(No Model.) 2 Sheets—Sheet 1.

J. I. HOKE.

HARROW.

No. 509,434. Patented Nov. 28, 1893.

Fig. 1.

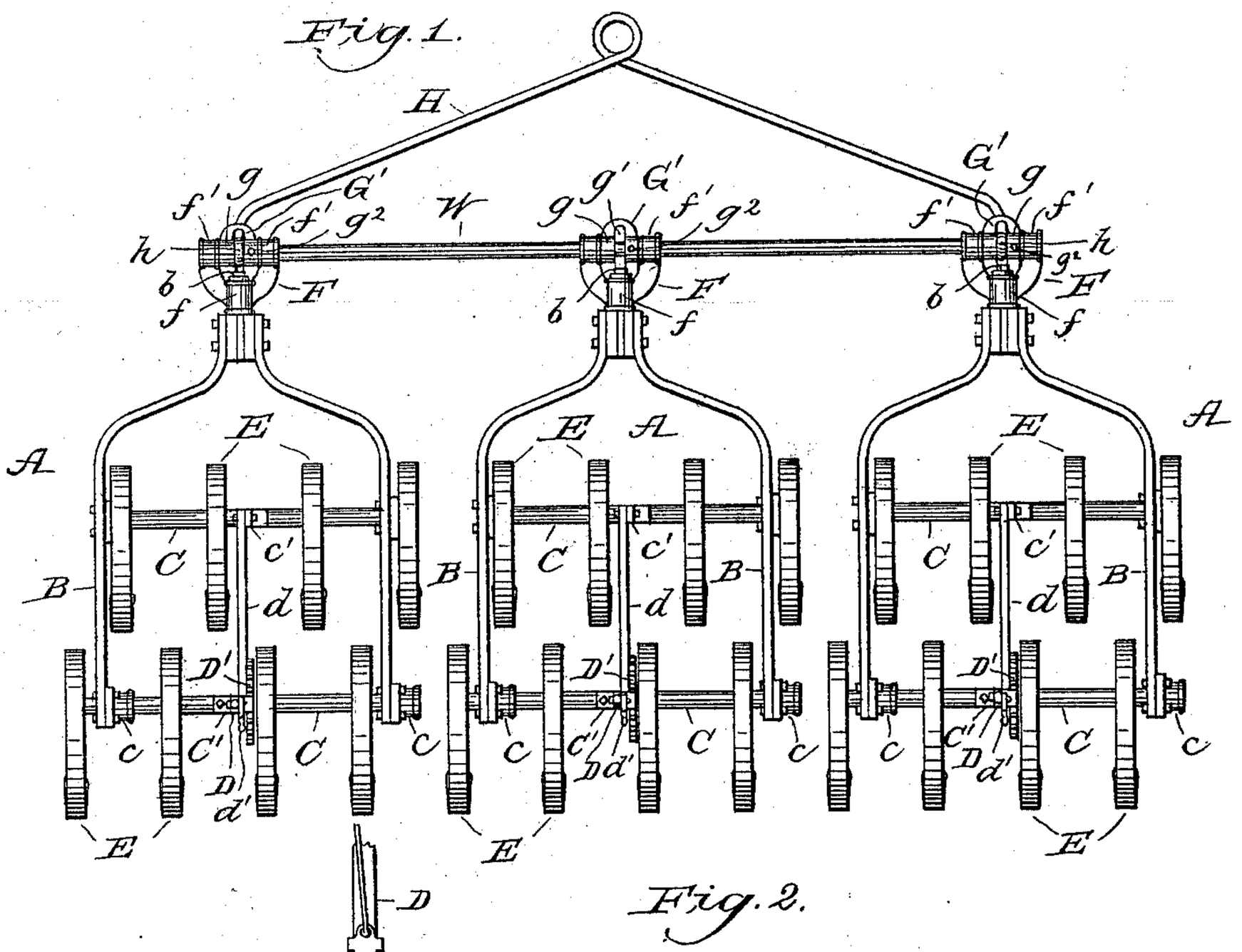


Fig. 2.

