for securing the harrow to the plow frame; Fig. 3 is a side elevation showing the rocking arm which carries the harrow and a spring pressure device adapted to exert pressure on said arm, and Fig. 4 is a rear elevation partly in section of a harrowing member.

In the drawings and specification figures and letters of reference correspond.

A indicates the frame of a plow and B the mold boards carried in the usual manner on the beams C, the connection however not being shown since it is well understood.

The wheels of the plow are shown at D.

Secured to a part of the plow frame is a bracket comprising a vertically disposed member E from which projects outwardly a horizontal extension F. One of the horizontal surfaces of the extension F is provided with a series of teeth or serrations. The said vertically disposed member is held in position on the frame by means of a bolt G passing therethrough above the frame and bent to form a right angle and provided with a loop at H through which passes a bolt J which extends below the frame as shown. This construction is preferred although it is to be understood that any other suitable form of connection may be employed.

Upon the serrated surface of the extension F rests a member K serrated on its surface to engage the serrations on the extension. The said member K is held firmly in any desired position by means of the serrations and by a vertical bolt L passing through the parts F and K and by which the member K may be adjusted angularly to any position in a horizontal plane. It will be seen that the engaging serrations of these two parts have a positive locking action against the angular displacement of the member K additional to the clamping action exerted by the adjustable bolts L, so that

any strain exerted upon the connection by the harrow member is prevented from bending or weakening the bolts or jarring them loose from the frame.

Upon the outer extremity of the member K is carried a horizontally extending supporting member M secured by a vertical bolt N to the part K. A slot O is provided in said member K as shown through which the bolt N passes and this slot permits the member M to be shifted laterally with respect to the line of draft. The under surface of said member M is toothed or serrated where it bears upon the member K and corresponds with the teeth of the extension F so that it may be secured directly to said part F if it is desired to dispense with the intermediate laterally slidable member K.

On the support member M is fixed a toothed sector P with which is adapted to be engaged a spring catch Q on an adjusting and regulating lever R. The horizontal member M is bored horizontally to provide a socket to receive a short horizontal pivot arm of a long rocking arm S, the main part or harrow carrying part of which is at right angles to said pivot arm so that such arm is permitted a free rocking movement on the support M as a fulcrum and in a vertical plane. The main part of the arm S extends rearwardly in a direction substantially parallel to the line of draft when the support M is in its normal adjustment of substantial parallelism to the fixed bracket extension F.

Secured to the rocking arm S a short distance from the member M is a clamp T having a vertically disposed bore, shown by dotted lines in Fig. 3, through which extends the end of a rod U preferably bent in an arc of a circle, the other end of said rod being attached to the lever R. A spring V surrounds the rod U and its ends bear against the lever and the said clamp T whereby a constant resilient pressure is exerted upon a freely rocking arm S and through said rod upon the rotating ground engaging harrow teeth, this pressure thus causing the teeth to be forced into the ground while at the same time the free rotatability of the teeth prevents the spring from pressing with such force thereon as to create too great a draft on the plow and preventing an up and down jumping movement being created by the spring such as would be produced by the action of such spring on fixed teeth. The rod U is free to play through the hole in clamp T and a controlling pressure to any desired extent may be imparted to the arm S by moving the lever in a direction to compress or relieve said spring.

The harrow member is shown in Fig. 4 in elevation. It consists of a series of toothed disks 2 each having a hub extending at each side, the hub of one disk interlocking with another by means of corresponding lugs and notches as shown so that all will revolve together as a single member and all occupy the same relative positions at all times. The hubs are centrally bored and a rod 3 extends through them, the outer hub bores of the end disks revolving within socketed ends 6 of arms 4 suspended from a horizontal supporting rod member 5. The arms 4 having horizontal extensions at their upper ends which are provided with grooves in which the rod 5 is seated and with means for permitting of the adjustment of the arms 4 along the rod 5, which means may consist of a series of bolts passing through the rod 5, the rod 5 being of such a length as to permit of the required range of adjustment, said rod being shown in Fig. 4 as broken at the ends. The teeth of the disks are tapered and pointed and formed so as to have a concaved and convexed edge and all of them are bent outward or away from the plane of the disk and may be a part of the disk or can be secured thereto. The rod member thus described is suspended from the arm S in the following manner. A plate 7 having a serrated upper surface is secured in any desired manner to the said rod 5 and upon this is seated a member 8 whose under surface is serrated to correspond with and engage said serrated plate 7, said member by reason of its form adapted to be clamped to the arm by means of the bolt 9; and a bolt 10, shown in dotted lines in Fig. 4, serves to clamp the two serrated members together and also secures the member 7 to the rod 5 and which when loosened permits of any desired adjustment in a horizontal plane in order to place the harrowing member at an angle with reference to the line of movement of the plow. However, any other means of attaching the plate 7 to the rod-member 5 may be used or the teeth could be integral with said member if desired.

