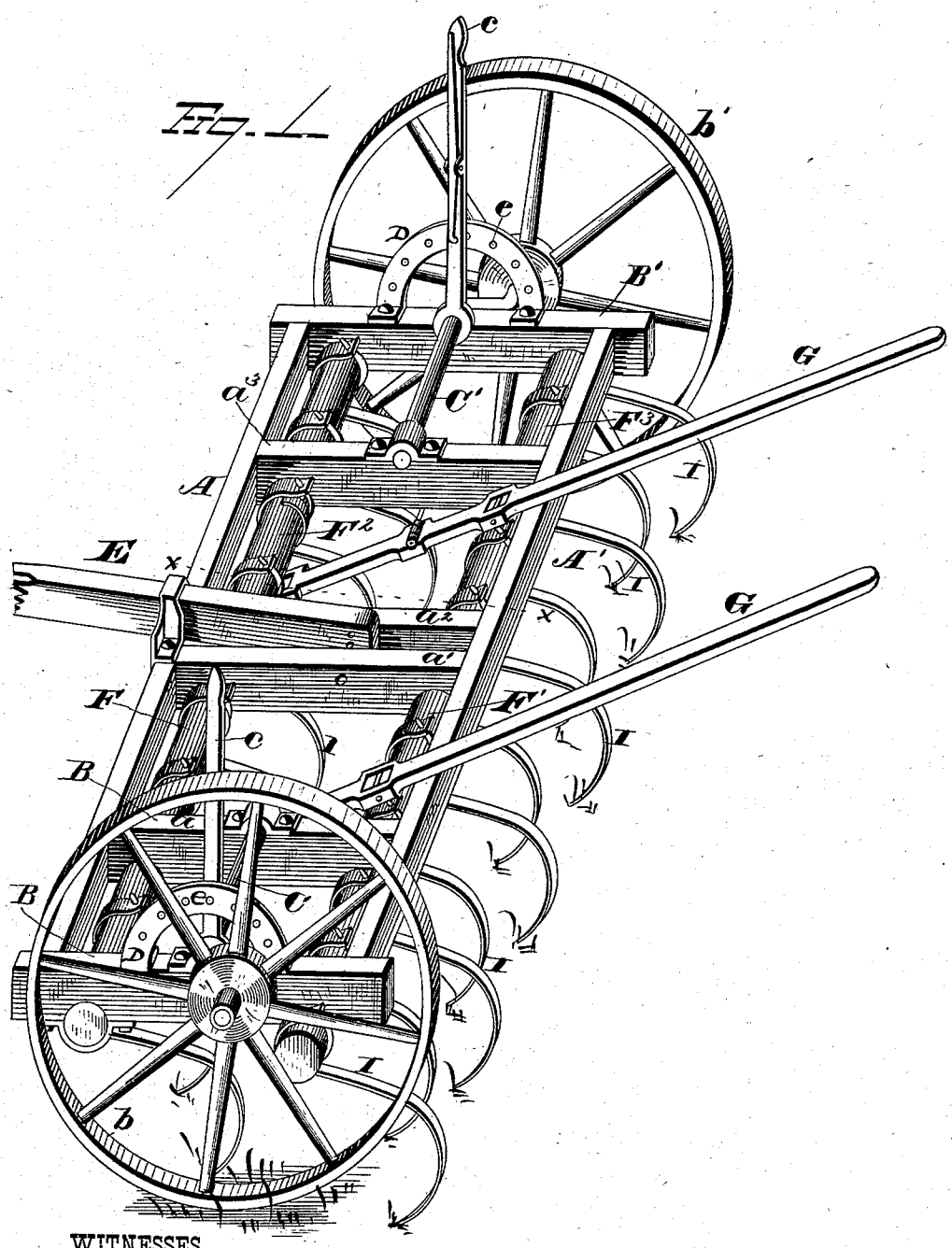
(Model.) 2 Sheets—Sheet 1.

C. MURRAY.

WHEEL HARROW.

No. 255,006. Patented Mar. 14, 1882.

Fig. 1.



WITNESSES

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(Model.)

2 Sheets—Sheet 2.

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WHEEL-HARROW.

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Fig. 2.

