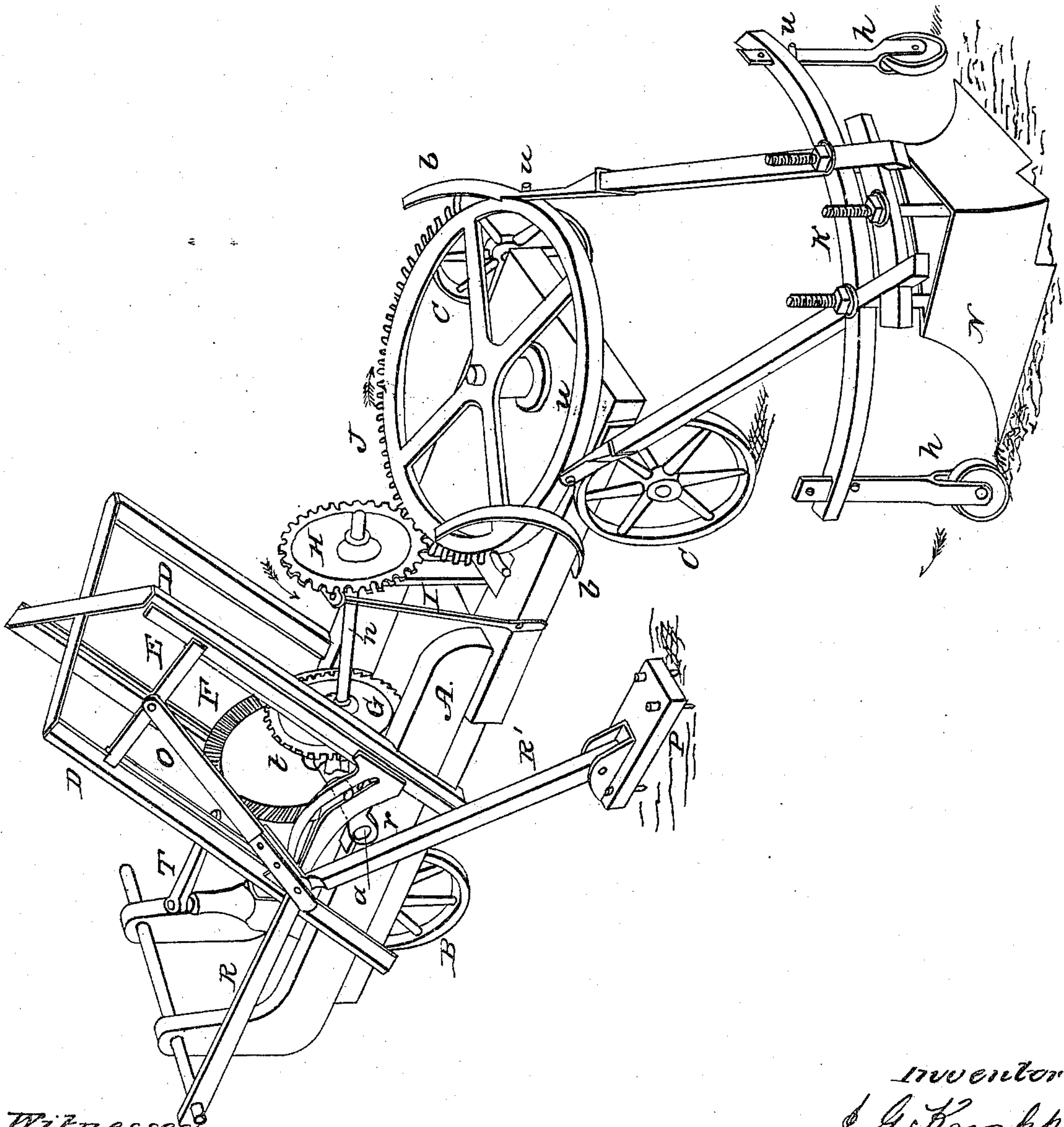


J. G. KNAPP.
Steam Plow.

No. 97,299.

