E. G OTIS.

Steam-Plow.

No. 18,468 Patented Oct. 20, 1857.

Fig. 2.

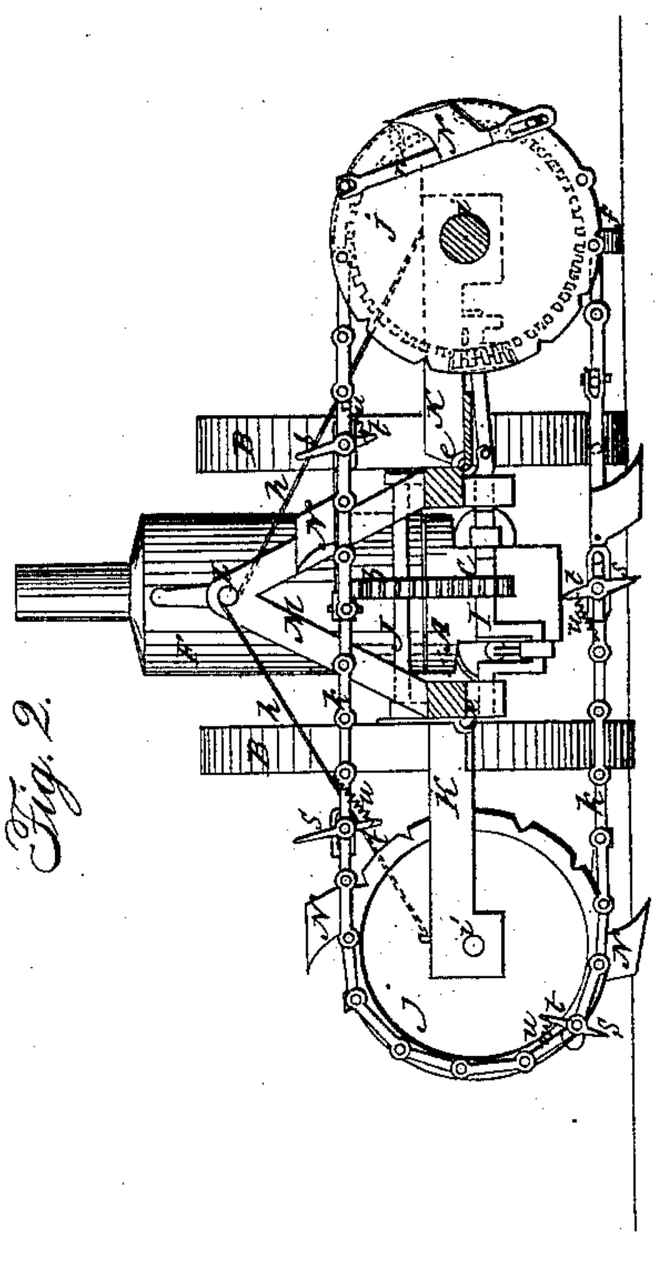


Fig. 1.