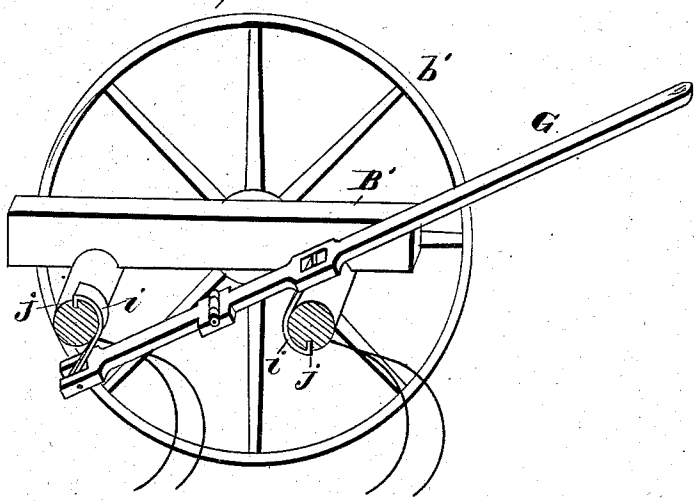


Fig. 3.

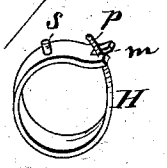


Fig. 4.

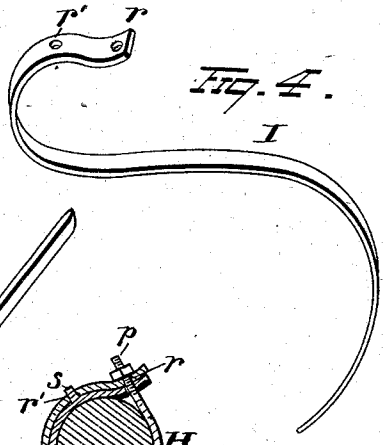


Fig. 5.

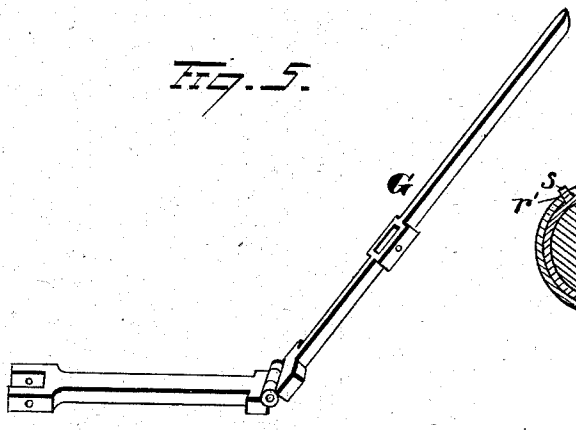
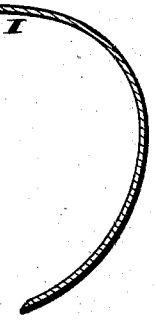


Fig. 6.



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UNITED STATES PATENT OFFICE.

CRAIG MURRAY, OF VICKSBURG, ASSIGNOR TO SPENCER J. WING, OF SCHOOLCRAFT, MICHIGAN.

WHEEL-HARROW.

SPECIFICATION forming part of Letters Patent No. 255,006, dated March 14, 1882.

Application filed February 10, 1881. (Model.)

To all whom it may concern:

Be it known that I, CRAIG MURRAY, of Vicksburg, in the county of Kalamazoo and State of Michigan, have invented certain new and useful Improvements in Wheel-Harrows; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use it, reference being had to the accompanying drawings, which form part of this specification.

My invention relates to an improvement in wheel-harrows, the object of the same being to provide a wheel-harrow of such construction that the rock-shafts to which the teeth are attached may be divided into two or more sections, each section consisting of two or more rock-shafts, connected by suitable mechanism in such a manner that each section can rock or rotate independent of the other; also, to provide means whereby the teeth shall be self-regulating, being controlled and operated so as to cause the teeth to be adjusted to the inequalities of the surface of the ground; also, to provide means whereby the rock-shafts are free to rock backward or forward when locked in working position, thus leaving the teeth free to operate up and down in a line parallel to the surface of the ground, yet held firmly therein by the operating force of one upon the other; also, to provide means whereby the operator can, while either riding or walking, throw into or out of engagement with the ground either or both sections of the rocking shafts without stopping the machine; and a further object is to provide means for fastening the teeth to the rock-shafts without weakening the same, and allowing of any adjustment thereon without being removed; and with these ends in view my invention consists in certain details in construction and combinations of parts, as will be more fully explained, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a view in perspective of my improved harrow. Fig. 2 is a vertical section taken through the lines *x x* of Fig. 1. Fig. 3 is a view of the clip for securing the harrow-tooth to the rock-shaft. Fig. 4 is a view of the harrow-tooth. Fig. 5 is a view of the combined operating-lever and connecting-rod, and Fig. 6 is a vertical section of one of the harrow-teeth secured to its rock-shaft.

