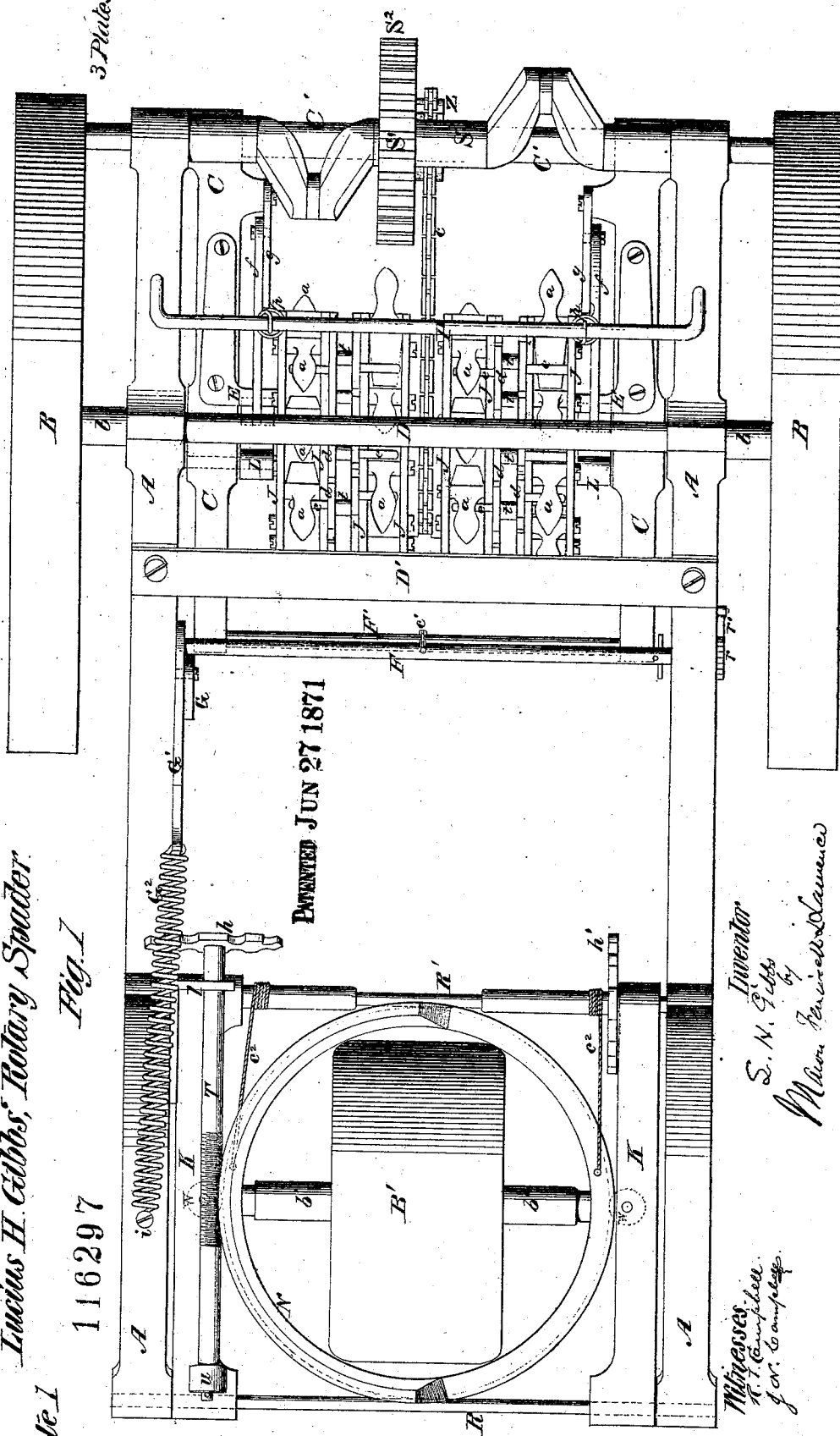


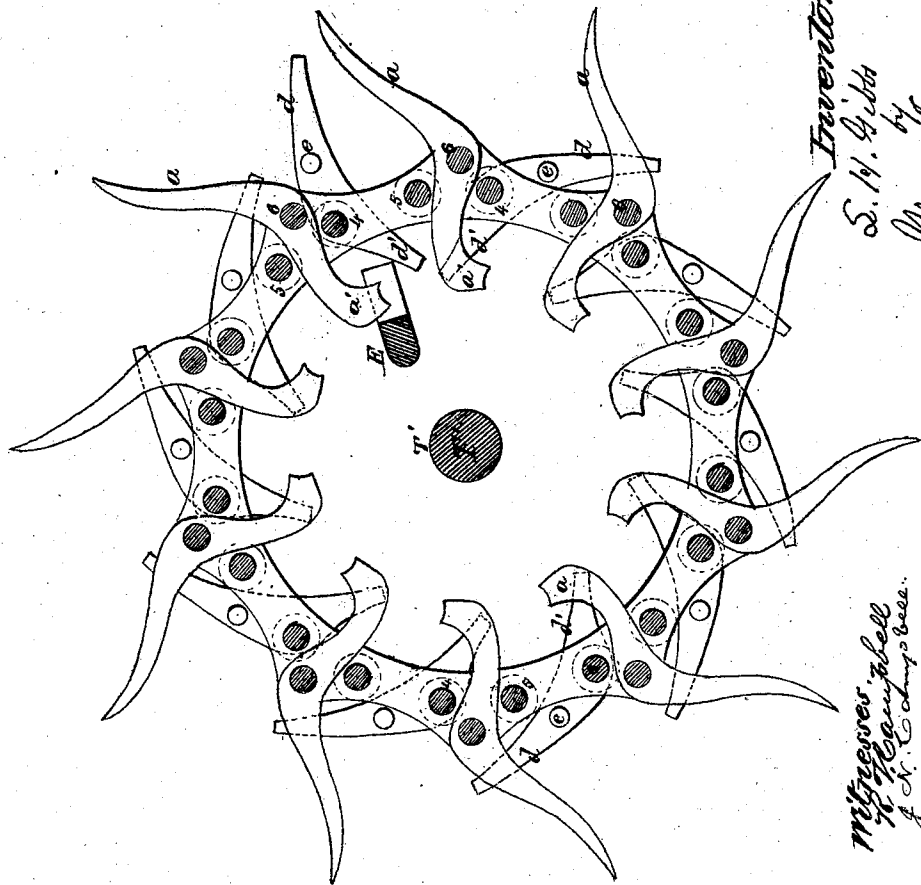


PATENTED JUN 27 1871

Inventor
S. N. Gibbs