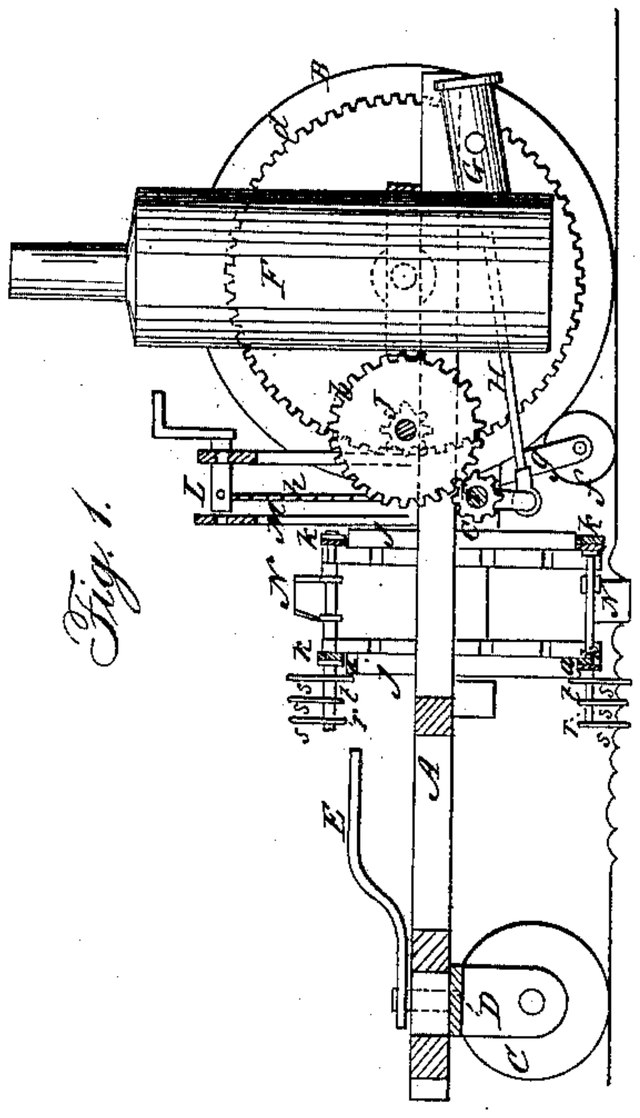
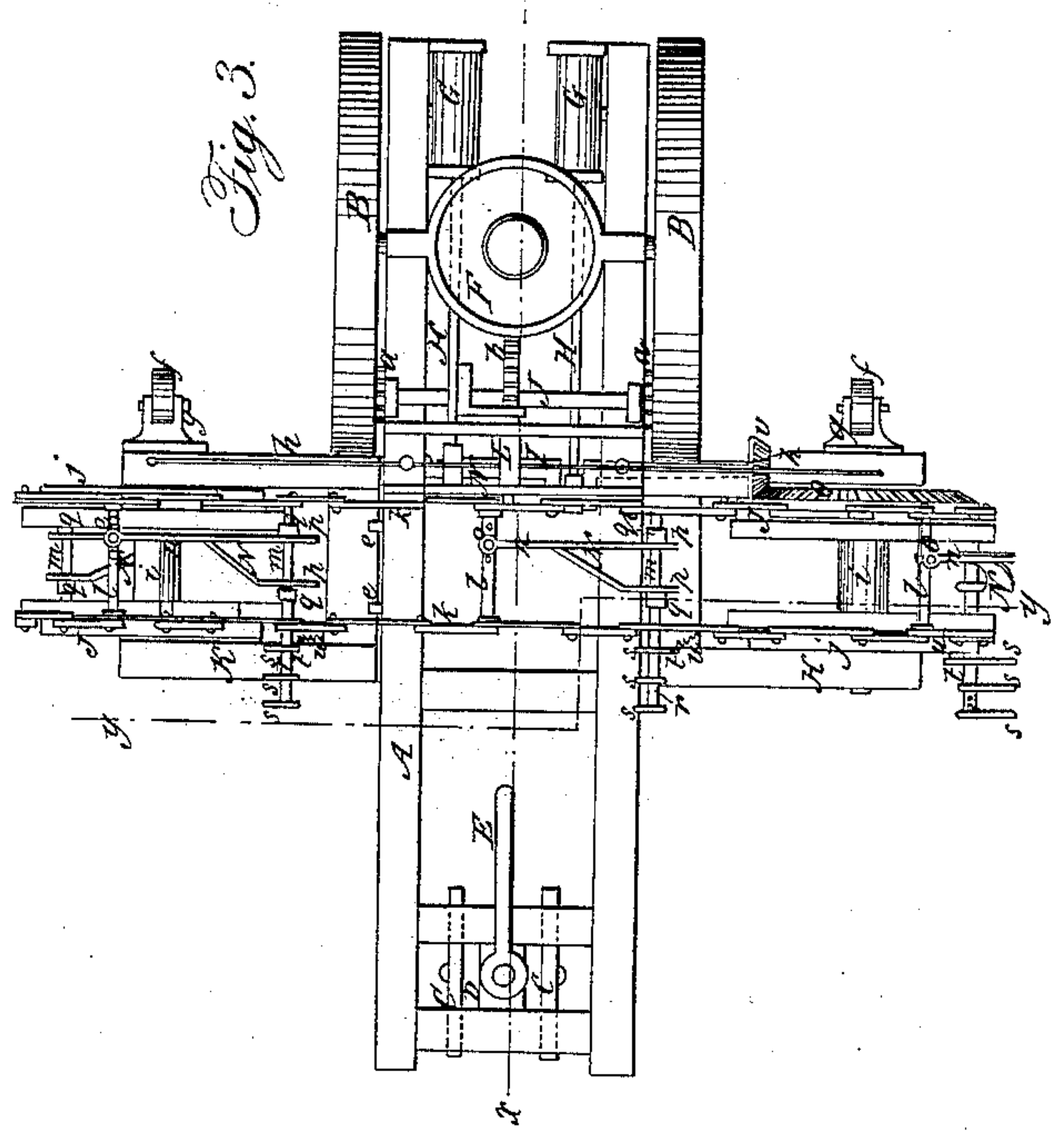


