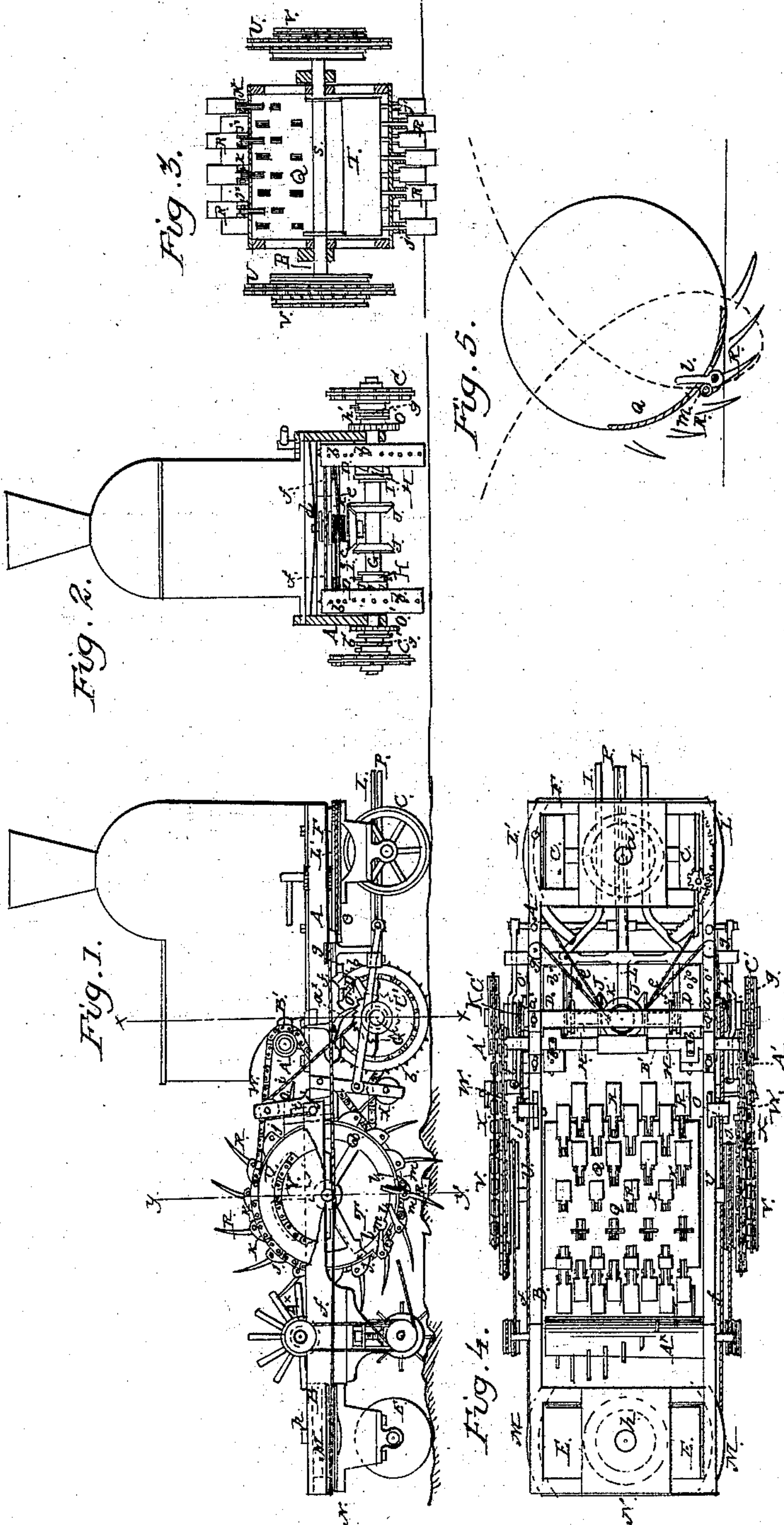


J. K. SMITH.  
Steam Plow.

No. { 1,149, }  
      { 32,153. }

Patented Apr. 23, 1861.



Witnesses:

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# UNITED STATES PATENT OFFICE.

JOHN K. SMITH, OF TRENTON, NEW JERSEY.

## IMPROVEMENT IN STEAM-PLOWS.

Specification forming part of Letters Patent No. 32,153, dated April 23, 1861.

