(No Model.)

W. L. MARSHALL.

HARROW.

No. 587,011. Patented July 27, 1897.

Fig 2

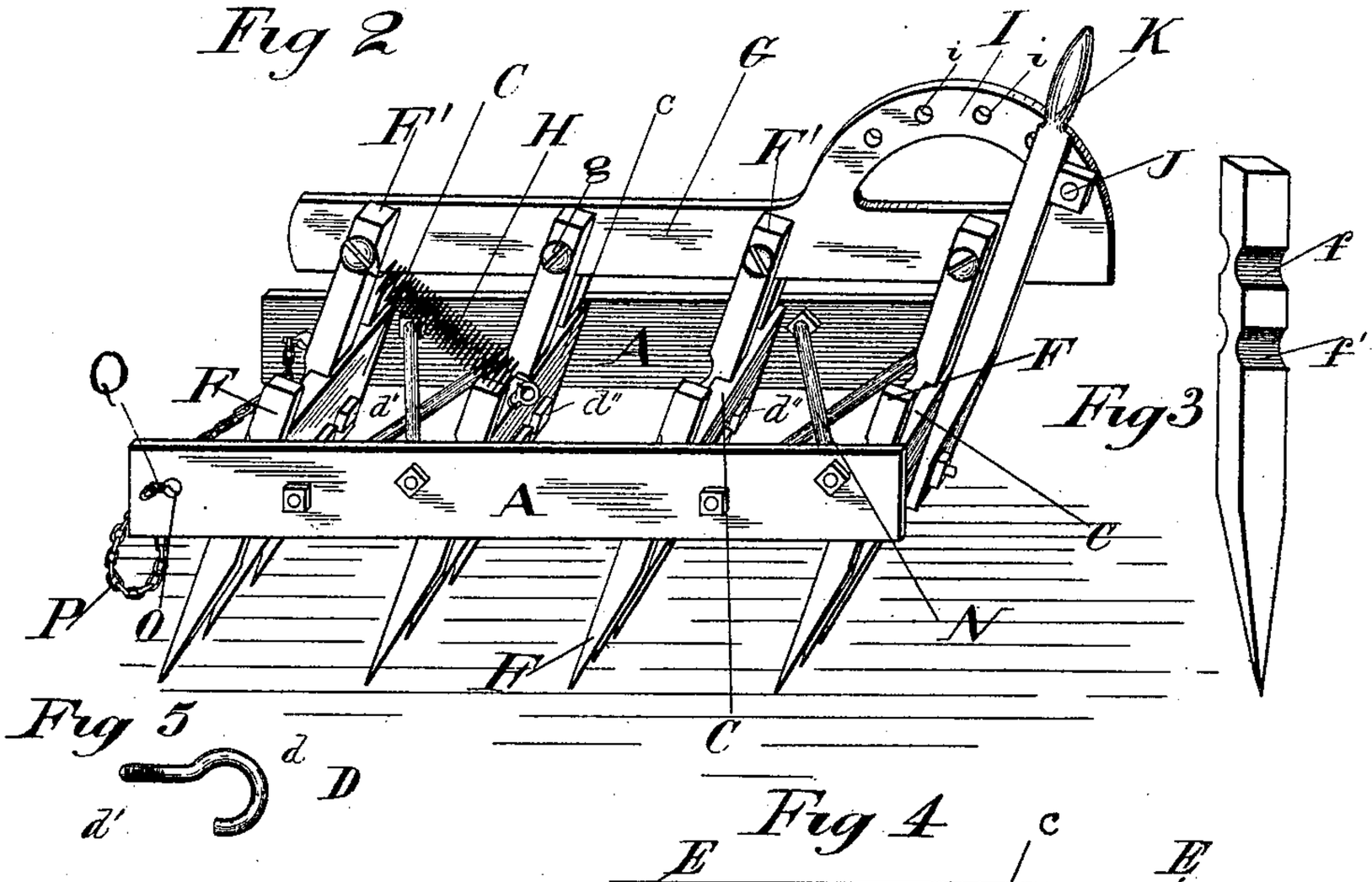


Fig 5

Fig 4

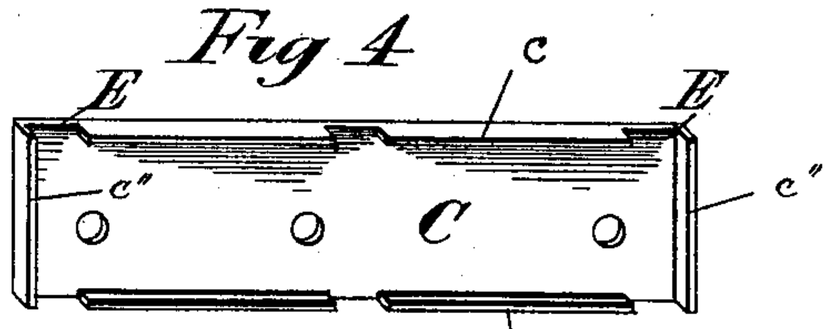
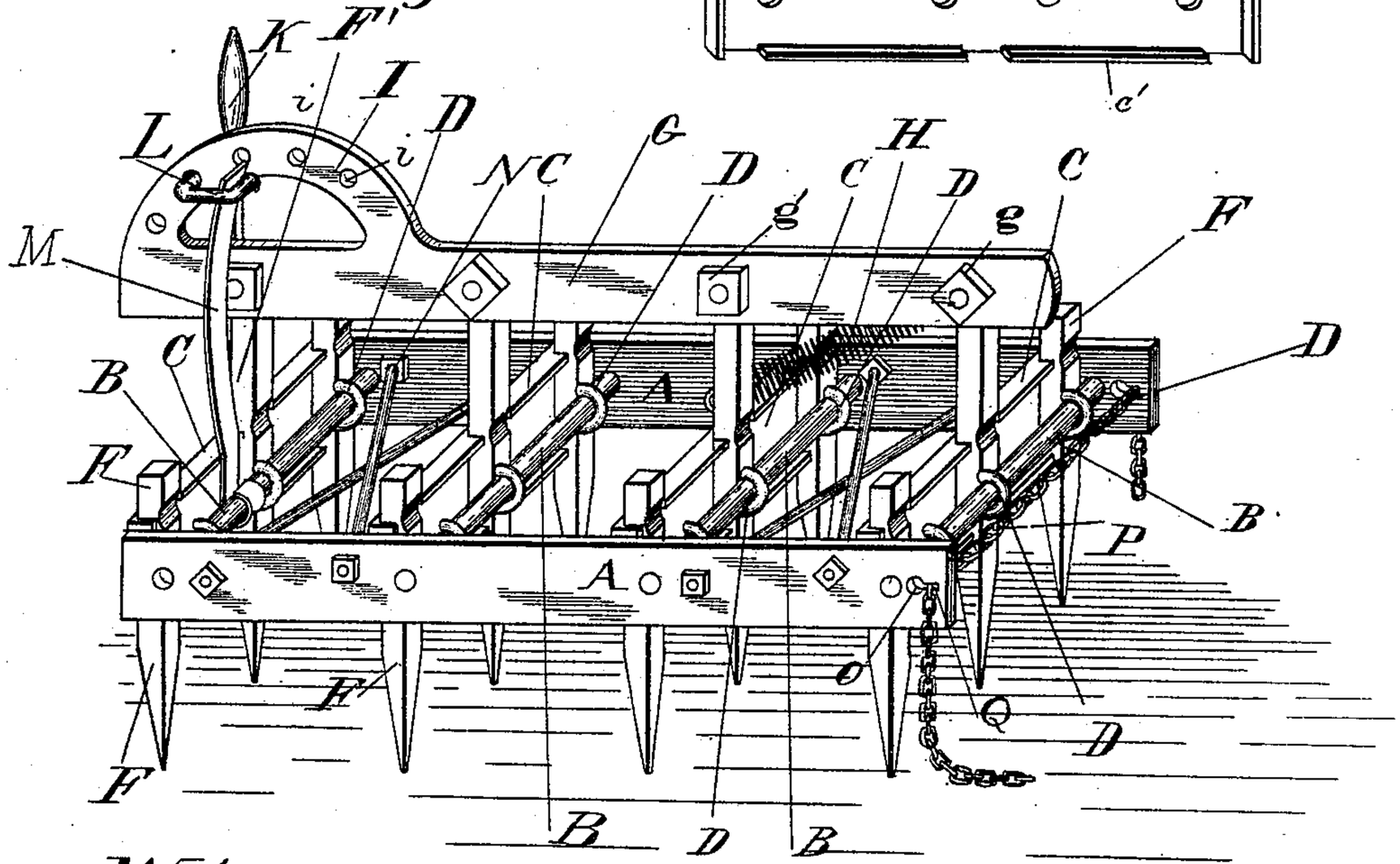


Fig 1



Witnesses

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UNITED STATES PATENT OFFICE.

WILLIAM L. MARSHALL, OF PORT PERRY, CANADA.

HARROW.

SPECIFICATION forming part of Letters Patent No. 587,011, dated July 27, 1897.

Application filed February 2, 1897. Serial No. 621,696. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM L. MARSHALL, of Port Perry, in the county and Province of Ontario, Canada, have invented certain new and useful Improvements in Harrows; and I hereby declare that the following is a full, clear, and exact description of the same.