Fig. 3.



UNITED STATES PATENT OFFICE.

E. GRAVES OTIS, OF YONKERS, NEW YORK.

IMPROVEMENT IN STEAM-PLOWS.

Specification forming part of Letters Patent No. **18,468**, dated October 20, 1857.

To all whom it may concern:

Be it known that I, E. GRAVES OTIS, of Yonkers, in the county of Westchester and State of New York, have invented a new and Improved Steam-Plow; 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 longitudinal vertical section of my improvement, taken in the line *x x*, Fig. 3. Fig. 2 is a transverse vertical section of the same, taken in the line *y y*, Fig. 3. Fig. 3 is a plan or top view of the same.

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

This invention consists in the employment or use of an endless chain of plows and harrows, arranged and applied to a steam traction-engine in a peculiar manner, as hereinafter described, whereby a simple and practicable implement is obtained.

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

A represents a horizontal rectangular frame, the front end of which is supported by two wheels, B B, and the back end supported by two swivel-wheels, C C, which may be connected with one turn-plate, D, to which a lever, E, is attached for the purpose of operating it.

On the front end of the frame A a steam-boiler, F, is placed, and any proper engine may be employed for applying the power to the propulsion of the frame and the operating of the plows and harrows.

In the drawings two oscillating steam-cylinders, G G, are shown for this purpose, the piston-rods H of which are connected with and drive a crank-shaft, I, which is placed transversely in the frame A. The frame A is propelled by means of pinions *a a*, which are placed on either end of a shaft, J, said shaft being rotated from the shaft I by means of gear-wheels *b c*. The pinions *a a* gear into toothed rims *d d*, which are attached to the inner sides of the wheels B B.

To either side of the frame A and just behind the wheels B B a short frame, K, is attached by hinges or joints *e*, so as to allow said frames a certain degree of vertical play or vibration. These two frames K K are in line with each other, and are placed at right angles with the frame A. The outer ends of the frames are supported each by a small wheel, *f*, which is attached to the lower end of an adjustable pendant, *g*.

To the outer end of each frame K a cord or chain, *h*, is attached, and these cords or chains are secured to a shaft or small windlass, L, which is placed in the upper part of a V-shaped framing, M, attached to the frame A, the windlass being directly over the center of the frame A—that is, in reference to its width. (See Figs. 2 and 3.)

In each frame K and at its outer end a shaft, *i*, is fitted, and on each shaft *i* two pulleys, *j j*, are placed, and around these pulleys endless chains *k k* pass, a chain passing around a pulley on each shaft. The chains *k* are formed of metal links connected by rivets, or they may be constructed in any proper way. The two chains are connected at suitable intervals by tie-rods *l m*, and the pulleys *j j* are each constructed with a concentric flange having notches formed in it to receive the tie-rods as the pulleys rotate. These flanges keep the chains in proper position and also prevent them from slipping as the pulleys rotate.