The dotted lines in Fig. 1 illustrate the manner in which the member M together with its lever R and the harrowing supporting arm S may be adjusted at any angle.

At the extreme rear of the plow frame is shown in dotted lines the position at which the bracket EF may be placed if desired and as showing that my improved harrow attachment may be placed on any part of the plow frame or on frames of different contour, the adjusting members permitting the harrow to be placed in any desired position.

As shown in Fig. 4 the rod 5 which carries the disk 2 is made of considerable length so that as many of the disks may be accommodated as are needed to harrow a territory of a given width. By merely shifting one of the arms 4 along this rod 5, after moving a nut on the rod 3, as many disks may be slipped upon said rod as are needed

after which the parts are replaced and it is necessary as a matter of course to have the rod 3 of such a length that the entire disks may be added. The disks are all dished as shown in Fig. 4 and between each is an arm 11 answering as a scraper for keeping the disks cleared of trash and mud and these are adjustable by means of bolts 12 so that they may be moved closer to the disks when working in especially sticky soil.

The particular construction of harrow frame shown in this application is claimed in my co-pending application Serial Number 547,776, which is a divisional application of this case.

I desire to make it known that it is not the intention to confine myself to the particular construction shown and described since equivalent means may be used. The means by which I place a variable yielding pressure upon the harrow I value considerably, also the adaptability of the device to any form of plow and the method by which the number of disks may be altered. Also of considerable importance are the toothed or serrated portions by which the arm 5 and the harrowing member are positively held in any desired adjustment, mere friction or the clamping action of the bolts alone not being depended upon.

As has been intimated herein the intermediate member K may be eliminated and the member M attached directly to the extension F in which case the angular adjustment of the arm S that may be had as before, will answer as a lateral adjustment as well since the harrowing member is adjustable on the said arm S to set it at the proper angle after it has been altered in position laterally relative to the plow.

With regard to an angular adjustment on the plow-frame of a harrowing member that is rotatable I am not aware of any device which includes an arm having a single point of connection at one end on the plow-frame and angularly adjustable thereon and having at its other end the rotating harrowing device after the manner shown herein. Neither has a rotary harrowing member or device itself been angularly adjustable upon an arm in a horizontal plane by the means shown herein nor any means akin thereto.

Having thus described my invention, I claim:—

1. In a harrow attachment for plows in combination with a plow and plow-frame, harrow members, an automatically rocking member supported by the frame, means to carry the harrow members on said member in position to bear upon and pulverize the furrowed soil turned by the plow, said harrow members mounted to rotate freely and having a free automatic movement with said member in a vertical plane whereby the harrow members pulverize the soil with a vertically yielding contact and means to angularly adjust the rocking member in a substantially horizontal plane whereby the rotary harrow members may be positioned to cover the line of the furrow and also the angle of the said rotary harrow members to the furrow may in part be regulated.

2. In a harrow attachment for plows in combination with a plow and its frame, harrow members, a single automatically rocking arm extending rearwardly at one end from said frame, a support fixed to the frame, said arm having an integral part having a pivotal bearing on said support, said support attached at a single point to said frame and adjustable angularly at and around said point, said harrow members being rotatably mounted at the other end of said arm in position to engage the furrowed soil turned by the plow.

3. In a harrow attachment for plows, in combination with a plow and plow frame, a harrow frame, freely rotating harrow disk members carried by said frame in position to contact with and pulverize the soil turned by the plow, a supporting member rigidly and detachably connected to said plow frame, a rigid elongated arm pivotally supported at one end by the supporting member to have free movement bodily in a vertical plane and extending substantially longitudinally of the line of draft to a point behind the plow, said harrow frame supported solely by said arm near the free end of the latter, an adjustable lever carried by the supporting member for raising and lowering said arm and a spring intermediate the arm and lever and exerting a yielding downward pressure on the arm to permit said arm and the harrow members to rock freely in a vertical plane under said pressure.