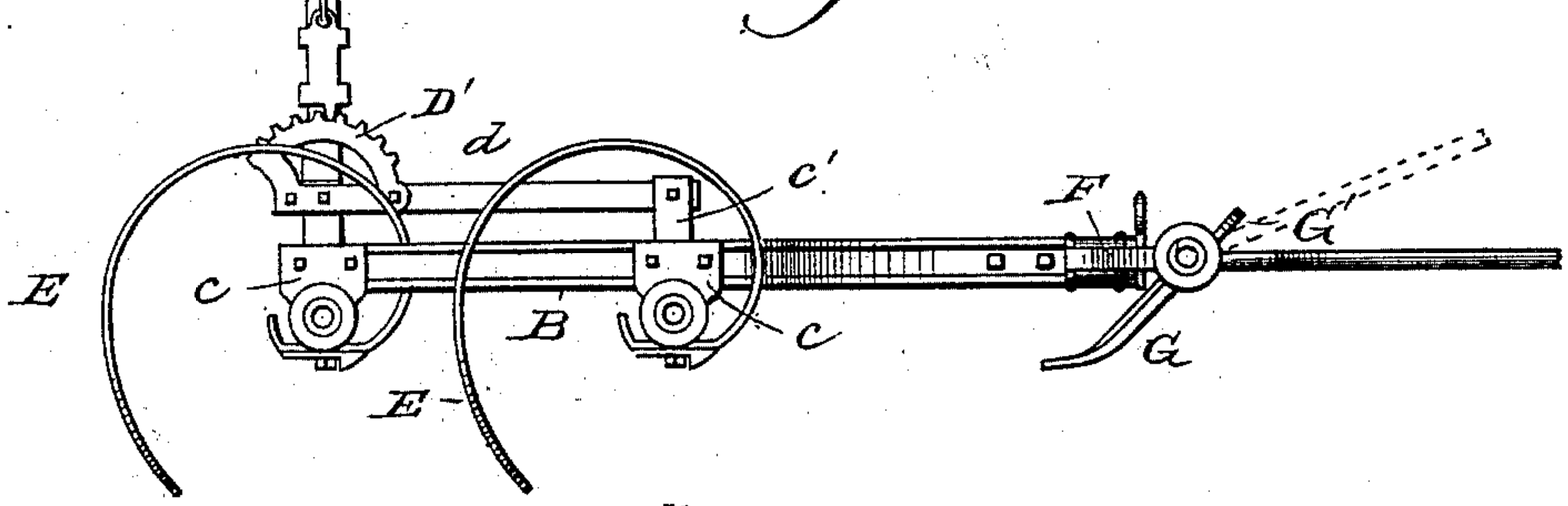
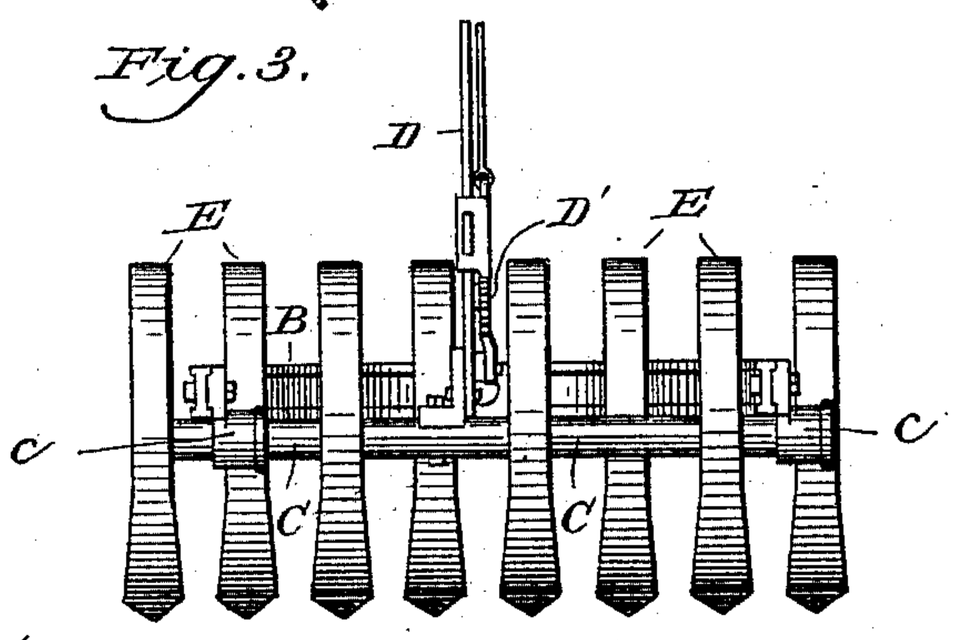


Fig. 3.



