

No. 640,722.

Patented Jan. 2, 1900.

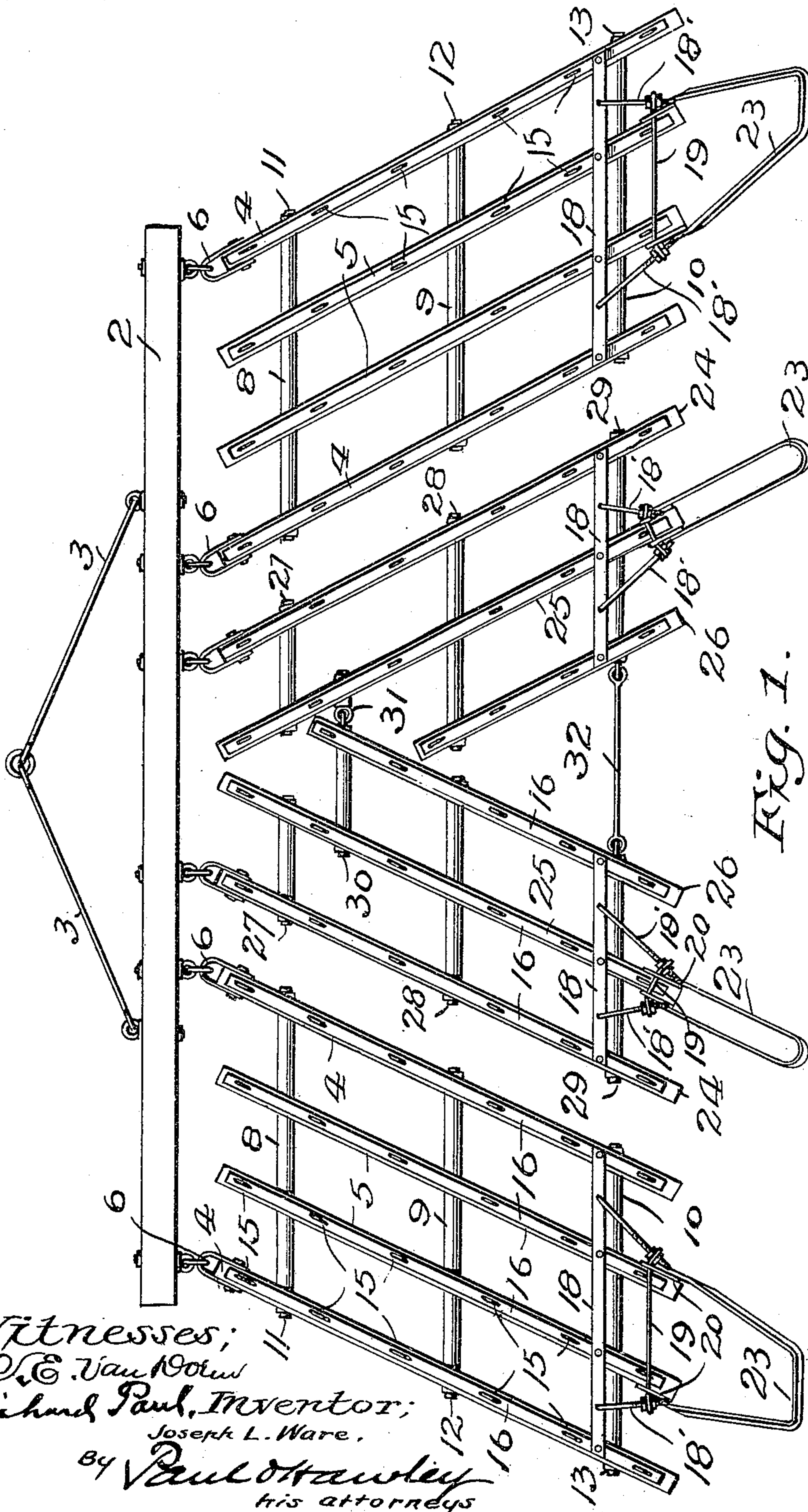
J. L. WARE.

HARROW.

(Application filed June 11, 1898.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses;  
O. E. Van Volken  
Richard Paul, Inventor;  
Joseph L. Ware,

By Paul Hawley  
his attorneys



No. 640,722.

Patented Jan. 2, 1900.