4. In combination with a plow and plow frame, a harrow attachment comprising an elongated arm free to rock bodily in a vertical plane and pivotally supported at one end by said frame and extending substantially longitudinally of the line of draft behind the plow, a regulable compression spring exerting downward pressure on said arm, a harrow frame carried at the free end of the arm and having rigid connection therewith adjustable longitudinally of the arm, and freely rotating harrow disk members carried by said frame in position to contact with and pulverize the soil turned by the plow, said attachment having rigid and detachable connection at a single point to said plow frame.

5. In a harrow attachment for plows in combination with a plow and plow frame, a harrow carrying member free to rock in a vertical plane consisting of a single elongated arm circular in cross-section and hav-

ing at its front end a portion at an angle to the rearwardly extending portion and forming a pivot on which the arm is adapted to rock with respect to the frame, said arm having its rearward portion straight and continuous, a harrow frame carried at the free end of the arm and having rigid and longitudinally adjustable connection with said rear straight portion, a regulable compression spring exerting downward pressure on said arm and freely rotating harrow disk members carried by said harrow frame in position to contact with and pulverize the soil turned by the plow.

6. In a harrow attachment for plows in combination with a plow and plow-frame, a rigid elongated arm free to rock in a vertical plane, supported by said frame and extending behind the plow, a regulable compression spring exerting downward pressure on said member, a harrow frame having rigid, and longitudinally adjustable connection with the arm near the free end thereof, and freely rotating harrow disk members carried by said frame and consisting of separated blades adapted to contact with and pulverize the soil turned by the plow, whereby as the harrow is drawn along its separate blade members are adapted to enter the soil and yield vertically.

7. In a harrow attachment for plows, in combination with a plow and plow frame, a member free to rock in a vertical plane, supported at one end by the frame and extending behind the plow, a regulable compression spring exerting downward pressure on said member, a harrow frame carried at the free end of the member and freely rotating harrow disk members carried by said frame and consisting of separated blades adapted to contact with and pulverize the soil turned by the plow, whereby as the harrow is drawn along the separated blades are adapted to enter the soil and to yield tangentially and vertically, means to adjust the rocking member angularly and substantially horizontally relatively to the frame, and means to adjust the harrow members angularly and substantially horizontally to the rocking member, whereby the harrow frame may be moved inward or outward to cover the line of the furrow and whereby the rotary harrow members may be fixed at the proper acute entering angle to the furrow and also fixed to accord to adjustments in the angle of the rocking member.

8. In a harrow attachment for plows in combination with a plow and its frame, a bracket fixed to the frame and having a substantially horizontal portion extending therefrom, a supporting member having means to angularly adjust it in a horizontal plane on the bracket and having an integral cylindrical socket member, a freely swinging arm, said arm having an angled pivot-arm mounted in said socket and a rotary device carried at the free end of the swing-harrow device carried at the free end of the swinging arm.

9. In combination with a plow, a plow-frame, a rocking harrow arm, a rotary harrow carried by said arm, an arm-socketing device, a socket-supporting device carried by the plow-frame, an adjustable clamping bolt adapted to clamp said socketing device vertically to said supporting device and permitting angular adjustment of the arm with respect to the frame and auxiliary means for holding the arm against horizontal displacement.

10. In a harrow attachment for plows, the combination with the plow-frame having a member angularly serrated on one of its faces, a member provided also with angular serrations and adapted to clutch those of the first member against horizontal displacement, an arm carried by the second described member, a harrowing device carried by the arm, means to secure the two members in any adjustment relatively, a lever carried on and movable with one of the members, and a spring interposed between the lever and the arm and upon which variable pressure is imposed by said lever for the purposes set forth.

11. In a harrow attachment for plows, the combination with the plow-frame of a member supported pivotally to rock in a vertical plane and carried behind the plow, attaching means for said rocking member, such means being supported from the frame and adjustable angularly in a substantially horizontal plane thereto, means at said frame to secure the first said means thereto, rotatable harrow members carried at the free end of the arm, and means movable with the rocking member and the adjustable attaching means to produce a yielding downward pressure on the arm.

12. In a harrow attachment for plows in combination with a plow and its frame, an angularly adjustable member supported by said frame, a rocking member rearward of the plow and supported by said adjustable member, rotatable harrow members at the end of said rocking member positioned to contact with the soil turned by the plow, a compression spring exerting downward pressure on said rocking member, common means for regulating the tension of said spring and adjusting the height of said rocking member, said spring and means adjustable with said rocking member and angularly adjustable member.