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(No Model.) 2 Sheets—Sheet 2.

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Fig. 4.

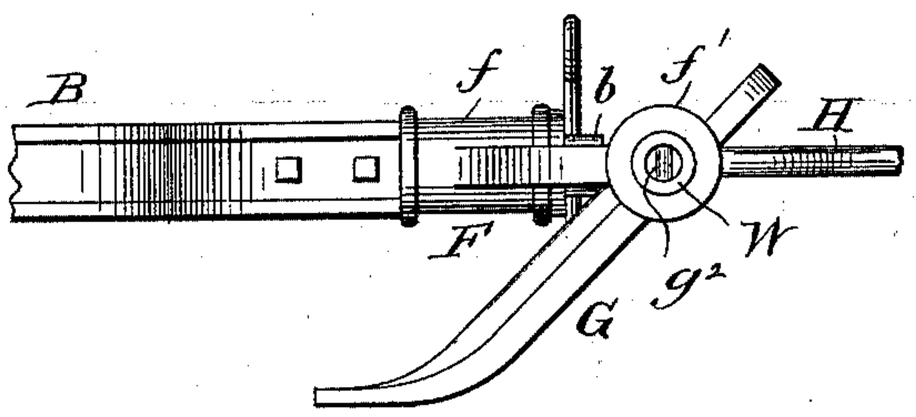

Fig. 5.

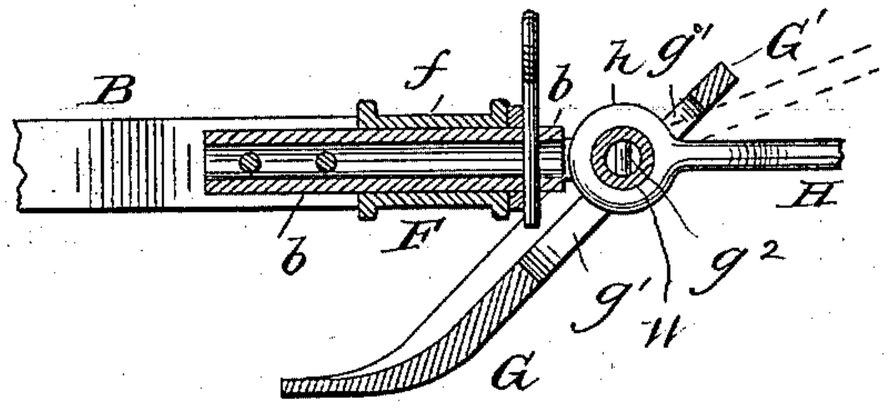

Fig. 6.

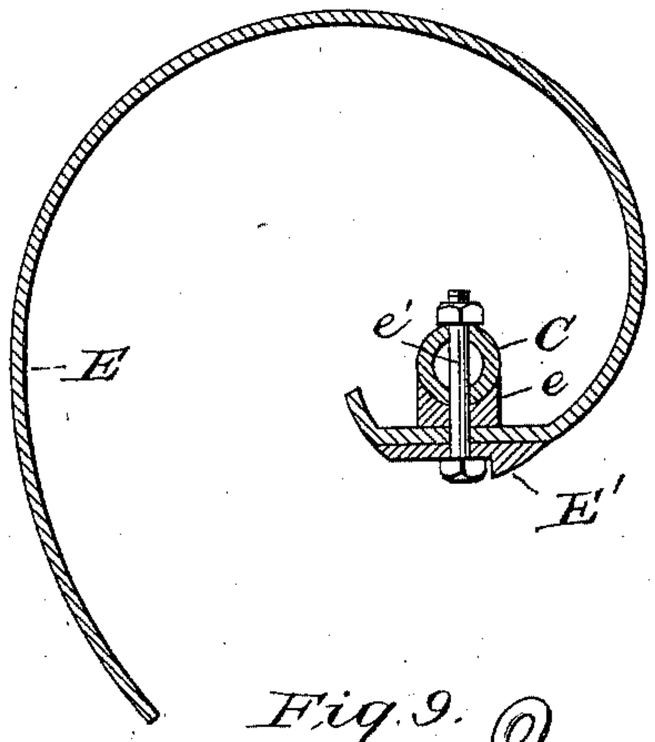

Fig. 7.

