

(No Model.)

3 Sheets—Sheet 1.

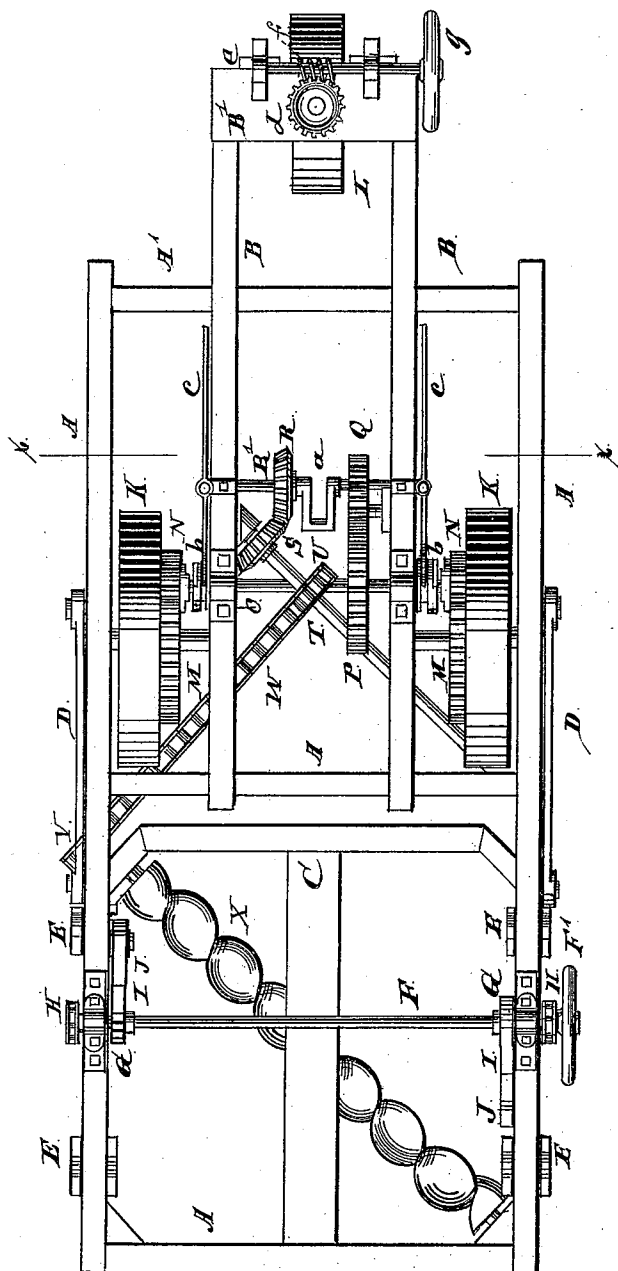
G. WILLARD.

STEAM PLOW.

No. 336,969.

Patented Mar. 2, 1886.

Fig. 1.



Witnesses:  
Albert H. Adams.  
Geo. Bond.

Inventor:  
George Willard

(No Model.)

3 Sheets—Sheet 2.

G. WILLARD.

STEAM PLOW.

No. 336,969.

Patented Mar. 2, 1886.

Fig. 3

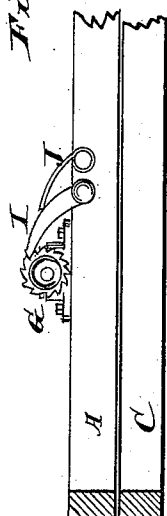
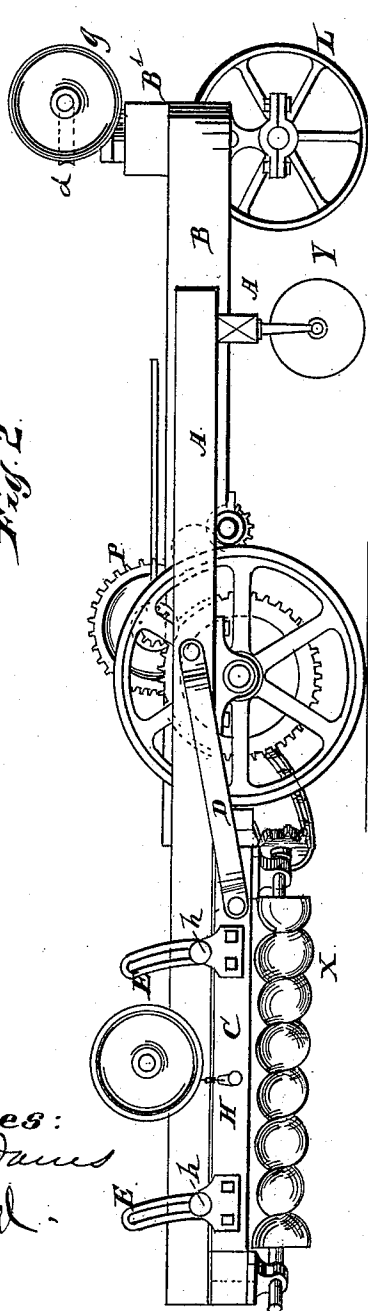


Fig. 2.