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UNITED STATES PATENT OFFICE.

JOSEPH G. KNAPP, OF MADISON, WISCONSIN.

IMPROVEMENT IN STEAM-PLOWS.

Specification forming part of Letters Patent No. 97,299, dated November 30, 1869.

To all whom it may concern:

Be it known that I, J. G. KNAPP, of Madison, in the county of Dane and State of Wisconsin, have invented certain new and useful Improvements in Steam-Plows; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawing, making part of this specification, and to the letters of reference marked thereon, like letters indicating like parts wherever they occur.

To enable others skilled in the art to construct and use my invention, I will proceed to describe it.

My invention relates to machines for plowing, more especially to that class denominated "steam-plows;" and the invention consists in so constructing the machine as that it and the plows shall be moved alternately, the machine being moved forward intermittently and the plows moving to and fro in an arc of a circle behind the machine, as hereinafter more fully described.

The accompanying drawing is a perspective view of a machine embodying my invention.

To construct a machine, I first provide a frame or body, A, and mount it on two wheels, C, at its rear end, and a swivel-wheel, B, at the front, this latter wheel being mounted in a forked standard, provided with a handle, T, by which it can be turned laterally, as may be desired, to steer or guide the machine. Upon this frame or body I place the mechanism and the power that is to operate it, any suitable steam-engine being used, and therefore not necessary to be shown.

The propelling apparatus I make as follows: Transversely of the frame A, I locate the main driving-shaft *a*, which has a crank, *r*, on one end, as shown in the drawing. This crank connects with a sliding frame or gate, E, by means of a slot in its lower end, as represented in the drawing, the gate or frame E working up and down between standards D, secured firmly to the body A of the machine. To the upper end of this gate E is pivoted a pitman, *o*, the lower end of which is pivoted to the hinged ends of two levers or rods, R R', these latter forming a toggle-joint, having one end pivoted to the side of the body A at its front, and the other end being pivoted to a foot-piece, P, which rests on the earth. The slot in which the wrist of the crank *r* works

is curved, so that as the crank passes the center below and begins its upward movement it will raise the sliding gate E, and thereby raise the center joint of the toggle-levers R R', and as the front end is fast to the body of the machine the rear end, with the foot P, is drawn forward on the ground until the wrist of the crank has arrived near the top of its circle of movement, from whence it moves forward in the slot, which is curved to correspond with the line of movement of the wrist, for some distance, the gate and toggle-joint, of course, remaining stationary while the wrist travels along this part of the slot. As the wrist reaches the front end of the slot, it carries the gate E downward during about one-fourth or less of its revolution, thereby straightening the toggle R R', and the foot P being provided with spurs or other devices to take hold on the earth and prevent its slipping, it follows that as that end cannot yield the other end must, and as this other end is connected to the machine the latter is carried forward with it. By varying the curve of the slot in which the wrist of the crank moves, the movement of the gate E and toggle-joint, and consequently of the machine also, may be varied almost indefinitely, the object being to so adjust these parts as to impart to the machine a quick forward movement, and to do it during a small part of the revolution of the crank, for reasons hereinafter explained. A duplicate gate and toggle are to be applied in a similar manner to the opposite side of the body or frame A, and connected to a crank on the opposite end of the same or another shaft, to assist in propelling the machine.

It is obvious that, if necessary, any number of sets of toggles may be similarly arranged and made to operate simultaneously.