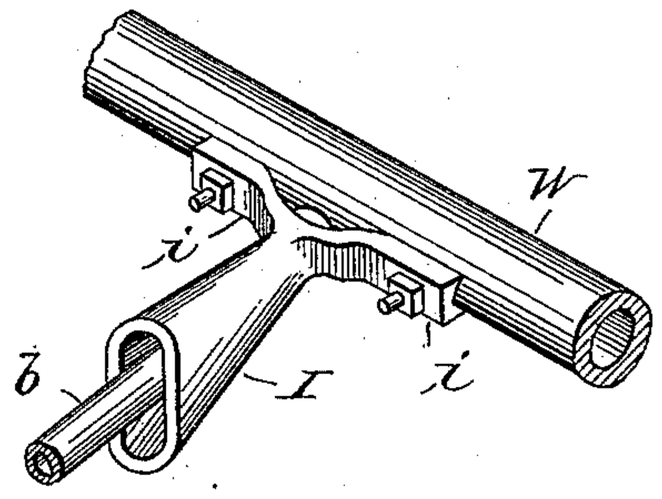

Fig. 8.

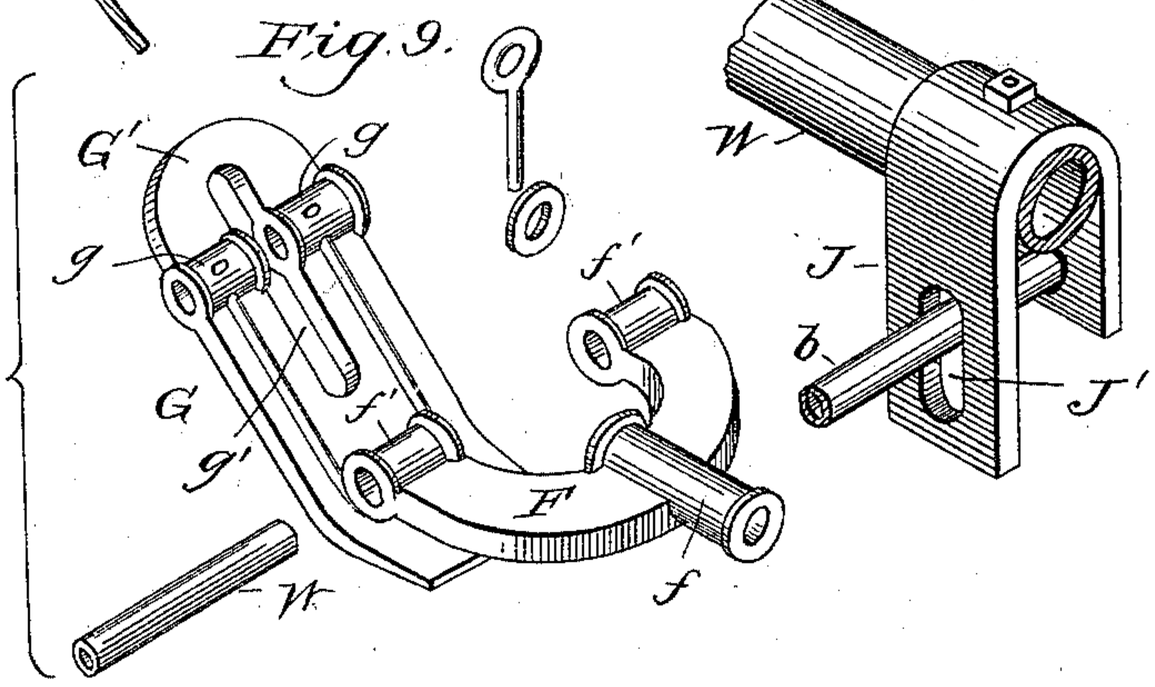

Fig. 9.

