(Model.) 3 Sheets—Sheet 1.

E. M. MILES.

COMBINED REVOLVING PLOW OR SPADER AND ROLLER.

No. 260,596. Patented July 4, 1882.

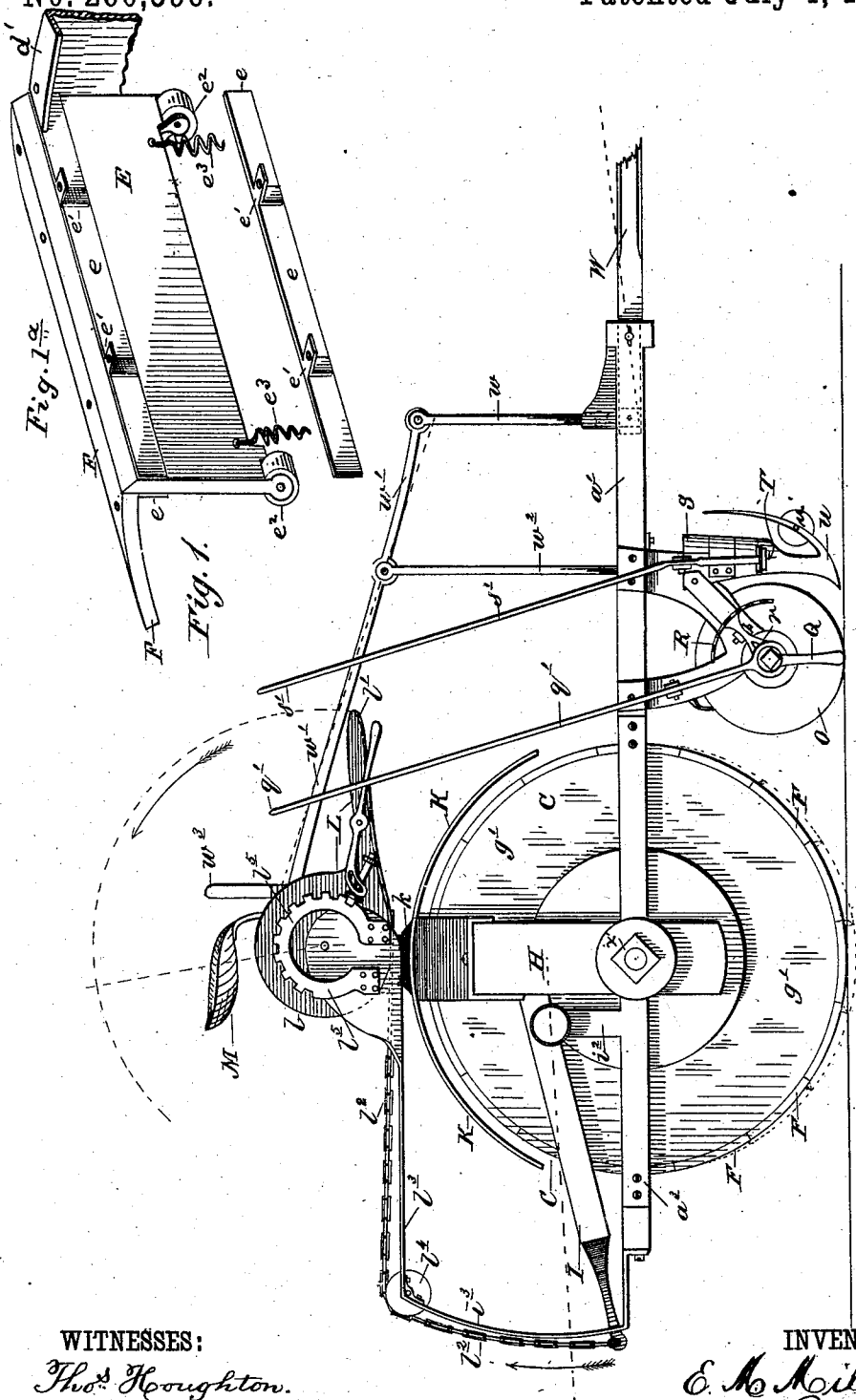

Fig. 1.

Fig. 1a.