*To all whom it may concern:*

Be it known that I, JOHN K. SMITH, of Trenton, in the county of Mercer and State of New Jersey, have invented a new and Improved Steam Plow or Digging-Machine; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the annexed drawings, making a part of this specification, in which—

Figure 1 is a side view of my invention; Fig. 2, a vertical section of the same, taken in the line *x x*, Fig. 1; Fig. 3, a vertical section of the same, taken in the line *y y*, Fig. 1; Fig. 4, a plan or top view of the same; Fig. 5, a diagram, showing the operation of the spades.

Similar letters of reference indicate corresponding parts in the several figures.

This invention relates to an improvement in that class of steam-plows in which spades or shares are attached to the periphery of a rotating drum.

The object of the within-described invention is to insure a perfect or proper action of the spades or shares upon or in the soil, so that the desired work may be done in an efficient manner on whatever soil the machine operates. The invention also has for its object the ready elevating of the spade-cylinder above the surface of the ground, when it is desired to have said cylinder inoperative, and also the ready turning of the machine and the clearing of earth or trash from the spades.

To enable those skilled in the art to fully understand and construct my invention, I will proceed to describe it.

A B represent two frames, which are of rectangular form and connected together as hereinafter shown. The front frame, A, is supported by two pairs of wheels, C C D D, and the back frame, B, is supported at its back end by a pair of wheels, E E. The front wheels, C C, of the frame A are attached to a bolster-plate, F, which is connected to frame A by a king-bolt, *a*. The wheels D D are placed loosely on an axle, G, and are connected to said axle and disconnected therefrom by clutches H, operated by levers I, as shown in Figs. 2 and 4. The peripheries of the wheels D D may be provided with the usual teeth or spuds, *b*, to prevent slipping.

On the axle G of the wheels D D there are permanently secured two wheels, J J, having

smooth but beveled faces; and K is a wheel of the same form and construction, which is attached to a lever, L, and the wheel K, by adjusting this lever, may be brought in contact with either of the wheels J, and the wheel K therefore rotated either to the right or left, as may be desired.

The axis of the wheel K has two pulleys, *c d*, upon it, and around the lower pulley, *c*, a chain or rope, *e*, passes, the ends of which are attached to the peripheries of segments L' L' at the ends of the bolster-plate F, as shown clearly in Fig. 4. Around the upper pulley, *d*, of the axis of wheel K a rope or chain, *f*, passes, said rope or chain also passing around guide-pulleys *g g* at the sides of the frame A, and extending back to the back part of frame B at each side, is attached to segments M M, at the end of a bolster-plate, N, to which the axle of the wheels E E are attached, said bolster-plate being connected to the frame B by a king-bolt, *h*.

To the back part of the frame A there are attached two uprights, O O, one at each side of the frame, and in each of these uprights a slot, *i*, is made, through which pins *j*, attached to the front end of frame B, pass. These pins connect the two frames A B together, and in consequence of the pins being fitted in the slot *i* the front end of the frame B is allowed to rise and fall to a certain extent.

The two frames A B support the working parts of the machine, and it will be seen that in consequence of connecting the segments L' L' M M of the bolster-plates F N to the axes of the wheel K by the chains or ropes *e f*, and the wheel K by adjusting-lever L, made to engage with either of the wheels J J, the axes of the wheels C C E E may be turned simultaneously in radial positions with the circle the machine describes in turning, and the machine therefore may be readily turned either to the right or left. The wheels E E are quite broad, so that they may serve as rollers. The turning of the machine is also further facilitated by loosening one of the wheels D on the axle G, so that one may turn independently of the other.

On the axle G there are placed loosely two ratchets, O' O', which may be connected to the axle, when necessary, by clutches *g g*, said clutches being actuated by a lever, P. To these



ratchets pulleys  $h'$  are attached, one to each, and to each pulley  $h'$  a chain or cord,  $i'$ , is connected, the chains or cords  $i'$  passing over pulleys  $j'$  in the uprights  $O O$ , and connected at their ends to the inner end of frame B. Whenever, therefore, it is desired to raise the inner end of frame B, the ratchets  $O'$  are connected to the axle G, and the chains or cords  $i'$  are wound on the pulleys  $h'$  and the inner or front end of frame B elevated, pawls  $a^x$ , which engage with the ratchets, retaining the frame B in its elevated state.