13. A harrow attachment comprising a supporting member, a second member adjustably mounted thereon and carrying a toothed sector, a rock arm pivotally connected with the said second member, a lever mounted on said second member carrying

means for coöperating with the teeth of the sector, resilient means adjustable with said arm and second member operatively connecting the lever with the rock arm, and a harrowing member carried by the rock arm.

14. In a harrow attachment for plows, in combination with a plow and plow-frame, a rocking-arm, a harrow member carried by the rocking-arm at one end, a member for supporting the arm at its other end, an intermediate member detachably secured to the frame and supporting member, and means connecting said members adjustable in a straight line laterally substantially at a right angle to the line of draft.

15. In a harrow attachment for plows, the combination of the plow-frame, an arm, means on the frame to receive the arm on which said arm is angularly adjustable, means to rigidly secure the arm thereto, a second arm secured to the first and adapted for a lateral and angular adjustment thereon, means to secure the arms, one of said arms having a slot to permit it to shift relative to the other, and a harrowing member carried by the said second arm.

16. The combination with a plow, of a rock arm carried at one end thereon and adjustable in a horizontal direction both laterally and angularly relative to the direction of advance, a harrowing member carried at the free end of such arm, and means for providing a yielding downward pressure on the arm.

17. An arm, a support, a member to which the arm is adjustably secured, said member adapted for adjustment both laterally and angularly relative to the support and the advance, means for securing the member and support relatively rigid against lateral displacement when in adjusted position, a harrowing member carried on the arm, and means for exerting a variable yielding downward pressure upon the arm.

18. The combination with a plow, of a rock-arm carried at one end thereon and adapted for lateral and angular adjustment with reference thereto in a substantially horizontal plane, such arm having a free vertical pivotal motion, a rotary harrowing member carried at the free end of the arm and adjustable angularly thereon, a spring for giving a yielding downward pressure upon the member, and a lever for receiving the pressure of said spring and varying the tension thereof.

19. In a harrow attachment, a plow-frame, a support carried thereby, devices carried on the support and adjustable thereon both laterally and angularly, means for securing said devices and the support relatively rigid after adjustment, an arm pivotally carried by the devices and arranged to have vertical movement, a harrowing member carried at the free end of the arm, a spring for maintaining a yielding downward pressure on the member upon the ground through the arm, and a lever for compressing the spring for the purposes set forth.

20. In a harrow attachment, the plow-frame, an arm supported therefrom and slidably adjustable in a lateral direction and angularly adjustable horizontally in a pivotal manner with respect to said frame, a single means for securing said arm and frame relatively rigid with respect to both said adjustments, means for carrying the arm pivotally to have vertical movement, a harrowing member carried at the free end of the arm, and a spring for maintaining a yielding downward pressure of the member upon the ground through the arm.

21. In a harrow attachment for plows, in combination with a plow and plow frame, a series of harrow members, an elongated arm extending from the plow frame rearwardly substantially in the line of draft and pivotally supported at one end from said plow frame, a harrow frame carrying said harrow members and rigid connecting means between the frame and arm, comprising a pressure clamp embracing the arm and adjustable thereon substantially in the line of draft, means independent of the arm for holding the clamp against the arm, a member carried by the harrow frame and said member and clamp having interlocking faces, means joining said clamp member and frame and permitting angular adjustment in a horizontal plane to change the angle of the harrow frame and members to the line of draft.

22. In a harrow attachment for plows, in combination with a plow and plow frame, a series of harrow members, an elongated arm extending from the plow frame rearwardly substantially in the line of draft and having its rear portion circular in cross-section, a harrow frame for said harrow members and rigid detachable adjusting and connecting means between the harrow frame and arm comprising a pressure clamp member embracing the said circular portion of the arm and secured thereon by means independent of the arm whereby it may be adjusted longitudinally, and angularly in a vertical plane on said arm, and a member carried by the harrow frame, a bolt connecting said members and frame, and permitting angular adjustment of the frame in a horizontal plane to change the angle of the harrow members to the line of draft and said clamp members having interlocking faces to hold the parts against lateral strain.