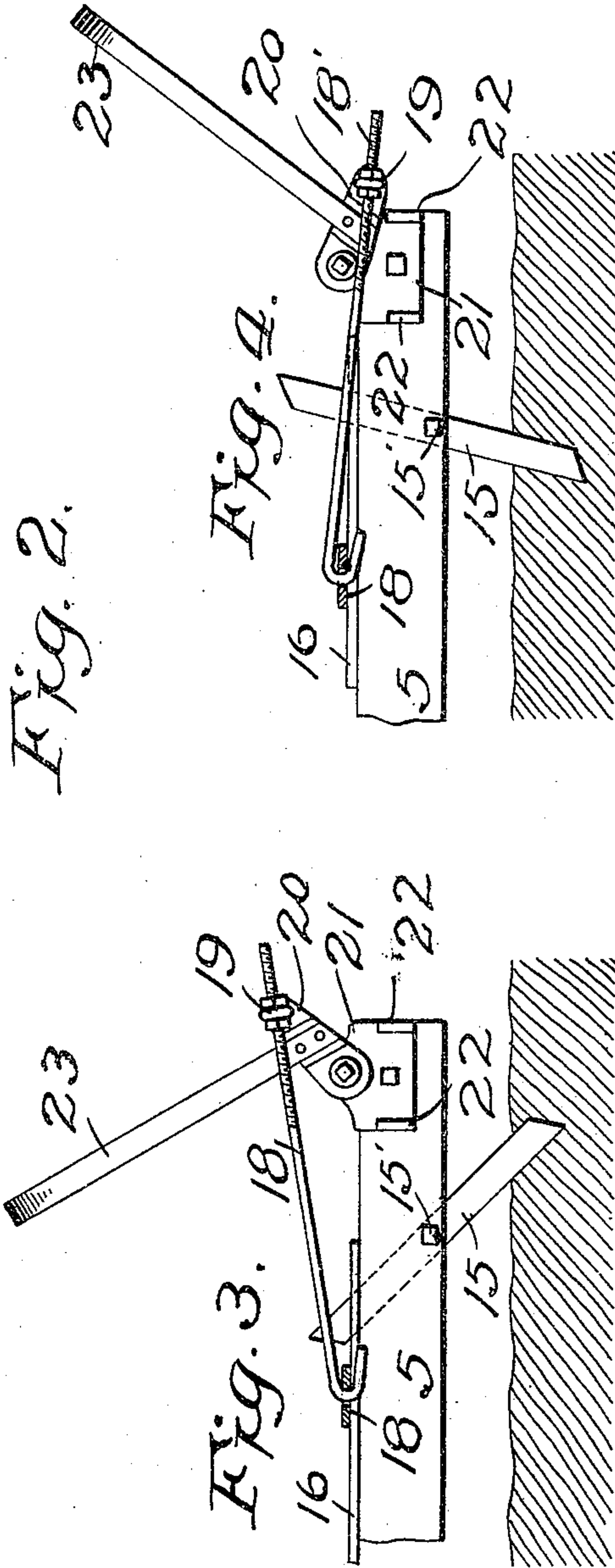
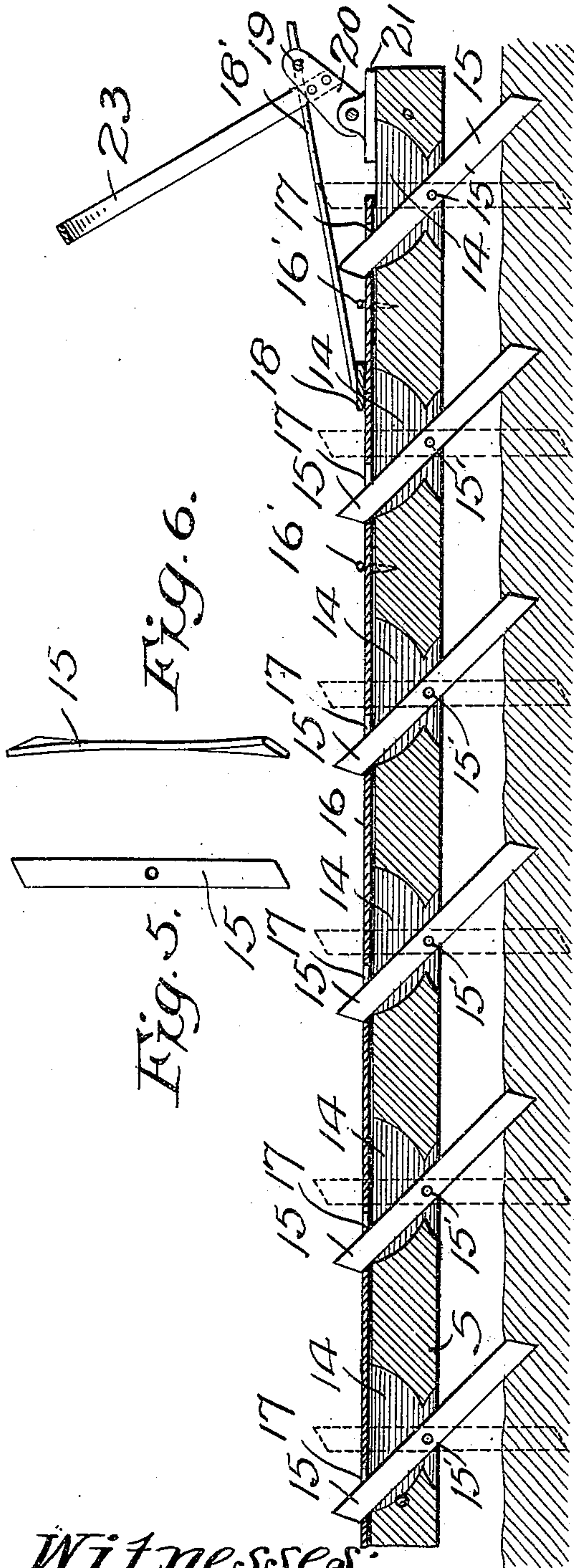
J. L. WARE.