Witnesses:  
Albert N. Adams  
O. W. Bond.

Inventor:  
George Willard



# UNITED STATES PATENT OFFICE.

GEORGE WILLARD, OF CHICAGO, ILLINOIS.

## STEAM-PLOW.

SPECIFICATION forming part of Letters Patent No. 336,969, dated March 2, 1886.

Application filed June 6, 1885. Serial No. 167,915. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE WILLARD, residing at Chicago, in the county of Cook and State of Illinois, and a citizen of the United States, have invented certain new and useful Improvements in Steam-Plows, of which the following is a full description, reference being had to the accompanying drawings, in which—

Figure 1 is a plan view; Fig. 2, a side elevation; Fig. 3, a detail of the lifting-ratchet; Fig. 4, a cross-section on line *x x* of Fig. 1; Fig. 5, a cross-section showing the steering-wheel.

The object of this invention is to improve the construction and operation of plows to be drawn or propelled by steam; and its nature consists of the several parts and combinations of parts hereinafter more fully described and claimed as new.

In the drawings, A A' indicate the main frame; B B', a secondary frame mounted thereon; C, the plow-frame; D, draft bars or rods; E, guide-brackets; F, lifting-shaft; F', hand-wheel; G, ratchet-wheels; H, lifting-chains; I, dogs; J, springs; K, supporting carrying-wheels; K', their shafts or axles; L L', guide-wheels and forks; M, gear-wheels for driving the main wheels; N, pinions for driving the wheels M; O, shafts; P, gear-wheels for rotating the shafts O; Q, pinion for driving the wheels P; R S, bevel-wheels; R', crank-shaft; T, shaft; U V, sprocket-wheels; W, drive-chain; X, scroll-plow; Y, revolving disk or colter; *a*, crank; *b*, clutches; *c*, clutch-levers; *d*, worm-wheel; *e*, worm-shaft; *f*, worm; *g*, hand-wheel; *h*, locking screws or bolts on the bracket E.

The frames A, B, and C are usually made of wood. The frame A is mounted on the supporting-wheels. The frame B is mounted upon the frame A, and in use the steam-engine, provided with the usual operative parts, is mounted thereon, and the piston-rod is connected with the crank *a* of the shaft R', or in any other suitable manner, to drive the carriage and operate the plows. As the engine and boiler may be of any of the known forms, they are not shown or described. The frame C is attached to the frame A by the draw-bars D, and is held in line by the brackets E. The draw-bars are pivoted to both frames, so that

the frame C is free to rise and fall when the brackets E are unlocked. The brackets are formed as shown in Fig. 2, and are provided with set screws or bolts *h*, so that the frame C may be locked when desired, and as there shown it is locked up against the frame A in position for transportation or travel.

In use the bolts *h* are loosened, when the plow drops to the ground and is ready for operation. Ordinarily, the frame C and the plow will of themselves have sufficient weight to give the plow a proper cutting depth. In hard soils, or for uniform cutting, when the plow is down to the desired position the brackets E may be relocked with the screws *h*, so as to give the plow the weight of the main frame, and also to prevent it from rising and falling with the undulations of the ground, except as it may be controlled by the main frame. The plow-frame C is raised or lowered by the shaft F, hand-wheel F', and chains H, which are wound upon the shaft. The depth to which the plow may descend is also regulated by this device without locking the brackets E, as the length of the chains is determined by rotating the shaft F, and it is held in position by means of the ratchet-wheels G and dogs I, which dogs are held by the springs J. The dogs may be made of sufficient weight to avoid the necessity of using springs; but for this class of machinery spring-dogs are preferred. The plow, with its frame, may also be held in an elevated position by this device where only a short distance is to be traveled, or when it is desirable to raise the plow in turning without locking the brackets E.

As shown, the frame C is provided with a longitudinal brace; but bracing is unnecessary, and if a brace is used it is preferably placed cornerwise and at right angles with the scroll-plow. The brackets E or their slots are curved on the proper circle to keep the drive-chain W taut as the frame C varies in its vertical position.

As this machine is organized, the power to drive the plow is direct from the engine, and is not taken from the supporting-wheel. Power being applied to the shaft R' by means of the crank *a* or otherwise, the bevel-wheels R S are put in motion, and power is applied from the shaft T and sprocket-wheel U by the chain

W direct to the sprocket-wheel V, which rotates the scroll-plov. Power is also transmitted from the shaft R' by the pinion Q through the wheel P, which rotates the shaft O. This shaft is provided with clutches *b c*, which engage with the pinion N, and when the engagement is made the pinions N rotate the gear-wheels M, which are attached to the supporting-wheels K or to their axles K', as may be most convenient. Either one of the supporting-wheels may be put in motion without the other, so as to facilitate turning at the ends of the furrows, or otherwise. These several pinions and gear-wheels are constructed in about the proportion shown, so as to give the carrying-wheels a sufficiently slow movement to give the plov its proper operation. Provision may also be made, either by clutch or by slipping the bevel-wheel S, to throw the plov out of operation when it is elevated or its operation is not desired, or when it is desired to travel any considerable distance.