The harrow-frame is composed of the front and rear beams, A A′, end beams, B B′, and braces *a*, *a′*, a^2, and a^3, which latter are secured between the front and rear beams, A A′, in any desired manner. The end beams, B B′, together with the braces *a* and a^3, support the short crank-axles C C′, on which are journaled the carrying-wheels *b b′*. These crank-axles are provided with handles *c*, having spring-pressed pawls attached thereto, which engage with perforations *e* in the sector-bar D, fixed upon the frame. By means of this construction the harrow-frame can be raised or lowered at will, thereby holding the teeth above the surface of the ground or lowering them to an operative position; or either side of the frame can be raised or lowered to suit any unevenness of the ground.

E is the draft-pole, which passes through a collar secured to the front beam, A, and is pivotally secured therein by a pin passing through the collar and pole. The inner end of the pole is perforated, and is secured between the braces $a' a^2$ by a bolt passing through said braces and perforation, and held in position by a nut. By this means the pole is adjusted as required.

F F′ F^2 F^3 represent respectively the rock-shafts, which are arranged transversely to the line of draft, each section being free to operate independently of the other. These sections—two in the present instance—are arranged one on each side of the draft-pole, and consist of the front and rear rock-shafts, F F′, composing one section and rock shafts F^2 and F^3 the other section. These sections are arranged to operate simultaneously and independently of each other, so that in passing over an obstruction on one side of the harrow that side can be elevated without changing the position of the other.

H are clips or collars, made of spring metal, which are adapted to fit around the rock-shafts

F F' F² F³, and are secured thereto by the screw-threaded end *p*, passing around the rock-shaft and up through the open slot *m*, formed in the opposite end of the clip. To the upper side of the clip or collar H is connected a bolt, *s*, in any desired manner.

The spring-metal harrow-teeth I are formed to encircle the forward part of collar H, and are then curved downwardly, then rearwardly, and then downwardly again, so that a sufficient length of spring shall be located at the rear of the rock-shaft to allow the spring to yield vertically and ride over any small obstructions or obstacles without interfering with the operation of any of the other teeth; but in the event that any obstruction of such size or height is encountered as might injure or break the teeth the latter may be readily raised to ride over such obstruction without injury thereto. The upper ends of the teeth are provided with two holes, *r r'*, adapted to register with the screw-threaded end of the clip *p* and the bolt *s* on its upper side and be secured in place by nuts.

The above construction allows the teeth that have been broken or worn to be replaced without removing the clip from the rock-shaft. So also can the teeth be adjusted on the rock-shafts to allow greater penetration in light soil without altering the height of the frame by simply unloosening the nut on the end of the clip and turning the clips and teeth until in the required position, when they can be secured by the nut.

The rock-shafts composing each section are connected by means of the spring-arms *i* and combined hand-lever and connecting-rod G. These spring-arms are bent as shown in the drawings, and have a shoulder, *j*, formed on one end thereof, which fits in a mortise in the rock-shaft. The spring-arm *i* on the front shaft is connected therewith on top, and then curved around the rear side, and extended below, while the arm on the rear shaft is attached on the under side, and curves around the front and extends above the shaft. The free ends of these arms are then connected to the combined lever and connecting-rod G, by which the shafts are oscillated. The combined lever and connecting-rod is composed of two parts connected by a hinge-joint, which is situated between the rock-shafts composing one section, and is arranged obliquely to the frame of the harrow, the lower end thereof lying below the front rock-shaft and connected to the spring-arm *i* in any suitable manner, and the spring-arm on the rear rock-shaft being connected to the lever just above the rock-shaft in the same manner. The hinge before referred to lies between the rock-shafts, and is adapted to open downward by elevating the rear end of the combined lever and connecting-rod, which partly revolves the rock-shafts and elevates the teeth without changing the position of the frame. It is evident that this result can be accomplished in many different ways—such, for instance, as transposing the arrangement of the spring-arms and lever—that is, having the spring arm of the front shaft extend above the same and the spring-arm on the rear shaft below the same and connected by the lever with its handle end in front of the machine. Again, this same result could be accomplished with gear-wheels between the rock-shafts capable of being operated by a lever and numerous ways resorted to for accomplishing the same result.