The plowing apparatus consists of a double-pointed plow, V, arranged in the form of two plows, united at their rear ends with points standing in opposite directions, so as to cut either way. This plow I connect to a suitable frame, K, with an adjustable gage-wheel, *h*, attached in front of each point, as represented in the drawing. This frame K has two strong arms projecting from the landside; and these arms are pivoted at their forward ends to a strong wheel, J, which is mounted on the rear end of the main frame A, so as to revolve in a horizontal plane. This wheel J is provided

with teeth on one-half only of its periphery; and it has attached to its opposite edges a short distance from end of the row of teeth a semicircular guard, *b*, with its concave side fronting the row of teeth, as represented in the drawing. Motion is imparted to this wheel J by means of a gear-wheel, H, secured to the rear end of a shaft, *n*, which has its opposite end secured and turning loosely in a sleeve, *t*, which has a hole through its front end at right angles to the shaft *n*, through which the main shaft *a* passes, the sleeve *t* being thus pivoted upon the main shaft, so that the shaft *n*, while revolving in the sleeve, may have its rear end, with the wheel H, raised or lowered at pleasure in a vertical plane.

To assist in guiding the shaft *n* in its vertical movements a slotted standard, I, is secured upon the frame A just in front of the wheel H and firmly braced.

Upon the main shaft *a*, I secure a driving bevel-gear wheel, F, which meshes into a bevel-gear wheel, G, secured upon the shaft *n*, by which means motion is imparted to the shaft *n* and wheel H, and through the latter to wheel J and the plows attached thereto. As the wheel H revolves in the direction of the arrow, it causes the wheel J to rotate in the direction of the arrow on it until the row of teeth on J have all passed under the wheel H, when the latter falls to the under side of J, the guard *b* operating against the projecting end of shaft *n*, and thus holding the wheels H and J in gear as the former drops below, after which, gearing with the teeth of J on their under side, the motion of J is reversed, it being made to move the same distance in the opposite direction. As the opposite end of the row of teeth arrives and passes over the wheel H, the other guard *b* engages under the projecting end of the shaft *n*, thus holding the wheels in gear, while the wheel H rolls around the end tooth to the upper side of J again. By this arrangement of gearing it will be seen that while the wheel H continues to revolve in one direction continuously, the wheel J is made to have a reciprocating semi-rotating movement, and that as the plows are attached to and move with it they move to and fro in a semicircle around the rear end of the machine, cutting a furrow as they go each way.

As it is necessary that the machine should remain stationary until the plows have nearly completed their movement in either direction, and should then perform its forward movement while the wheel H is changing from one to the other side of wheel J, the propelling mechanism is arranged as previously de-

scribed, whereby the forward movement of the machine occurs during the passage of the cranks or main shaft through a small portion of their revolution, and the parts must be so arranged and geared as to have this occur just at the time when the plows have completed or are about completing their movement either way, as at that moment the points of the plows are forward in line with the movement of the machine. The whole can be moved bodily forward, the plows cutting as they advance parallel with the machine.

It is obvious that by having the row of teeth on wheel J longer or shorter, the plows may be made to move through a larger or smaller arc of a circle, as may be desired.

It is also obvious that many other arrangements of mechanism may be used to impart to the plows the reciprocating motion described, that herein described for that purpose being used simply to illustrate my invention and show one method of accomplishing the object.

The engine may be of any suitable kind, and located wherever convenient on the machine.

As in a machine of this kind the engine only has to move the machine itself or the plows at one time, it is obvious that a lighter engine may be used than otherwise could, and, as the plowing is done behind, the machine itself can always travel or stand on the unplowed land.

Having thus described my invention, what I claim is—

1. A machine for plowing and cultivating the soil, having its mechanism so arranged as to propel the machine and operate the plows alternately at intervals, substantially as described.

2. The combination of the toggle-joint R R' with the sliding gate E and crank *r*, when said parts are arranged to operate in connection with the frame A of a machine mounted on wheels, substantially as set forth.

3. Arranging a plow, N, in connection with an intermittently-forward moving machine, in such a manner that said plow shall move to and fro in the arc of a circle horizontally, substantially as described.

4. The combination of the mechanism consisting of the shaft *a*, wheel F, shaft *n*, mounted in the sleeve *t*, and carrying the wheels G and H, and the wheel J, with its partial row of teeth, and the guards *b*, all arranged as set forth, for operating the plows.

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Witnesses:

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