HARROW.

(Application filed June 11, 1898.)

(No Model.)

2 Sheets—Sheet 2.



Witnesses:  
O. E. Van Woren  
Richard Paul

Inventor:  
Joseph L. Ware.  
By Paul Ottaway  
his attorney



# UNITED STATES PATENT OFFICE.

JOSEPH L. WARE, OF ST. PAUL, MINNESOTA.

## HARROW.

SPECIFICATION forming part of Letters Patent No. 640,722, dated January 2, 1900.

Application filed June 11, 1898. Serial No. 682,184. (No model.)

*To all whom it may concern:*

Be it known that I, JOSEPH L. WARE, of St. Paul, Ramsey county, Minnesota, have invented certain new and useful Improvements in Harrows, of which the following is a specification.

My invention relates generally to harrows composed of several independent sections or frames, and particularly to that class known as "lever-harrows;" and the objects of the invention are to provide a harrow of such construction that the teeth, particularly in the middle section, will drop into and reach the bottom of all depressions and furrows, which ordinarily are not touched by the teeth of lever-harrows as usually constructed, and to provide a lever-harrow wherein the strain will be lengthwise of the grain of the timbers composing the framework of the several sections, thus permitting the use of a comparatively light frame without seriously impairing the strength or durability of the harrow.

Another object is to provide means for preventing the side drift or travel of the end sections.

A further object is to provide a lever-harrow wherein the sections are pivotally secured at an angle to the draft-beam or head and having self-clearing teeth, thus avoiding the necessity of raising the harrow to free the teeth from sod, roots, clods of earth, or mud, which frequently accumulate during the process of harrowing.

A still further object is to provide a lever-harrow having reversible teeth, thus increasing the efficiency and utility of the implement.

The invention consists generally in a lever-harrow comprising a head or draft-beam, end sections or frames attached at an angle thereto, and a middle section substantially in the form of a divided A.

Further, the invention consists in a lever-harrow wherein the timbers composing the frame are substantially parallel to the draft-line.

Further, the invention consists in a lever-harrow wherein the sections are connected to the draft bar or beam at an angle and provided with a particular form of tooth adapted to travel in a direction substantially parallel with the draft-line, thus preventing any side drift of the sections.

Further, the invention consists in a lever-harrow having pivoted teeth and adjustable means for changing the vertical angle or inclination of said teeth.

Further, the invention consists in a lever-harrow having pivoted teeth and self-locking levers for operating the same.

Further, the invention consists in a lever-harrow having pivotally-secured reversible teeth, and, further, the invention consists in various constructions and combinations, all as hereinafter described, and particularly pointed out in the claims.

In the accompanying drawings, forming part of this specification, Figure 1 is a plan view of a harrow embodying my invention. Fig. 2 is a longitudinal section of one of the frame-timbers, showing the pivotal arrangement of the harrow-teeth and the mechanism for operating the same. Fig. 3 is a detail showing the locking-lever in its forward position. Fig. 4 is a similar view showing the lever in its backward or locked position. Figs. 5 and 6 are details of a harrow-tooth.