by
M^r J. H. Lawrence

Witnesses.
R. T. Campbell.
J. W. Campbell.

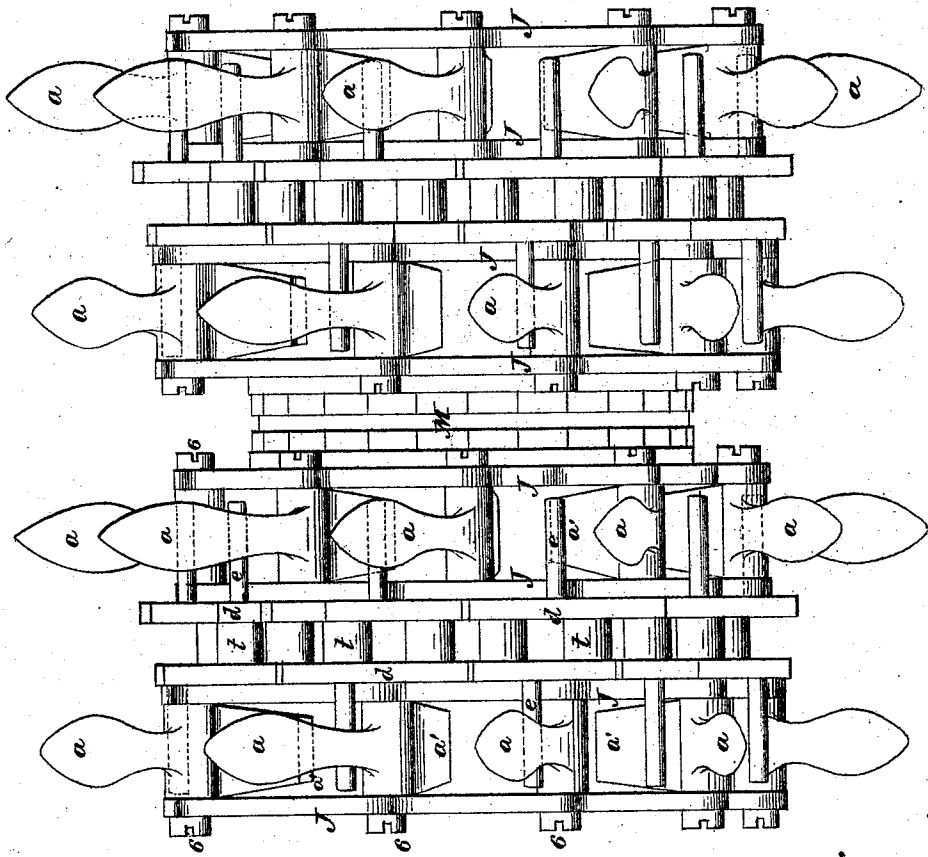
Fig. 5.



