(No Model.)

# W. J. LAWRENCE.

## HARROW.

No. 503,545. Patented Aug. 15, 1893.

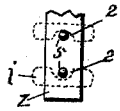

Fig. 6.

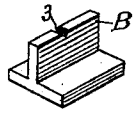

Fig. 5.

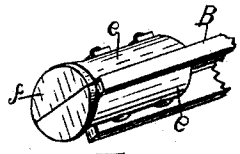

Fig. 7.

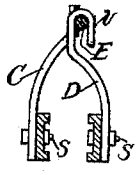

Fig. 8.

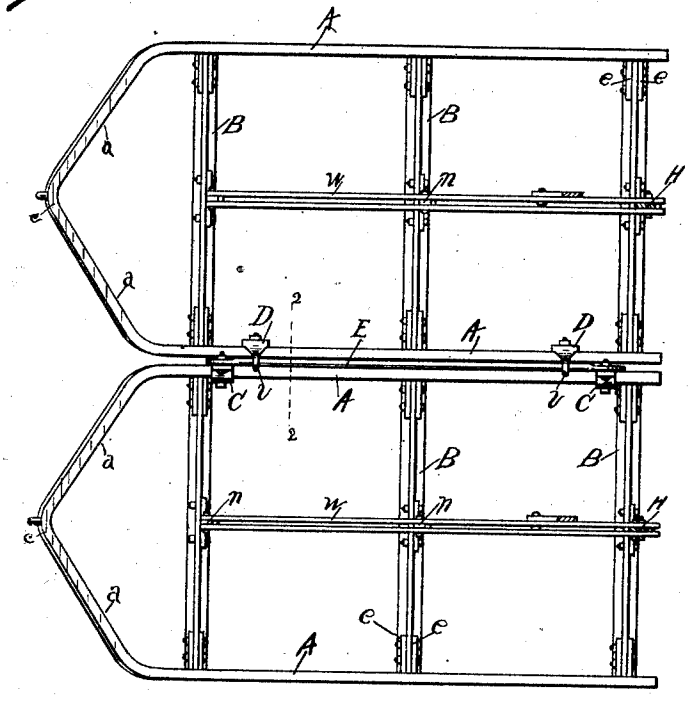

Fig. 1.

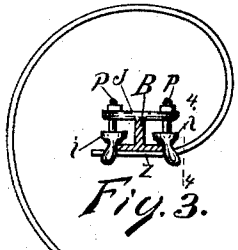

Fig. 3.

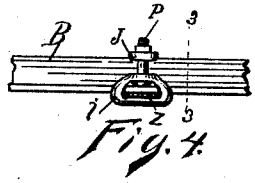

Fig. 4.



Fig. 2.

Witnesses
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# UNITED STATES PATENT OFFICE.

WILLIAM J. LAWRENCE, OF KALAMAZOO, MICHIGAN.

## HARROW.

SPECIFICATION forming part of Letters Patent No. 503,545, dated August 15, 1893.

Application filed March 24, 1892. Serial No. 426,228. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM J. LAWRENCE, a citizen of the United States, residing at Kalamazoo, county of Kalamazoo, State of Michigan, have invented a new and useful Harrow-Frame, of which the following is a specification.

This invention relates more particularly to that class of harrows in which are employed revoluble share-bars or tooth-bars, and also to harrows employing frame-sections hinged together.

The object of the invention consists in certain improvements in relation to the hinge, the axial bearings of the share-bars or tooth-bars, the share or tooth holder and the form of the frame-sections; all as more particularly described and claimed below.

In the drawings forming a part of this specification, Figure 1 is a plan view, parts being in section on line 9—9, in Fig. 2; Fig. 2 a side elevation of Fig. 1; Fig. 3 a cross section on line 3—3, in Fig. 4, looking from a point at the right, also showing a harrow tooth in side elevation. Fig. 4 is a sectional elevation on line 4—4, in Fig. 3; Fig. 5 a portion of one of the tooth-bars in perspective, at a point where the teeth or shares are attached; Fig. 6 an inverted view of letter details in Figs. 3 and 4; Fig. 7 an enlarged broken perspective of the axial bearings of the share-bars or tooth-bars in Fig. 1; and Fig. 8 is a section on line 2—2, in Fig. 1, looking from a point at the right.

Referring to the lettered parts of the drawings, A A are the frame-bars of the frame-sections, which frame-bars extend straight on each side toward the front ends of the frame-sections, where they converge at oblique angles, *a*, and join each other in a short curve, *c*, at the nose of the frame-section. By this means there is less resistance against obstructions, as the slanting sides allow the harrow to more readily sheer by the obstruction or throw it out of the way. The front end of the frame-section is turned upward, something in the form of a runner, as shown in Fig. 2, to guard against what is termed nosing in the ground.