23. In a rotary harrow attachment for plows in combination with a plow and plow frame, a bracket fixed to the frame, a freely swinging rocking arm, rotary harrow members carried by and rocking with said arm, means to fix the arm in different angular ad-

justments in a horizontal plane with respect to the frame in order to change the relative positions of plow and harrow, and means to fix the harrow members in different angular adjustments in a horizontal plane with respect to the arm to thereby change the angle of the members relative to the line of travel and to accommodate said members to changes in adjustment of the arm.

24. In a harrow attachment for plows in combination with a plow and plow frame, harrow members, a rigid elongated rocking arm extending substantially longitudinally of the line of draft and pivotally supported at one end from the plow frame, a harrow frame carrying said members and a clamp carried by said frame and adapted to rigidly connect said frame and arm, and detachable from and adjustable longitudinally along said arm.

25. In combination with a plow and plow frame, a harrow attachment having detachable and adjustable connection with the plow frame at a single point, a frame embracing clamp bracket for obtaining such connection, a single elongated integral arm free to rock bodily in a vertical plane and provided with a part having pivotal bearing and with a part extending back of the plow substantially longitudinally of the line of draft, a member providing support for the arm and carried by the bracket, rotary harrow members in position to engage the soil turned by the plow, a frame for said harrow members, said frame having rigid and detachable connection with the arm at a single point, a clamp embracing the arm and secured to the harrow frame for obtaining such connection and means independent of the arm for detachably securing said clamp on the arm.

26. In combination with a plow and plow frame, a harrow attachment having detachable and adjustable connection with the plow frame at a single point, a frame embracing clamp bracket for obtaining such connection, a single elongated integral harrow supporting arm free to rock bodily in a vertical plane and provided with a part having pivotal bearing and with a part extending back of the plow substantially longitudinally of the line of draft, a member providing support for the arm and carried by the bracket, an arm-adjusting lever and a toothed sector carried by said support member, and a spring between the arm and lever for permitting the free movement of the arm under adjustable spring tension, rotary harrow members in position to engage the soil turned by the plow, a frame for said harrow members, said frame having rigid and detachable connection with the arm at a single point, a clamp embracing the arm and secured to the harrow frame for obtaining such connection and means independent of the arm for detachably securing said clamp on the arm.

27. In combination with a plow and plow-frame, a harrow attachment having a frame embracing clamp bracket detachably and adjustably connected with the plow-frame, an elongated rigid arm freely movable bodily in a vertical plane, and provided with a part having pivotal support on and by the said bracket and with a part extending back of the plow substantially longitudinally of the line of draft, a harrow frame carried at the free end of said arm and having rigid and detachable connection therewith and harrow members carried by said frame and having automatically rocking engagement with the soil turned by the plow.

28. In combination with a plow-frame and a plow for turning a furrow, of an attachment having soil-stirring means which engage the furrow slice previously turned by the plow, and have a vertical movement independently of the plow, the attachment comprising a support extending from the plow-frame, a rigid arm carried by the support and having a regulable yielding connection with the support and extending rearwardly, and rotary harrow members carried by the arm.

29. In combination with a plow and plow-frame, a support on the plow-frame, an arm pivotally secured to the support and extending rearwardly and having at its rear end a frame secured to it, rotary harrow members borne by the frame and means carried by the support for applying a regulable pressure upon the arm between the support and harrow-frame.

30. In combination with a plow and plow-frame, a harrow attachment drawn forward by the plow-frame but having an independent rocking action, the harrow attachment comprising a support extending laterally from the plow-frame, an elongated arm having a yielding connection with the support and extending rearwardly behind the plow, and rotary harrow members borne by the arm below the line of the arm, the whole attachment being held to one side of the plow-frame and in position to engage the furrow slices turned by the plow and the arm lying in a plane nearly parallel with the surface of the soil engaged, whereby the harrow members may effectively harrow the soil without unduly increasing the draft.

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

EMIL M. KRAMER.

Witnesses:
C. C. AMSLER,
SAM A. BROWN.

Correction in Letters Patent No. 963,587.

It is hereby certified that in Letters Patent No. 963,587, granted July 5, 1910, upon the application of Emil M. Kramer, of Cissna Park, Illinois, for an improvement in "Harrow Attachments for Plows," an error appears in the printed specification requiring correction, as follows: Page 4, line 67, consisting of the words "device carried at the free end of the swing-" should be stricken out; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 9th day of August, A. D., 1910.

[SEAL.]

F. A. TENNANT,

Acting Commissioner of Patents.