This invention relates to a harrow comprised of one or more sections, and the primary object of the invention is to construct the harrow-sections so that the teeth of each section (while the implement is either stationary or in motion) can be readily set at any predetermined angle to the surface of the soil over which the implement may move or may be moving, and which will when they meet an obstruction unitedly tilt into a backward position and return automatically and unitedly to their normal position after passing it, and the secondary object of the invention is to provide each harrow-section with an independent connection with the doubletree to allow of each harrow-section being set at any predetermined angle to the advance of the implement; and the invention consists, essentially, of a harrow comprised of one or more sections, each section consisting of two side bars, a plurality of sets of harrow-teeth for each section, each set independently and rotatively connected to the side bars, a coupling-bar to cause the united movement of each set of springs to hold the harrow-teeth in their normal position when at work and to automatically return them to their normal position when relieved from any actuating force, the whole device being hereinafter more fully set forth and more particularly pointed out in the claims.

In the drawings, Figure 1 is a perspective view of a harrow-section, showing the harrow-teeth set perpendicular to the surface. Fig. 2 is a perspective view of the same section, looking at it from the opposite side and showing the harrow-teeth set at an inclination to the surface. Fig. 3 is a perspective view of one of the harrow-teeth. Fig. 4 is a perspective view of one of the clamping-bars for the harrow-teeth. Fig. 5 is a view of a clamping-bolt.

Like letters of reference refer to like parts throughout the specification and drawings.

A A represent the side bars of a harrow-section.

B B represent a series of four rock-shafts mounted in the side bars A A, parallel to and at equidistant points from each other.

C C represent a series of four clamping-bars, one adjacent to each of the rock-shafts B B. Each of the clamping-bars C C is equal in length to the distance between the side bars A A, and when the clamping-bars C C have been secured to their respective rock-shafts B B they are the means of keeping the side bars A A asunder. Each of the clamping-bars C is connected to its respective rock-shaft B by means of three bolts D D. Each of the bolts D D consists of a hook-shaped end *d*, encircling the rock-shaft, and a shank *d'*, extending through the clamping-bar and fitted with a nut *d''*. The top and bottom edges of the side of each of the clamping-bars C, adjacent to its respective rock-shaft, are provided with a flange *c* and *c'*, respectively, and each end of the said side is provided with a flange *c''*.

E E represent a series of seats formed in each of the flanges *c c'*, the seat E in the flange *c* being vertically above the seat E in the flange *c'*.

F F' represent the harrow-teeth of each set of a series of four sets. The harrow-teeth F F' of each set are located between their respective rock-shaft and clamping-bar, and each tooth is located in its respective seat E. Each of two opposite sides of each of the harrow-teeth is provided with two horizontal channels *f f'*. The channel of each tooth, when the teeth are in position, engages its respective rock-shaft, and by doing so the teeth are prevented from moving vertically when the clamping-pressure is upon them. The teeth F F of each set are located adjacent to the ends of their respective clamping-bars, the flanges *c''* at the ends of the clamping-bars preventing any side motion on the part of the teeth.

The purpose of forming the channels *f f'* in each of two opposite sides of the harrow-teeth is to permit of the teeth being reversed when found necessary to do so. The middle tooth F' of each set of harrow-teeth extends considerably above the top of its respective clamping-bar.

G represents a coupling-bar pivotally connected to each tooth F' of each set by means of pivot-bolts *g* and nuts *g'*, each pivot-bolt

passing through its respective tooth F′ and through the coupling-bar G.

The purpose of the coupling-bar G is to cause all of the teeth of the section to move in unison, either when tilting backward to clear an obstruction or when returning to their normal position after passing it.

H represents a spring connected to the top of the teeth F′ of the first set and to the clamping-bar C of the second set of harrow-teeth. I may employ any number of springs H, but I find that for light soil one spring is necessary, and for heavy soil, under ordinary conditions, it is not necessary to employ more than two springs, the second spring being attached to the hindmost clamping-bar C and to the tooth F′ of the second last set.

I represents a quadrant connected to the rear end of the top of the coupling-bar G. The quadrant I is provided with a series of holes *i*, adapted to receive a bolt J. Rigidly connected to the rearmost clamping-bar C is a lever K, which extends above the top of the quadrant I and the back of which is adapted to engage the bolt J. The tendency of the spring or springs H is to throw the coupling-bar G rearwardly and set the teeth F F′ at a forward inclination. To arrest the backward motion of the coupling-bar G, the bolt J is set to engage the back of the lever K at any predetermined portion of its backward stroke. The engagement of the lever K with the bolt J arrests the backward motion of the lever, and consequently the motion of the last set of harrow-teeth, and as all of the harrow-teeth move in unison the other sets will consequently be arrested. By setting the bolt J in the last hole *i* the harrow-teeth are given the forward inclination shown in Fig. 2, and by setting the bolt J in the second last hole *i* the harrow-teeth are brought into a vertical position or the position shown in Fig. 1. When the teeth meet with an obstruction, they are given a rearward inclination, and on passing the obstruction the springs H immediately return the teeth to their normal position. The bolt J extends through the quadrant I and is provided at its opposite side with a loop L.