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JOHN I. HOKE, OF SOUTH BEND, INDIANA.

HARROW.

SPECIFICATION forming part of Letters Patent No. 509,434, dated November 28, 1893.

Application filed November 28, 1892. Serial No. 453,331. (No model.)

To all whom it may concern:

Be it known that I, JOHN I. HOKE, of South Bend, in the county of St. Joseph and State of Indiana, have invented certain new and useful Improvements in Harrows; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form part of this specification.

This invention is an improvement in harrows, and its objects are to make a sectional harrow, the members of which will be prevented from laterally moving or swinging, but will be capable of movement in a vertical direction and can also oscillate on their longitudinal horizontal axis so that they will readily adjust themselves to the surface of the ground, and can pass over obstructions without interfering with the adjustment or working of the adjoining section.

Another object is to improve the construction of the sections, each of which can be employed as a small independent harrow and will have separately adjustable or removable teeth, and also be provided with means for simultaneously adjusting all the teeth of a section. Also to provide improved connections between the sections and the draft bar.

The invention therefore consists in the novel construction and combination of parts making up the section; in the novel combination of the independent sections and draft bar; in the novel connections between the sections and bar, and in other novel details of construction hereinafter fully described and claimed.

Referring to the drawings by figures and letters;—Figure 1 represents a plan view of the complete harrow. Fig. 2 is an end view of one of the harrow sections. Fig. 3 is a rear view. Fig. 4 is an enlarged side view of the connections between the harrow sections and the draft bar. Fig. 5 is a longitudinal section through Fig. 4. Fig. 6 is a detail sectional view of the connection between a harrow tooth and its supporting bar. Figs. 7 and 8 are detail perspective views illustrating modified forms of connections between the harrow section and the draft bar. Fig. 9 is a detail.

The harrow is composed of a plurality of sections A, three being shown in the drawings, arranged end to end and each is attached at front by an independent yielding or swinging connection to the draft beam W. As shown each section is formed of side bars B, B, the front ends of which converge and are made into, or united to a shank *b* which is connected to the beam W as hereinafter described. The bars B, B, (preferably made of iron) are connected by tubular tooth-carrying shafts C, C, journaled in box-castings *c*, *c*, attached to bars B, B, at opposite points as shown. The shafts are connected by a lever D pivoted to an ear or arm C′ on the rear shaft and a link *d* pivoted to one end of lever D near arm C′ and at its other end to an arm *c*′ on the front end shaft.

A sector D′ is attached to the rear end of link *d*, and its teeth are engaged by a hand spring-catch *d*′ on lever D. By shifting lever D, therefore shafts C will be partly rotated in the castings *c*, and held stationary when catch *d*′ is engaged with sector D′, thus providing means for simultaneously adjusting the teeth.

A series of **C**-shaped spring harrow teeth E is attached to shaft C at intervals, and preferably so spaced that the teeth on the rear shaft stand intermediate those on the front shaft. The teeth are secured to the shaft by means of washers *e* which are concaved in one face to fit on the shafts and flat on the other face, the end of the harrow tooth being clamped between the flat face of the washer *e*, and a washer E′ by means of a bolt *e*′ which transfixes the washers, tooth and shaft as shown in Fig. 6. The lower face of washer E′ is longitudinally convex in front of the bolt to conform to the curvature of the tooth, to prevent its catching onto obstructions and to protect the tooth from wear. The head of bolt *e*′ is protected behind the enlarged front end of washer E′ so that it will not catch trash, &c., over which the washer may ride.

As shown in Figs. 1, 4 and 5 the sections are connected to beam W by means of **Y**-shaped castings F. The shank *f* of each casting F is tubular, and the shank *b* of a section is passed therethrough and confined therein by

a washer and pin as shown so that the section may freely rotate or oscillate in relation thereto. The ends of the bifurcations of castings F are formed into rings *f' f'* which are slipped loosely on beam W, said beam being preferably a metal tube. A shoe G is connected to the beam between the bifurcations of each casting F, said shoe having a tubular portion *g* through which the beam passes, and curving down from said portion beneath and under the casting F as shown. It also has a short upwardly and forwardly projecting portion G' and a longitudinal slot *g'* which extends through the tubular portion *g* and in part G' as shown. This slot *g'* accommodates the eye *h* of the draft rod H to which the single or double trees are attached.