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H. H. Campbell
& Co. Litho. & Press.

Inventor
S. H. Gibbs
by
M. A. Lawrence

Fig. 6



UNITED STATES PATENT OFFICE.

LUCIUS H. GIBBS, OF BROOKLYN, ASSIGNOR TO HIMSELF AND PHILO REMINGTON, OF ILION, NEW YORK.

IMPROVEMENT IN ROTARY SPADING-MACHINES.

Specification forming part of Letters Patent No. 116,297, dated June 27, 1871.

To all whom it may concern:

Be it known that I, LUCIUS H. GIBBS, of Brooklyn, in the county of Kings and State of New York, have invented a new and Improved Rotary Spading-Machine; 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, in which—

Figure 1, Plate 1, is a plan view of the machine. Fig. 2, Plate 2, is a section taken longitudinally and vertically through the machine on one side of its center. Fig. 3, Plate 2, is a perspective view of one of the spades. Fig. 4, Plate 2, is a perspective view of one of the clearers. Fig. 5, Plate 3, is a cross-section through the spade-drum. Fig. 6, Plate 3, is a rear view of the spade-drum.

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

This invention relates to certain novel improvements on machinery for spading the soil; and consists: First, in the employment of a rotary drum of spades, which drum is sustained by means of a suitable carriage, and rotated in such manner that the operation of the spades upon the soil shall propel the machine. Second, in the construction of a rotary spading and propelling-drum; of a series of parallel rings secured together and properly braced; and in pivoting the spades between said rings and between transverse studs or stops, in combination with a yielding support which is placed inside of the drum, and so arranged that as the spades successively enter the soil said support will prevent backward thrust, except under extraordinary circumstances, as, for instance, the striking of a stone or other obstructions, in which event the said support will yield and prevent derangement or breakage. Third, in the combination, with the pivoted spades, of pivoted clearers and a tripping device for clearing from the spades any earth which may adhere to them after they rise from the ground. The invention further consists in a vertically-adjustable supporting-frame for the rotary spading-drum, in combination with adjusting and holding devices, whereby the spades can be run at any desired depth, or raised free from the ground, at pleasure, as will be hereinafter explained.

To enable others skilled in the art to understand my invention, I will describe its construction and operation.

In the accompanying drawing, A A represent two longitudinal side bars, which, with transverse braces D D', constitute the carriage-frame. This frame is supported upon three transporting wheels, B B and B'. The two former are large wheels, and are applied on short axles *b b*, which do not extend across the frame. The latter is a small caster-wheel, which is located near the front depressed end of the frame, and applied on a shaft which has its end bearings in a grooved ring, N. This ring N receives in the groove which is made into its periphery two horizontal transverse rods, R R', and two anti-friction wheels, W W, which latter are applied in slots made in longitudinal bars K K. The ring N is in this manner allowed to turn about its own axis. The rear rod R' is allowed to rotate, and is provided with a hand-wheel, *h'*, for this purpose. By means of two chains, *c' c'*, which are attached to the rod R' and to the ring N, the latter with its wheel B' can be turned to the right or left. The hand-wheel rod R' is used for guiding the machine when its spades are at work, and as it is required to keep the wheel B' very steady I employ a screw-shaft, T, which is applied at its front end to a swivel-bearing, *u*, and provided on its rear end with a hand-wheel, *h*. This screw-shaft engages with teeth on the perimeter of a raised portion of ring N, and when thus engaged it is held by a pivoted piece, *l*. By raising piece *l* the screw-shaft can be disengaged from the ring N.