The teeth can be operated from the driver's seat on the frame or from behind by simply elevating the outer end of the lever, which allows the teeth to become disengaged from the ground and ride above the surface thereof. The rock-shafts are free to rock or rotate, when in locked working position, either backward or forward, and all resistance offered to the teeth on the front rock-shaft is transmitted to the rear shaft through the medium of the combined lever and connecting-rod, and equalizes the pressure on the teeth.

Any undue pressure exerted upon the spring-metal teeth of either the forward or rear sections of the rock-shafts, owing to the teeth striking an obstruction, will operate to lift them out of the ground, so as to ride over such obstruction. Again, the force that tends to draw the teeth into the soil will be equalized between the front and rear rock-shafts of each section, and thus cause the teeth to sustain equal wear and further produce uniform work in breaking up and pulverizing the soil.

It is evident that slight changes in the construction may be resorted to without departing from the spirit of my invention; and hence I would have it understood that I do not limit myself to the exact construction shown and described; but,

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

1. In a wheel harrow, the combination, with a rigid frame supported at opposite ends by carrying-wheels, of independent series of rollers or rock-shafts journaled in the supporting-frame at opposite sides of its transverse center, whereby the series of rollers at opposite sides of the supporting-frame may be operated independently of each other, said rollers or rock-shafts having spring-metal teeth secured thereto, and connecting-rods pivotally connected to the rock-shafts of each series, said connecting-rods being jointed at a point between said rock-shafts or rollers, substantially as set forth.

2. In a wheel-harrow, the combination, with a rigid frame supported at opposite ends by carrying-wheels, of rock-shafts provided with spring-metal teeth, said rock-shafts being journaled in the rigid frame, and connecting-rods attached to two of said rock-shafts, said connecting-rods being jointed at a point between the rock-shafts, the joint constructed to cause the connecting-rod to operate as a rigid rod

when subjected to end pressure, and to fold when either end of the connecting-rod is raised, substantially as set forth.

3. In a wheel-harrow, the combination, with a rigid frame supported at opposite ends by carrying-wheels, of rock-shafts journaled in the rigid frame, and connecting-rods attached to said rock-shafts, said connecting-rods being each provided with a joint located between the rock-shafts, said joint allowing the two portions of the connecting-rod to be depressed and preventing said parts from yielding in an upward direction, the rear portion of the connecting-rod being formed with a handle, substantially as set forth.

4. In a wheel-harrow, the combination, with independent rock-shafts having spring-metal teeth secured thereto, of a combined connecting-rod and operating-lever located above one rock-shaft and below the other and attached to said rock-shafts by means of spring-metal arms, substantially as set forth.

5. In a wheel-harrow, the combination, with a rigid frame supported at opposite ends by carrying-wheels, of rock-shafts provided with spring-metal teeth, and a connecting-rod attached to the under side of one rock-shaft and the upper side of the other, said connecting-rod being provided with a joint between the two rock-shafts, substantially as set forth.

6. The combination, with a tooth-supporting bar, of a circular harrow-tooth-fastening clip completely encircling the bar and provided with fastening devices on its opposite ends, whereby it may be drawn tightly around the bar and secured thereto in any desired rotary adjustment, substantially as set forth.

7. The combination, with a tooth-supporting bar, of a harrow-tooth-fastening clip constructed to completely encircle the bar, one end of said clip being screw-threaded and the other provided with an open slot, and a nut for drawing the clip tightly around the tooth-supporting bar, substantially as set forth.

In testimony that I claim the foregoing I have hereunto set my hand.

CRAIG MURRAY.

Witnesses:
A. E. CORBISHLEY,
C. E. BAILEY.