In the frame B, at its front part, a cylinder, Q, is placed. This cylinder is allowed to rotate freely in its frame, and to its periphery a series of spades, R, are attached by pivots or pins  $j^x$ , which pass through ears or lugs  $k$  on the periphery of the cylinder. Each spade R is provided with a tang,  $l$ , which passes through a slot in the cylinder, said tangs having springs  $m$  bearing against them, as shown clearly in Fig. 1. Any suitable number of spades may be attached to the cylinder of the periphery of the cylinder Q.

Within the cylinder Q and on its axis S there is suspended a weight, T, which extends the whole length of the cylinder A and projects down within the path of rotation of the tangs  $l$  of the spades, as shown in Fig. 1.

To the ends of the axis or shaft S of the cylinder Q there are attached wheels U V, two at each end of the shaft. The wheels U are larger in diameter than the wheels V, and chains W X pass around them, the chains W of the wheels U also passing around wheels A' on the crank-shaft B', which is driven by any suitable steam-engine on the framing, and the chains X of the wheels V passing around wheels C' on the ends of the axle G. The wheels U V A' C' are provided with teeth, so as to prevent the chains slipping thereon.

The machine is propelled along by the rotation of the cylinder Q, the spades R acting upon the earth and serving the double purpose of spades and propellers.

It will be seen, however, that in order that the spades R may perform both of the above-named functions perfectly it is essential that the earth or soil do not give too readily to their action and still yield sufficiently, so that it may be acted upon by the spades. In the one case the cylinder Q would rotate without propelling the machine along, and in the other case the spades would work over the ground and drive the machine along without digging up the ground. To remedy this difficulty the cylinder Q, although driven directly from the crank-shaft B', has its propelling action controlled or checked by the chains X of the wheels V C', for as the wheels C' are connected to the axle G the wheels D, which are on said axle, are made, by the connection above alluded to, to serve as drivers or drags, as may be required. If, for instance, the soil be loose and not sufficiently tenacious to admit of

the spades propelling the machine, the wheels D are made to assist, as they would of course, in resting on the ground, serve as drivers. On the other hand, if the soil should be hard and offer considerable resistance to the action of the spades, so that the latter would have a tendency to work over the ground and propel the machine along without perfectly digging up the ground, the wheels D in this case serve as drags and prevent this imperfect action. Thus it will be seen that the action of the spades is rendered perfect on all kinds of soil.

I do not confine myself to the employment or use of chains W X and wheels U V A C', as gearing may be used instead. All that is required is to have the wheels of a proper relative size; and I would here state that the spades R may be made to take any desirable reach or spit by giving more or less backward throw, which may be required in different soils, by using different-sized wheels, which should always be kept on hand.

The action of the spades R on the soil is shown clearly in Fig. 5. It will be seen by referring to this figure that the spades have a prying action at their lowest point and act in a very efficient manner on the soil.

At any time when it is desired to elevate the spades above the surface of the ground to render the machine inoperative the inner or front end of the frame B is elevated as previously explained.

The machine will admit of being built extremely light, as weight is not, as in most other steam plowing and digging machines, required in order to obtain sufficient traction. The machine therefore may be provided with engines of medium power.

The spades are prevented from choking or clogging by the action of the springs  $m m$ , their tangs  $l$ , and the weight T, for as the spades leave the ground the tangs  $l$  strike the lower part of the weight T, and the spades are elevated while passing under the weight and released or thrown back by the springs  $m$  as they pass from underneath the weight, the sudden action or movement of the spades produced by the springs  $m$  causing the earth to be thrown from the spades.

I would remark that any suitable rolling and pulverizing devices may be used to operate behind the cylinder Q, and a rotary spade-clearing device, A<sup>x</sup>, may also be used, if desired.

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

1. The arrangement of the segments L' M on the bolster-plates F N of the axles of the wheels C E, the cords  $e f$ , the pulleys  $c d$ , and wheel K of lever L, and the wheels J J on axle G, for the purpose of guiding or turning the machine, as set forth.

2. The arrangements of the ratchets O' on axle G, cords  $i'$ , passing over the pulleys  $j'$

and attached to frame B, in connection with the frames A B, connected together as shown, whereby the inner or front end of frame B, and consequently the spade-cylinder, may be elevated when desired.

3. The employment or use of the weight T, suspended on the axle S, in connection with

the tangs *l* of the spades R and the springs *m*, all arranged to operate as and for the purpose set forth.

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Witnesses:

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