The revoluble share-bars or tooth-bars are shown at B, having bearings at each end in the side frame-bars, A A. The axial bearings of these share-bars or tooth-bars, B, consist of two half round castings, *e*, flanged out at the front ends, so that when they are put together they form a head, *f*, Figs. 2 and 7. The castings, *e*, are recessed on their inner faces, so that when they are placed together a space is left between them to receive the share-bar or tooth-bar, B, as in Fig. 7, to which bar said castings are bolted. Sufficient space is left between the head *f* and the end of the tooth-bar B, to receive the frame-bar, A. This makes a very convenient bearing for share-bars or tooth-bars which are not susceptible of being tenoned or rounded to form axial bearings, and can be readily attached by being inserted through the holes in the frame-bars from the outside.

The frame-sections here shown are independent of each other in their movements up and down and endwise, by means of the peculiar hinging arrangement which attaches them together. Each frame-section is provided with hinging-arms, C D, Figs. 1 and 8, those C C of one frame-section being connected together by a rod, E, pivoted at the ends to the upper ends of said hinging-arms C, as in Fig. 1. The hinging-arms D, of the other frame-section, are provided with hooks, *v*, which catch over the rod E.

The hinging-arms, C D, of each frame-section are pivoted to the frame-bars A, at their lower ends, as at S S, in Fig. 8. By pivotally connecting the hinging-arms C together by means of the rod E, and all of the hinging-arms being pivoted to the frame-bars A, the said hinging-arms will all tilt forward or backward in unison, which might not be the case if not so connected. To illustrate: those at the rear of the harrow might tilt backward and those at the front of the harrow tilt forward, and thus lock the frame-sections against the free action which they now have to tilt or move up and down and endwise independently of each other.

In lieu of the hook, *v*, of the hinging-arms D, of course an eye might be employed, or the hinging-arms of one frame section might be hinged directly to the hinging-arms of the other frame-section, but where an open hook is employed one frame-section can be readily detached from the other and used separately, if necessary.

The share-bars or tooth-bars B, of each frame-section are provided with an upwardly extending arm, *n*, Figs. 1 and 2, which arms are connected together by a bar, *w*, pivotally attached to the upper ends of said arms.

At H is a lever, which is rigidly attached at its lower end to the share-bar or tooth-bar, B, and pivotally attached to the rear end of the bar *w*. When this lever is carried forward the share-bars or tooth-bars are turned on their axial bearings, as in the ordinary manner, to control the depth of cut or to throw the shares or teeth into or out of the ground. One of these frame-sections can be swung on its hinge over on to the other and thus fold the harrow, for convenience in transportation.

While the frame-bars, A, are here shown made from channel metal and the share-bars or tooth-bars from T metal, any other desirable forms may be employed.

The share or tooth holder consists of two stirrups, *i*, through the loops of which stirrups the shank, *z*, of the share or tooth is passed and beneath the share-bar or tooth-bar B. Through the upper end of these stirrups is a bolt hole, through which is passed a bolt, P, the lower sides of the stirrups being recessed at 2 2, as in dotted lines in Fig. 6, to admit of the insertion of the bolt. A clip, J, fits across the top of the share-bar or tooth-bar, B, and receives the bolts, P, which bolts are provided with binding nuts, as clearly appears in Figs. 3 and 4.

A niche, 3, Fig. 5, may be formed in the upper side of the share-bars or tooth-bars, B, to receive a rib on the under side of the clip, J, and the under face of the shank, *z*, of the tooth or share, may be provided with projections, 5, in Fig. 6, to help hold the parts more firmly; but not necessarily so.

The hinging-arms, C D, are designed to be made sufficiently high to accommodate the upper bows of spring harrow teeth, shown in Fig. 3, when one frame-section is folded over on to the other, but of course if other style of teeth or shares were used the hinging-arms need not be so high.

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

1. The combination of the frame-bars, the share-bars and the two-part castings headed at their outer ends and recessed to receive the end of the share-bar to which they are bolted, the heads of said castings being sufficiently removed from the ends of the share-bars to form a recess for the frame bars, in holes of which they have direct bearings, by being passed into said holes from the outside.

2. In a harrow, the combination of frame-sections, hinging-arms pivoted thereto and hinged together, and a rod pivotally connecting the hinging arms so they will cant in like direction; substantially as set forth.

3. The combination of a share-bar or tooth-bar, stirrups having bolt holes in their upper ends, bolts passed through said holes, a tooth or share having its shank passed through the stirrups and against the tooth-bar or share-bar, a binding clip on said bar, through which clip said bolts pass, and binding nuts; substantially as set forth.

In testimony to the foregoing I have hereunto subscribed my name in the presence of two witnesses.

WILLIAM J. LAWRENCE.

Witnesses:
NICHOLAS A. VYNE,
HENRY E. TRUMBLE.