In the drawings, 2 represents a harrow-head or draft-beam provided with a suitable draft attachment, such as the rods 3 3. At each end of the beam 2 I prefer to provide a harrow-section substantially in the form of a parallelogram, composed of bars 4 4 and 5 5, running in the direction substantially of the line of draft, so that the strain will be lengthwise of the grain, said bars being connected in each section by hollow spools or rods 8, 9, and 10, passing transversely through the bars preferably near the middle and at each end, and by rods 11, 12, and 13, which pass through said spools and lock the parts of the respective sections rigidly together. The outer bars of the two sections are pivotally connected to the draft-beam at an angle thereto by means of links or clevises 6 6 and eyebolts passing through said draft-bar. The bars 4 4 and 5 5 are preferably rectangular in cross-section and provided at intervals with vertical saw-slits 14, in which teeth 15 are pivoted upon pins 15', passing through the middle of the teeth and through the bars 4 4 and 5 5 near the bottoms of the slits. The teeth 15 are composed, preferably, of flat steel bars having beveled ends and provided with a slight lateral twist at each end, so that although the



frame of the harrow-section is connected to the draft-beam at an angle the teeth will follow a direction substantially parallel with the draft-line, thus preventing the sidewise drift or travel of the harrow. The teeth, being pivoted near the middle and having duplicate ends, may be reversed whenever desired, and the efficiency and durability of the harrow thereby greatly increased.

10 Moving in guides 16' upon the top of the bars 4 4 and 5 5 are flat metal bars 16 16, having slots 17 17 registering with the saw-slits 14 and through which the upper ends of the pivoted teeth 15 project. Transverse bars 18 15 preferably connect the rear ends of the bars 16 16 in each section, said bars 18 having small holes to receive the hooked forward ends of rods 18' 18', the rear ends of which are threaded and adjustably secured in the 20 looped ends of rods 19, forming loose pivotal connections between the outer ends of short levers 20, which are pivotally supported at their inner ends upon plates 21, secured to the rear ends of the middle bars 5 5.

25 U-shaped levers 23 are secured to the levers 20 and project up to a position to be grasped by the operator when it is desired to change the vertical angle of the teeth and permit them to drop any turf or roots that 30 may have accumulated under the harrow. When the levers 20 are thrown to the position indicated in Fig. 4, the rods 18' will pass below the center of the pivotal support of said levers and lugs 22, provided on the plates 35 21, form stops to limit the backward movement of said levers, and when the levers are moved into engagement with said stops the same will be automatically locked until such time as the operator moves the lever 23 to 40 the position indicated in Fig. 3 and raises the rods 18' above the pivotal center of the levers 20. The adjustable connections at the rear ends of the rods 18' permit the slant or pitch of the teeth to be regulated at will and 45 enable the operator to adapt the harrow either for pulverizing or smoothing purposes.

The end sections of the harrow being connected at an angle to the draft-beam, a V-shaped space is formed between them, wherein 50 I prefer to arrange a middle section substantially in the form of an A, divided vertically, each leg comprising an outer bar or rail 24, pivotally connected at its forward end to the draft-beam in the manner heretofore described with reference to the end sections, a 55 middle bar 25, and an inner shorter bar 26. The bars forming each leg of the section are rigidly connected by bolts 27, 28, 29, and 30, passing through hollow spools or rods corresponding to those heretofore described with 60 reference to the end sections, and the two legs of the section are pivotally connected, preferably at their forward and rear ends, by an eyebolt 31, connected to the bolt 30, and a 65 tie-rod 32, forming a continuation of and joining the ends of the bolts 29. This method of dividing the middle section permits the

teeth, particularly those carried by the inner shorter bars, to drop into the depressions and furrows in the surface of the field that is being cultivated, and thereby more thoroughly stir up the soil and break up the sod and clods of earth than could be accomplished with a lever-harrow as usually constructed. The teeth of the middle sections are pivotally arranged and are moved back and forth in the same manner as heretofore described with reference to the end sections of the harrow, and the lever operating the mechanism is also the same, except that the plates 21, and consequently the levers 20, are mounted upon the single middle bar of each leg of the section instead of upon the two middle bars, as described with reference to the end sections.