When it is desired to use the apparatus for a traction-engine without plowing, the bars D are unshipped and the bolts *h* withdrawn, which detaches the frame C and the plov from the frame M. In this condition the device may be used for a traction-engine, or it may be so set up and mounted as to be used for an improved power by applying a belt to one of the supporting-wheels.

In traveling, the machine is guided by the guide-wheel L, which is mounted in the cross-bar B' of the frame B by means of the fork L', which is provided with suitable bearing-shoulders and collars, and its upper end provided with a worm-wheel, *d*. By turning the hand-wheel *g* in either direction the action of the worm *f* upon the wheel *d* will incline the guide-way in either direction, so as to change the line of travel of the machine.

In Fig. 2 I have shown a rotary colter or disk, Y, attached to the cross-bar A'. A number of these wheels may be applied to this bar, and while they will operate as colters in cutting the soil, they will also operate as guides to counteract side-pressure from the operation of the scroll-plov. These colters, in use, will be attached to a secondary beam, or be provided with racks, so that they can be raised whenever it is necessary to make a short turn, or for traveling purposes.

The plov X is made in scroll form, and it is preferably made in the auger form shown by twisting a steel plate of the proper width into that form, and bolting or otherwise attaching bearings to the end thereof. This plov is made, preferably, about two feet in diameter, and it may be made of two or more scrolls, wound around and riveted or otherwise attached to a center shaft. It may also be made in sections, with hubs attached to a center shaft; but I do not recommend this manner of making it. The edges of the scroll are sharpened, so as to easily penetrate the soil, and it is given a sufficient rotatory

speed to cut and invert the earth in its movement; and this form of plov, as it partly levels the earth in turning, leaves it in a light and level position, and in a better condition for the subsequent operations of field culture than it is left by the use of ordinary plows, and it also levels the surface of the soil in its operations.

This plov is mounted in the frame C in a suitable manner to counteract its tendency to move endwise, and to give it the proper support.

In the operation of this plov it moves the earth to the side about the same distance that an ordinary mold-board plov leaves it, thus leaving on the land side a furrow or depression to be filled by the next round. If this furrow should not be sufficiently distinct, a mold-board plov may be attached to the land side of the frame, which will produce this result, and such plov will to some extent steady the movements of the frame C; but its attachment is not essential to the operation of the scroll-plov.

The length of the plov X is not material, as it may vary from four to ten feet. If much more than ten feet is used, a joint in the middle, to enable it to flex or yield, will be necessary. When made single, as shown, I prefer to make it about eight feet in length, which, at the angle shown, will give a width of plowing for about six feet, and by placing it at this angle an easy continuous cut is made, which is of a greater or less width, according to the adjustments of the machine.

What I claim as new, and desire to secure by Letters Patent, is—

1. The combination of the main frame, the rectilinear plov-frame, the scroll-plov having its ends journaled to opposite sides of the plov-frame, the guide-plates attached to the plov-frame and provided with vertical slots, the screws or bolts passing laterally through the slots of the plov-frame into the main frame, and draft-connections between the said frames, substantially as described.

2. The combination of the main frame, the vertically-movable plov-frame, the scroll-plov, the guides secured to the plov-frame and engaging the main frame, and draft-links pivoted at one end to the main frame and at the other end to the plov-frame, substantially as described.

3. The combination of the main frame, the vertically-movable plov-frame, the scroll-plov, the guides on the plov-frame engaging the main frame, and draft-connections between the main frame and the plov-frame, with the secondary frame B, the crank-shaft having the bevel-wheel R, the diagonal shaft T, having the bevel-wheel S and sprocket-wheel U, and the diagonal drive-chain connecting the sprocket-wheel with a wheel on the plov, substantially as described.

4. The combination of the main frame, the vertically-movable plov-frame, the scroll-

plow, the guides on the plow-frame engaging the main frame, and draft-rods pivoting the main frame and plow-frame together, with the crank-shaft having the bevel-wheel R and pinion Q, the shaft O, having the gear-wheel P, the carrying-wheels K, the pinions N, the clutches *b c* on the shaft O, the diagonal shaft T, having the bevel-wheel S and sprocket-wheel U, and the drive-chain connecting said sprocket-wheel with a wheel on the plow, substantially as described.

GEORGE WILLARD.

Witnesses:

ALBERT H. ADAMS,  
MARIE L. PRICE.