The casting F, shoe G and eye *h*, are slipped together onto the beam, or the beam slipped therethrough after they are arranged in proper position, and then the shoe is fixed to the beam W by pins g^2 as shown, and the draft strain on rod H causes it to tilt shoe G downward and their curved ends bear on the ground and uplift the beam and castings from the ground. The castings F and eyes *h* are locked in position on the beam by shoes G, the eyes being embraced by the shoe, and the shoe by the casting. The castings being loose on the beam, permit their connected sections to swing up or down or rise and fall independently of the other sections, and by reason of the loose connection between the sections and casting F, the sections can oscillate laterally. I thus have a kind of universal or double swivel connection between the sections and beam which allows the sections to independently adjust themselves to inequalities of the surface over which they pass.

The making of a harrow out of sections which are independent of each other, and capable of up and down, oscillating, vibrating motion but without lateral play whereby they are self adjusting I consider one important feature of my invention, and the connections between the sections and draft beam may be of various forms and yet permit the desired self-adjustment of the harrows, and therefore I do not wish to limit myself to the connections F. For instance in Fig. 7 the shank *b* of a harrow section is passed through a vertically flattened bell-mouthed or conical tube I, the smaller end of which is provided with lateral arms *i, i*, by which it is bolted to the draft beam W. This connection permits the up and down and oscillatory movements of the harrow section. Also in Fig. 8, a clip J is bolted to the draft beam W and the shank *b* of a harrow section is passed through a vertical slot J' in the rear leg of the clip and through an opening in the front leg, by which connections the above movements of the sections are permitted.

It will be observed that in my harrow the several sections are entirely independent of each other and have no connections by cross stays or otherwise which would hinder their free self-adjusting movements, but are so connected as to prevent lateral swing or motion of the sections, while they are free to move vertically and to oscillate about a horizontal longitudinal axis.

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

1. In a harrow the combination of a single longitudinally arranged draft beam with independent disconnected harrow sections in rear thereof, and an independent double swivel joint connection between each section and beam whereby each section is permitted to move up and down and oscillate to adjust itself to inequalities of ground surface without lateral motion and without affecting adjoining sections, substantially as described.

2. The herein described harrow section formed of two side bars bent toward each other and connected by their front ends, the opposite castings secured to said bars having journal eyes below the bars, the transverse shafts journaled in said castings and also forming bonds between the side bars, the harrow teeth secured to said shafts, and the lever and link connections between said shafts whereby they may be simultaneously rocked, and the sector for locking said levers, all constructed and arranged to operate substantially as and for the purpose described.

3. The combination in a harrow of a single draft beam and independent disconnected harrow sections, each consisting of two parallel side bars converging and connected rigidly at their front ends to a swivel casting, a series of journal castings attached to said bars, rock shafts journaled in said castings, the teeth attached to said bars, and means for simultaneously rocking said shafts, with loose connections between said swivel casting and the draft beam whereby each section is permitted free movement without interference with an adjoining section, substantially as described.

4. In a harrow the combination of the beam, the harrow section loosely connected thereto, and the shoe G and the draft rod, strung on the beam and underlying the connection of the harrow section therewith substantially as set forth.

5. In a harrow the combination of the beam, the harrow section, the casting F swiveled to the section, and the shoe G hung on the beam and underlying casting F, all constructed and arranged to operate substantially as described.

6. In a harrow the combination of the harrow section, the draft beam, the bifurcated casting F loosely connected to and connecting the beam and section, the slotted shoe G strung on the beam intermediate the bifurcations of casting F, and the draft eye *h*, substantially as described.

7. In a harrow the combination with a harrow section and a draft beam, of the Y-shaped casting F connecting the beam and sections having rings on its bifurcations, and a longitudinal bore in its shank, the axis of the shank bore being at right angles to the axis of the rings, substantially as described.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

JOHN I. HOKE.

Witnesses:
JAMES DUSHANE,
GEO. P. ROSE.