S. SMITH.
Rotary Harrow and Cultivator.

No. 210,437. **Patented Dec. 3, 1878.**

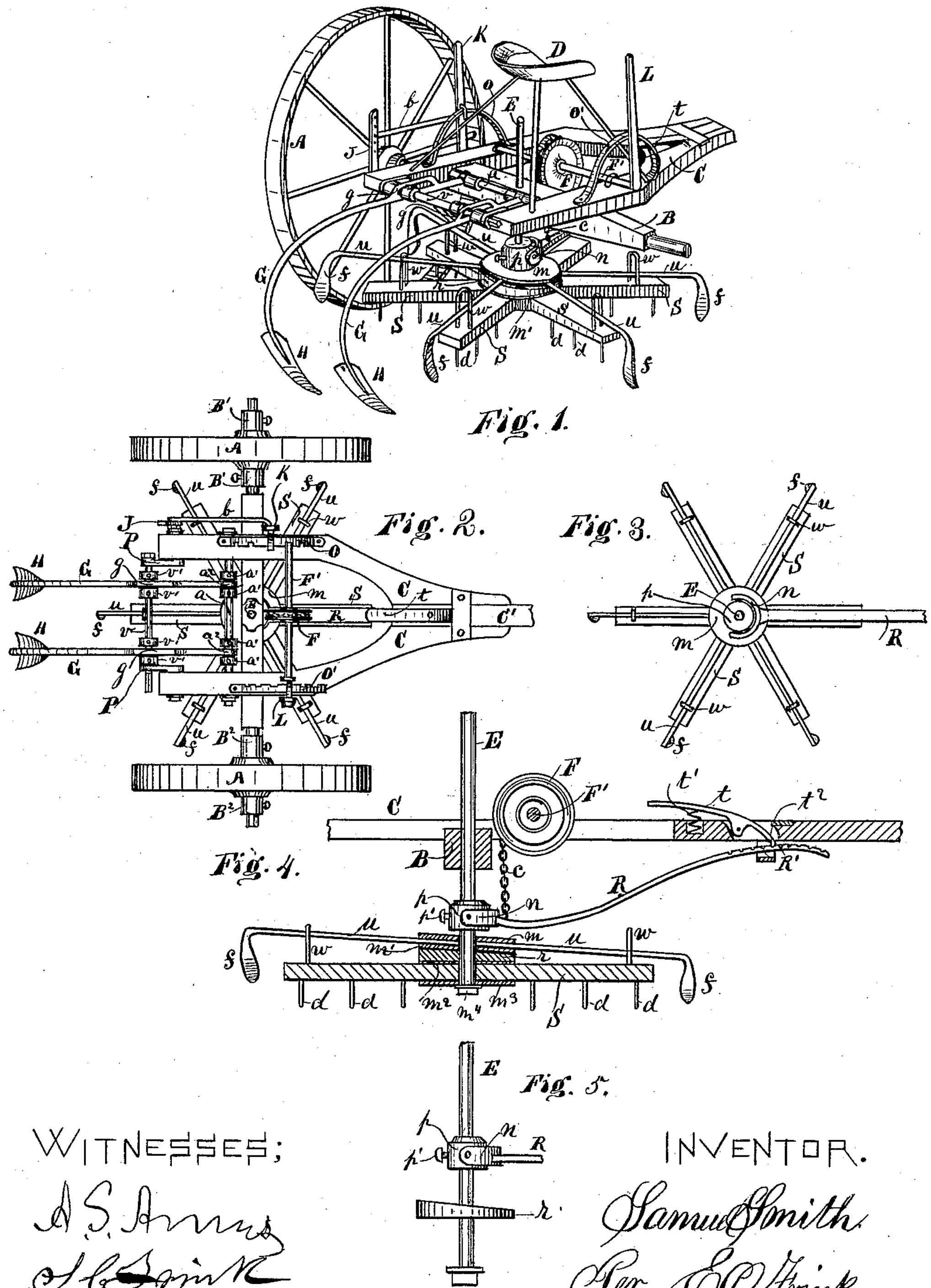

Fig. 1. Fig. 2. Fig. 3. Fig. 4. Fig. 5.

WITNESSES;

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SAMUEL SMITH, OF MABELVALE, ASSIGNOR TO HIMSELF AND DUDLEY E. JONES, OF LITTLE ROCK, ARKANSAS.

IMPROVEMENT IN ROTARY HARROW AND CULTIVATOR.

Specification forming part of Letters Patent No. **210,437**, dated December 3, 1878; application filed June 4, 1878.

To all whom it may concern:

Be it known that I, SAMUEL SMITH, of Mabelvale, in the county of Pulaski and State of Arkansas, have invented a new and Improved Rotary Harrow and Cultivator Combined, of which the following is a description, reference being had to the accompanying drawing.

My invention relates to a cultivator to be worked in combination with a harrow, both under one mechanical organization and in one machine.

The object of my invention is to cultivate plowed ground and harrow it at the same time, and, if wished, to also mark or lay off the land into rows for planting at the same time that it is harrowed.