M represents a flat spring or a series of flat springs, the lower end of which is coiled on the last rock-shaft B and the upper end of which extends through the loop L. The purpose of the springs M is to compensate the action of the spring or springs H. By shifting the loop L the force of the spring M can be increased or diminished. To rigidly unite and brace the side bars A A, I employ two crossed stay-bolts N at each side of the section, binding together the said side bars A A and holding in position the rock-shafts and their correlative parts.

O represents a hole formed in the front of each of the side bars A A, and P represents a chain located in the hole and adapted to be attached to the doubletree. Each end of the chain projects beyond its respective side bar A, and to hold the chain in position I find it advisable to fit each hole O with a forwardly-extending slot Q. Into each of the slots Q is adapted to enter one of the links of the drag-chain, which prevents any side movement on the part of the chain between the side bars A A.

When it is necessary to drag the sections parallel to the advance of the implement, both ends of the chain may be connected to the doubletree. When it is necessary to drag the sections at an angle, either end of the chain or any part of the chain between the side bars may be connected, throwing the section into a position at any desired angle to the advance of the implement.

The harrow-section can be reversed by changing the position of the springs H H.

By setting the harrow-teeth at a forward inclination they will penetrate the earth and collect any dirt that may be contained in it near the surface, and by arranging the teeth so that they can be tilted backward the dirt when gathered can be readily dumped and afterward collected.

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

1. A harrow-section consisting of side bars, a plurality of sets of harrow-teeth, independently and rotatively connected to the side bars, a coupling-bar to cause the united movement of each set, a spring to hold the harrow-teeth in their normal position, and to return them to their normal position after being actuated, a lever connected to one set of harrow-teeth, and a stop connected to the coupling-bar to arrest the motion of the lever, substantially as specified.

2. A harrow-section consisting of side bars, a plurality of sets of harrow-teeth, independently and rotatively connected to the side bars, a coupling-bar to cause the united movement of each set of teeth, a lever connected to one set of teeth, and a stop connected to the coupling-bar to arrest the movement of the lever, substantially as specified.

3. A harrow-section consisting of rigid side bars, a plurality of rock-shafts journaled in the side bars, a flanged clamping-bar adjacent to each rock-shaft, a plurality of teeth located between each rock-shaft and its adjacent clamping-bar, a coupling-bar connected to each set of teeth, a spring connected to the coupling-bar and to one of the clamping-bars, a lever connected to one set of teeth, and a stop connected to the coupling-bar to arrest the movement of the lever, substantially as specified.

4. In a harrow-section the combination of the side bars A, A, the rock-shafts B, B, journaled in the side bars, a clamping-bar C, C, for each rock-shaft, having flanges *c*, *c*′, the seats E formed in the flanges *c*, *c*′, the harrow-teeth F, F′ located between the rock-shafts and clamping-bars and in the seats E, a coupling-bar G connected to the harrow-teeth F′,

a spring H connected to the coupling-bar G, and to one of the clamping-bars, a quadrant I connected to the coupling-bar, a lever K connected to one of the clamping-bars, an adjustable stop J connected to the quadrant to arrest the motion of the lever, a spring M connected to one of the rock-shafts and to the coupling-bar, to compensate the action of the spring H, substantially as specified.

5. In a harrow-section the combination of the side bars A, A, the rock-shafts B, B, journaled in the side bars, a clamping-bar C, C, for each rock-shaft, having flanges *c*, *c'*, the seats E formed in the flanges *c*, *c'*, the harrow-teeth F, F' located between the rock-shafts and clamping-bars and in the seats E, a coupling-bar G connected to the harrow-teeth F', a spring H connected to the coupling-bar G, and to one of the clamping-bars, a quadrant I connected to the coupling-bar, a lever K connected to one of the clamping-bars, an adjustable stop J connected to the quadrant to arrest the motion of the lever, a spring M connected to one of the rock-shafts and to the coupling-bar, to compensate the action of the spring H, and a chain connected to the front of the side bars, and adapted to be attached to the doubletree, substantially as specified.

Toronto, January 14, A. D. 1897.

WM. L. MARSHALL.

In presence of—

M. A. WESTWOOD,
C. H. RICHES.