I do not confine myself to this mode of guiding the machine, as other plans may be adopted which will answer just as well.

The rear ends of the side bars A A are forked to afford bearings for two horizontal transverse shafts, C' S. The upper shaft S has two cranks formed on it, and a pinion spur-wheel, S¹, keyed on it. The lower shaft C' has a large spur-wheel, S², keyed on it, which engages with the wheel S¹. On one side of the wheel S², and keyed on the shaft C', is a chain-wheel, Z, around which passes a chain-belt, *c*, that also passes around and transmits rotary motion to the drum of spades. The shaft C' also affords a bearing for the rear ends of two longitudinal bars, C C, which, with a front cross-bar, F', constitute the spading-drum frame. This frame is free to vibrate vertically about the shaft C', and its front end can be raised or lowered by means of a chain, *c'*, which is attached to the bar F' and to a windlass-rod, F. This rod F has a

ratchet-wheel, *r*, on one end, which is engaged by a pawl, *r'*, on the main carriage-frame, and designed for retaining the spading-drum in an elevated position free from the ground when the spades are not required to operate.

For the purpose of transporting the machine from one place to another, the ends of the crank-shaft *S* are extended out from each side of the carriage-frame, and provided with pinions (not shown in the drawing) which engage with inside gear *V* on the large transporting-wheels *B B*. The said pinions, as well as the spur-wheel *S'*, should be adjustable on their shaft, so that when it is desired to transport the machine from one place to another without rotating the spading-drum, the wheel *S'* can be disengaged from its wheel *S*, and the small wheels on the ends of the crank-shaft can be engaged with the teeth *V* on the wheels *B B*. During the spading operation the wheel *S'* is engaged with wheel *S*, and the small wheels above referred to are disengaged from the teeth on wheels *B B*.

For the purpose of holding the spading-drum and its frame down during the spading operation, an arm, *G*, is made fast on one end of the turning-bar *F'*, and connected, by means of a pin, 2, to a slotted arm, *G'*, which is pivoted on the windlass-rod *F*. The pin 2 on arm *G* passes through a slot, 3, in arm *G'*, which slot is formed like the letter *J*, so that when the spading-drum is depressed and the pin 2 is set back in slot 3, near the pivoted end of the arm *G'*, a spring, *G''*, which is connected to this arm and to a stud, *i*, on frame-bar *A*, will, by its retraction, draw the free end of arm *G'* forward, and keep the parts in proper position. By forcing the upper end of arm *G* forward the spading-drum frame will be released and may be raised by turning the windlass-rod *F*. The spading-drum is applied on a horizontal transverse shaft, *T*, which has its bearings in the longitudinal side bar *C*, and is allowed to turn freely. This drum is composed of rings *J J*, secured together in pairs at proper distances apart. The drum shown by Fig. 6 is composed of four pairs, with an intermediate chain-drum, *M*, around which the chain-belt *c* passes, as shown in Figs. 1 and 2. Between each pair of rings there are ten spades, which are connected to the rings by means of removable pivots that allow the spades to be taken out when desired. The shovels *a* are spoon-shaped, but any other shape may be adopted; they are constructed with tail-pieces *a'*, for a purpose hereinafter explained. Between the spades *a* are transverse pins or bolts 4 and 5; the pins 5 receive against them the tail-pieces *a'* of the spades at the commencement of their entering the ground. The pins or bolts 4 afford pivots for clearers *d*, and also serve as braces and ties for the pairs of rings. The clearers *d* are pivoted between the pairs of rings, and are curved, as shown in Figs. 2, 4, and 5, so that, during the rotation of the drum, they will be pressed backward and inward by contact with the ground. Each shovel *a* is provided with a clearer, the clearing portion being a pin or blade, *e*, arranged transversely across each shovel, as shown in Figs. 5 and 6. The cylindrical blocks