My invention consists, mainly, in the new construction, arrangement, and application of devices, also in the new combination of elements, all of which, singly or combined, are deemed essential in my newly-organized combined rotary harrow and cultivator, whereby new and useful results are produced, as will be hereinafter fully described and set forth.

In the accompanying drawing, in which like letters of reference in the different figures indicate like parts—

Figure 1 is a perspective view of my newly-organized machine, with one wheel removed, in order to show the arrangement of parts more fully. Fig. 2 is a plan view of the same. Fig. 3 is a plan view of the rotary harrow detached from the machine. Fig. 4 is a sectional view of the rotary harrow, showing its operating mechanism; and Fig. 5 is an elevation of the harrow-shaft, showing the parts that are rigidly attached thereto.

B represents the axle-tree, having at each end long spindles, on which the wheels A A operate, and are made adjustable on the spindles by means of the set-collars B^1 B^1 B^2 B^2, for the purpose of allowing said wheels to be adjusted in width apart to suit the rows of corn or any other mark. On said axle-tree is also mounted the frame C C. The parts that are secured to the axle are parallel, and in front they converge so as to receive the draft-pole C^1. In the center of the axle B is a vertical hole or socket, in which the perpendicular harrow-shaft E operates vertically. The shaft E, Fig. 5, is provided with an adjustable collar, *p*, which is held at any desired position by the set-screw *p'*. Below said adjustable collar is another collar or annular disk, *r*, which is rigidly attached to said shaft, and its upper face is beveled so that one edge shall be thick, and the edge diametrically opposite thin, as shown. Below this collar *r* is a washer and nut, m^4. The revolving harrow may be constructed with six or more arms, S, radiating from a central hub, which is provided with annular plates or washers m^2 above and m^3 below, and harrow-teeth *d*, as shown in Fig. 4. The upper plate, m^2, when the harrow is adjusted on the shaft E, forms a washer between said harrow and the bottom of the beveled collar *r*, and the harrow is held on the shaft by the washer and nut m^4, below the plate m^3, in such a manner as to permit the harrow to revolve freely on said shaft. Between the beveled collar *r* and the adjustable collar *p* is another set of revolving arms, *u u*, which are secured to the central-hub collars, *m* m^1, and radiate therefrom to correspond with the harrow-arms S. Each harrow-arm S is provided with a stirrup, *w*, in which the arms *u u* are inserted. These stirrups act as dogs to revolve the upper set of arms *u u*, and the stationary beveled collar causes said arms to rise and fall in the stirrups as the harrow revolves. Each arm *u* is provided at its ends with curved drag points or shovels *f*, as shown. The beveled collar *r* is adjusted so that its thin side shall be at or near a right angle to the line of draft; and as the harrow moves forward the drag-shovels *f*, at the ends of the arms *u*, are constantly falling, with said arms, on the low side of the beveled collar *r*, and enter the ground, causing the harrow to revolve. The drag-shovels *f* leave the ground alternately as they are revolved, with the harrow, to the high side of the beveled washer, as shown in Fig. 4. The opening or space between the harrow and upper set of revolving arms *u u* is wide enough to permit roots and other trash to pass without causing any impediment to the working of the harrow.

The adjustable collar *p* is provided with a

direct-draft bar or brace, R, which is adjustable, and attached to said collar by a forked swivel-joint, *n*. This draft bar or brace extends forward under the frame C, and is furnished with a series of catches or ratchets, R′, on its upper surface, which engage with pawl end t^2 of the foot-lever *t*, and held in contact therewith by the spring t^1 until released by pressure from the foot of the operator, which will be hereinafter described.

The shaft F′ is mounted in suitable bearings attached to the parallel parts of the frame C C, and is provided with a lever, L, at one end, which operates in a notched quadrant, O′. The shaft F′ is also provided with a sheave-wheel, F, to which is attached one end of a chain, *c*. The other end of said chain is attached to the draft bar or brace R in such a manner that the harrow and shaft E can be raised or lowered by the lever L, and held at any desired elevation by the notched quadrant O′.

It will be seen from the foregoing that when the harrow is raised the draft bar or brace R is thrust forward, and the foot-lever pawl t^2 engages with the ratchet-teeth R′ and holds it there. If the harrow is to be lowered the foot-lever *t* must be pressed down, in order to release the pawl t^2 from the said ratchets. At the same time the lever L is operated to lower the shaft E.

It will also be observed that the draft-bar R, engaging with the foot-lever pawl t^2, forms a brace to the harrow-shaft E, and prevents it from being bent by contact of the harrow-teeth with the ground or other obstacles; also, that the harrow can be regulated up or down, as desired; also, that the drag-shovels *f*, on the revolving arms *u*, enter the ground at or near a right angle to the line of draft, and cause the harrow to revolve; and that said drag-shovels *f* leave the ground at a point diametrically opposite that to which they enter the ground, thus leaving the harrow free to revolve whenever a forward motion is imparted thereto.