The advantages of my improved lever-harrow lie in the fact that by dividing the middle or A section vertically the teeth in the comparatively narrow legs so formed will drop into all depressions and furrows and, conforming to the surface over which the harrow is passing, will more thoroughly pulverize the soil than the teeth of a lever-harrow as ordinarily constructed. By arranging the bars composing the frames of the sections so that the strain will be lengthwise of the grain I am able to use a lighter frame and avoid all danger of splitting the bars that is incident to the harrow-frame having transverse rails. By means of the self-locking mechanism for operating the pivoted teeth I can clear the harrow of any obstruction, and the adjustable mechanism permits the operator to regulate the pitch or inclination of the teeth and make a shallow or deep drill, as desired. A further advantage lies in the peculiar form of tooth which obviates the tendency of the end sections to drift toward the middle section, an objection incident to harrows having sections connected at an angle to the draft-beam.

I have shown the device formed in three sections, the A or divided sections being arranged in the middle; but I do not confine myself to this construction, as a greater or less number of independent sections may be provided, if desired, or a single A-section may be used without the end sections, and while wood is preferably used in the construction of the sections I may employ steel bars, and thus render the harrow less cumbersome and stronger and also neater in appearance and, perhaps, more durable.

It is obvious that the various details may be modified by any one skilled in the art, and I therefore do not confine myself to the construction herein shown.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. In a lever-harrow the combination, with a head or draft-beam, of end sections pivotally connected to said beam at an angle thereto, an A-shaped section also pivotally connected to said beam between said end sec-



tions, said A-shaped section being divided into legs pivotally connected to permit the section to conform to an uneven surface, a series of teeth pivotally mounted in said sections and having lower ends in a plane at an angle to the bars composing said sections and substantially parallel with the draft-line whereby side drift or travel of the sections is prevented, and lever mechanisms provided on said sections and connected with said teeth for tilting the same, substantially as described.

2. In a lever-harrow, the combination, with a head or draft-beam, of sections pivotally connected to said head at an angle thereto, a series of teeth pivotally arranged in said sections, said teeth having lower ends adapted to make a furrow in the soil at an angle to the bars composing said sections in a direction substantially parallel with the draft-line of the harrow, and lever mechanisms provided on said sections for tilting said teeth, substantially as described.

3. In a lever-harrow, the combination, with a head or draft-beam, of end sections pivotally connected thereto at an angle to said beam, a middle A-shaped section, a series of saw-slits provided in the bars composing said sections, a series of teeth pivotally mounted in said saw-slits and projecting above the tops of said sections, sliding bars provided upon said sections and having openings to receive the upper ends of said teeth, levers pivotally supported upon said sections, stops for limiting the movement of said levers, rods adapted to drop below the pivotal center of said levers when they are in engagement with said stops, whereby said levers will be locked in position, substantially as described.

4. In a lever-harrow the combination, with a head 2, of end sections pivotally connected to said head at an angle thereto, a middle A-shaped section, said middle section being composed of two legs, an eye bolt and tie-rod connecting said legs, whereby said middle section is permitted to conform to an uneven surface, a series of teeth mounted in saw-slits in said sections and extending

above the tops of the same, a series of bars provided on said sections and having openings to receive the tops of said teeth and locking-levers provided on said sections and connected with said bars for operating said pivoted teeth, substantially as described.

5. In a lever-harrow, the combination, with a head or draft-beam, of end sections pivotally connected to said head at an angle thereto, a middle A-shaped section also pivotally connected to said head, a series of teeth mounted in said end and A-shaped sections, each tooth independently of the others, said teeth having twisted lower ends to prevent side drift or travel of the harrow-sections and self-locking lever mechanisms provided on said sections and connected with said teeth for operating the same, substantially as described.

6. In a lever-harrow, the combination, with a head or draft-beam, of sections pivotally connected to said head at an angle thereto, a series of tilting teeth mounted in said sections, said teeth having twisted lower ends to prevent side drift or travel of said sections, and lever mechanisms provided on said sections and connected with said teeth for operating the same, substantially as described.

7. In a lever-harrow, the combination, with a head or draft-beam, of end sections pivotally connected to said head at an angle thereto, a middle A-shaped section also pivotally connected to said head, a series of tilting teeth mounted in said end and A-shaped sections said teeth having twisted lower ends to make a furrow substantially parallel with the draft-line of the harrow whereby side drift of the harrow-sections is prevented, and lever mechanisms provided on said sections and connected with said teeth for operating the same, substantially as described.

In testimony whereof I have hereunto set my hand, this 26th day of May, 1898, at Minneapolis, Hennepin county, Minnesota.

JOSEPH L. WARE.

In presence of—

RICHARD PAUL,  
M. C. NOONAN.