To the chains *k k* plows N are attached. These plows are secured to the rods *l m* of the chains, and are of the usual or an approximate form. The plows have each a beam, *n*, attached to their front ends, and the ends of these beams are connected by pins *o* to the tie-rods *l*, and to the back ends of the plows beams *p* are attached, two to each, said beams being slotted longitudinally, and a tie-rod, *m*, passing through the slots of the two beams of each plow. (See Fig. 3.) The beams *p* are prevented from sliding laterally on the tie-rods by means of collars or bosses *q*, which are fitted thereon. The tie-rods *m* extend out beyond one of the chains *k*, and a collar or sleeve, *r*, is fitted on the outer part of each rod *m*. To the collars or sleeves *r* teeth *s* are attached. In the drawings three teeth are shown attached to each sleeve; but more may be employed, if desired. The innermost tooth of each sleeve *r* has a shank or arm, *t*, attached to it, and this shank or arm is connected with the adjoining chain *k* by means of a spiral spring, *u*. (See Fig. 2.) The teeth *s*,

attached to the sleeves *r*, form harrows, as will be presently shown.

To the outer side of one of the pulleys *j* a toothed wheel, O, is attached, and a pinion, *v*, on the shaft I gears into said wheel. (See Fig. 3.)

The operation is as follows: The machine is propelled along in consequence of the pinions *a* gearing into the toothed rims *d d* on the wheels B B, and the endless chains are operated in consequence of the pinion *v* gearing into the wheel O. As the chains pass around the pulleys *j* the plows N of course make the necessary furrows as they enter the soil in passing around below the pulleys. The plows are all placed in line with each other, and are made to act successively in the soil in consequence of the movement of the machine; and it will be seen that the furrows, in consequence of said movement, will have rather an oblique position relatively with the line of movement of the machine. The plows N therefore require to be placed in oblique position to correspond to the obliquity of the furrows. This is effected by adjusting the ends of the beams *n* in either of a series of holes made in the tie-rods *l*, the slotted beams *p p* at the back ends of the plows permitting this, and also permitting the links of the chains *k k* to conform to the pulleys *j* while passing around them. Were the plows N rigidly attached to the chains, no allowance would be made for the chain's contraction while passing around said pulleys, and the chains could not work with any degree of nicety.

The plows may be made to cut a furrow of any desired depth by adjusting the pendants *g*, so that the wheels *f* may be raised or lowered and the frames K placed in the proper position to effect the desired end, and the plows are allowed to rise and fall so as to conform to the undulating surface of the ground, first, by the flexibility of the chains at intermediate points between the pulleys, and, second, by the yielding of the frames K.

The relative speed of the machine and chains may be regulated by varying the relative size of the gearing which drives them, so that the furrows may be made of any desired width; and the pinions *a a* may be connected with the shaft J by means of clutches, so that in turning the machine the wheel nearest the center of motion may be thrown out of gear. It will be understood, of course, that the machine is turned and guided by operating or turning the swivel-wheels C C, the frames K K being raised by turning the windlass L so as to raise the plows from the ground. As the ground is plowed it is harrowed by means of the teeth *s*, attached to the sleeves or collars *r* on the tie-rods *m* of the chains *k*, the harrows passing around with the chains and retained in proper position when acting upon the plowed ground by means of the springs *u*, said springs also permitting the harrows to yield to obstructions and the inequalities of the ground.

I am aware that plows have been previously attached to endless chains, and I therefore do not claim broadly such device irrespective of the arrangement of the parts substantially as herein shown; but,

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

1. Attaching the plows N to the chains *k k*, as herein shown and described, whereby they may be adjusted more or less obliquely to correspond with the oblique position of the furrows, and also to allow for the contraction of the chain in passing around the pulley.

2. The teeth *s*, attached to sleeves *r* on the tie-rods *m*, and provided with the springs *u*, substantially as shown, for the purpose specified.

E. GRAVES OTIS.

Witnesses:
W. TUSCH,
MICH. HUGHES.