The cultivator-shovels or plows H H are attached to curved or straight plow-beams G G, each beam having an eye at its other end, through which the shaft *a* is inserted, with adjustable collars *a′ a′ a′ a′* at each side. Said shaft *a* may be secured to the frame C C at various distances from the axle B by adjustable boxes.

The crank-shaft *v* is attached to the cranks P P, which are mounted in suitable boxes attached to the rear end of the frame C C, and is provided with a lever-arm, J, and connected with the operating-lever K by the rod *b*. The lever K operates in a notched quadrant, O, as shown.

Each plow-beam G is provided with a slot, *g*, through which the crank-shaft *v* operates, and allows the crank-shaft to slide therein as the shovels or plows H H are raised or lowered, with no strain upon the shaft other than that necessary to hold the plows up out of the ground. The crank-shaft *v* is also provided with collars *v′ v′ v′ v′*, which are on each side of the plow-beams and prevent lateral motion thereto.

It will be seen from the foregoing that the machine can be used as a harrow, or a harrow and plow, or cultivator, or either of them singly, and in harrowing corn-ground before it is laid off or marked off for planting. The harrow will smooth the ground, and the plows will lay off the land at any desired width, because every plow-beam is adjustable on the shaft *a* and crank-shaft *v*, and as many plows as may be desired can be used.

When it is necessary to dispense with the harrow, it can be removed by raising the frame C and detaching the chain *c*, when the shaft E will drop out of the axle B, and the machine can then be used as a plow or cultivator for corn or cotton, and the plows can be adjusted so as to plow on either side of a row of corn, or on both sides, using any ordinary plow used for cultivating, from a bull-tongue to a turning-plow, which are attached to the slotted beams G G.

Where there is heavy plowing to be done and no harrowing, the shaft *a* should be adjusted close to the axle B, so as to get the plows as close as possible to the axle, and make a lighter draft.

It is obvious that a corn or cotton planter or seed-sower can be attached to my improved machine, and made to operate by either cranks, cog-gearing, or other usual operating devices, and the machine can be adapted to sled-runners instead of wheels.

The seat D is supported by suitable standards attached to the frame C, as shown.

What I claim as new is—

1. In a revolving harrow, the vertically-adjustable shaft E, with beveled disk or collar *r* rigidly attached thereto, and adjustable collar *p*, in combination with a revolving harrow, S, having stirrups *w* and upper set of revolving arms *u*, with drag-teeth or shovels *f*, whereby the harrow receives a rotary motion, in the manner and for the purpose substantially as shown and described.

2. In a rotary harrow, the vertically-adjustable shaft E, with rigidly-attached bevel collar *r* and adjustable collar *p*, in the manner and for the purpose substantially as shown and described.

3. In a rotary harrow, the vertical adjustable shaft E, with collar *p*, in combination with the draft bar or brace R, with catches or ratchet-teeth R′, and the foot-lever and pawl $t\,t^2$, in the manner and for the purpose substantially as shown and described.

4. In a rotary harrow, the vertically-adjustable harrow-shaft E, with beveled collar *r*, rigidly attached, and adjustable collar *p*, with draft bar or brace R, the chain *c*, sheave F, shaft F′, and lever L, in the manner and for the purpose substantially as shown and described.

5. In a rotary harrow, the combination of the foot-lever *t* with pawl t^2 and spring t^1, the

adjustable draft bar or brace R, with catches or ratchet-teeth R′, and swivel-joint *n*, the adjustable collar *p*, and vertically-adjustable shaft E, whereby the said shaft is braced and prevented from bending as the revolving harrow-teeth engage with the ground, in the manner and for the purpose substantially as shown and described.

6. In a rotary harrow, the combination of a vertically-adjustable shaft, E, with beveled collar *r*, having a revolving harrow below said collar and a revolving set of drag-pointed arms, *u*, above, whereby a revolving motion is imparted to said harrow as the drags *f* enter and leave the ground, in the manner and for the purpose substantially as shown and described.

7. In a revolving harrow, the harrow-arms S, provided with stirrups *w*, in combination with the revolving drag-pointed arms *u*, whereby said drag-arms are revolved with the harrow-arms, in the manner and for the purpose substantially as shown and described.

8. In a revolving harrow, the upper set of revolving arms, *u*, provided with drag points or shovels *f*, and secured to a central hub, *m* *m*′, and adapted to be operated by a beveled collar, *r*, on the vertically-adjustable shaft E, whereby said drag-points are raised and lowered as they revolve on said collar *r*, in the manner and for the purpose substantially as shown and described.

9. In combination with a revolving harrow provided with an upper set of revolving arms, *u* *u*, and drag points or teeth *f*, the adjustable shaft *a*, with adjustable collars *a*′ *a*′ *a*′ *a*′, and plow-beams G, provided with slots *g*, and plows H, operated to be raised and lowered by the crank-shaft *v*, levers J and K, and connecting-rod *b*, in the manner and for the purpose substantially as shown and described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

SAMUEL SMITH.

Witnesses:
W. H. BOOKER,
M. H. EASTMAN.