t on the pins 4 are used to space the pairs of rings, and to keep the curved portions of the clearers in their places. On the inner side of the spading-drum, on each side of the chain-belt drum *M*, is an anti-friction stop, *O*, and a tripping-stop, *E*. The anti-friction stop *O* is a roller placed on a stud, *o'*, which stud is applied to a curved arm, *L*. Each arm *L* is arranged between the end of the spading-drum and its frame, and is pivoted at one end to the latter. To the opposite end of each arm a rod, *f*, is pivoted, which extends back and is secured to a slotted lever, *g*, by an adjustable connection, 9. The lever *g* is pivoted at one end to the frame-bar *C*, and is connected at the other end to a spring, *p*, which is secured above to a horizontal rod, *P*, on the main carriage-frame. Each roller *O* is arranged so as to receive against it the tail extensions of the spades as the latter successively move around and dig into the soil. The pins or bars 5 5 hold the spades up to the work at first, but, as the drum moves around, the roller *O* receives against it the tail extensions of the spades and affords a yielding or elastic resistance, which will give way should any of the spades meet with any of the obstructions which would be liable to break them or derange other parts of the machine. The springs *p p* should have force enough to prevent the rollers *O O* from yielding under ordinary circumstances. By means of the fastening 9 and the slot 8 the arm *L* and its roller *O* can be adjusted so as to give the spades more or less depth of cut, as may be required. Above the shaft of the spading-drum, and a little to the rear of this shaft, a tripping-arm, *E*, extends inward from the frame-bar *C* at each end of the spading-drum. These stops *E E* are secured fast to frame-bars *C C*, and are so arranged that, while they do not touch the tail extensions of the spades, they operate on the inner ends of the curved portions *d* of the clearers, and move the latter across the surfaces of the spades so as to clear them of any earth which may adhere to them.

It will be seen, by reference to Fig. 6, that the spades are arranged in oblique lines on the spading-drum. This is done for the purpose of allowing any one or more of the spades to be readily removed; also, for more thoroughly stirring and breaking up the soil; and also for relieving the machine from the strain to which it would be subjected if the spades were arranged in straight lines across the drum.

It will be seen from the above description: First, that the machine is propelled while spading by the action of the spades themselves, and that the spades enter the ground nearly in vertical planes, and are then tilted upward by the action of the stops *O O*. Second, that the spades are separately removable from their drum, and are of such shape as to readily enter and leave the ground. Third, that each spade is provided with a clearer for removing from it any earth which might adhere to it. Fourth, that the spades have combined with them tilting resisting-stops which hold them up to the work under ordinary circumstances, and which will yield and allow the spades to safely pass any obstruction which might

break them. Fifth, that said yielding-stop is adjustable for regulating the depth at which it is desired to run the spades into the ground. Sixth, that the spade-drum is applied to a frame which can be raised or depressed.

In carrying my invention into effect I shall have a platform arranged upon the carriage-frame, upon which the engine for driving the spades will be located. If an engine is not employed the machine will be drawn by animal-power, and the spading-drum caused to roll on the ground; or it may be rotated by power transmitted to it from the carriage-wheels. If desired, more than one spading-drum may be employed.

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

1. The rotary-propelling spade-drum, which is composed of pairs of rings having spades pivoted to them, and operated substantially as described.

2. A support or stop, O, in combination with

pivoted spades and yielding mechanism, substantially as described.

3. Clearers *d e*, in combination with pivoted spades applied to a rotary drum, substantially as described.

4. The rotary spading-drum, which is applied to an independent vibrating frame, and is driven independently of the carriage or supporting-wheels, and is propelled by the contact of its spades with the soil, all substantially in the manner herein set forth.

5. The locking-down device $G G^1 G^2$, in combination with a vertically-vibrating frame carrying a rotary-propelling spading-drum, substantially as described.

6. The pivoted arm L, carrying the stop O, having combined with it an adjustable rod, *f*, and a lever, *g*, substantially as described.

LUCIUS H. GIBBS.

Witnesses:

J. N. CAMPBELL,
EDM. F. BROWN.