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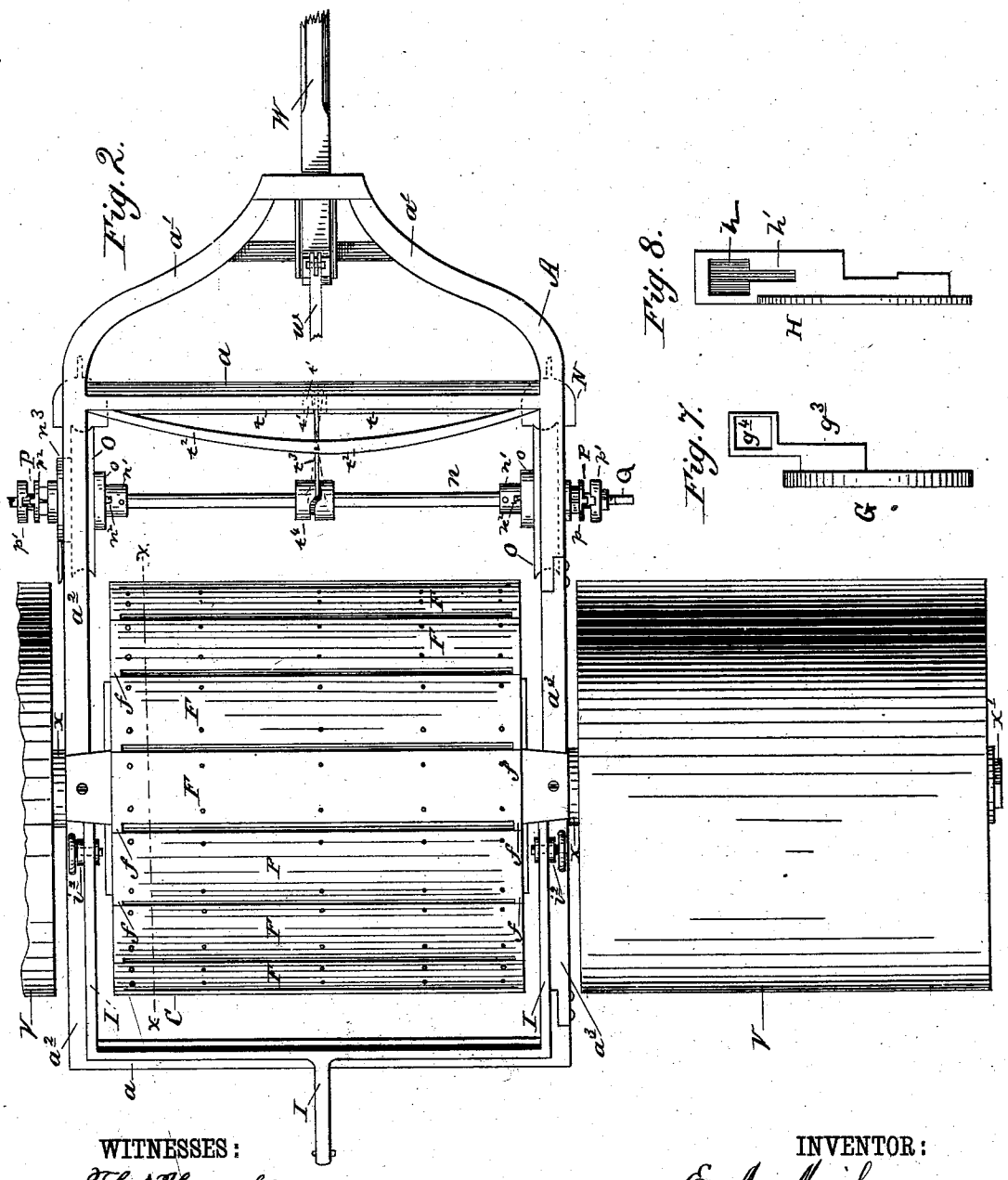

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Fig. 6.

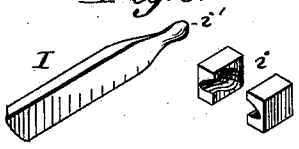


Fig. 9.

Fig. 3.

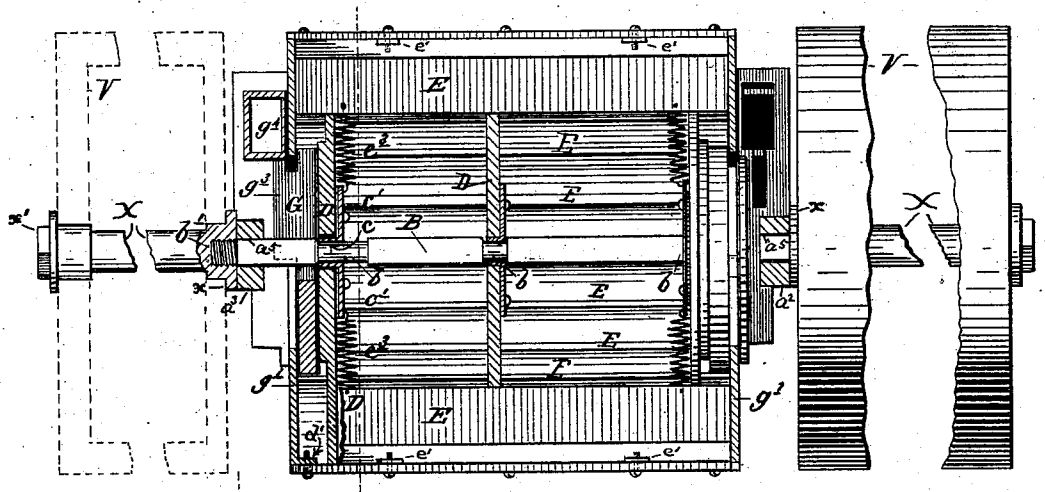


Fig. 4.

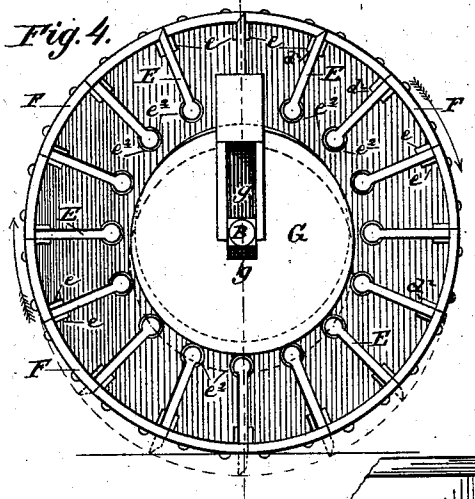


Fig. 5.

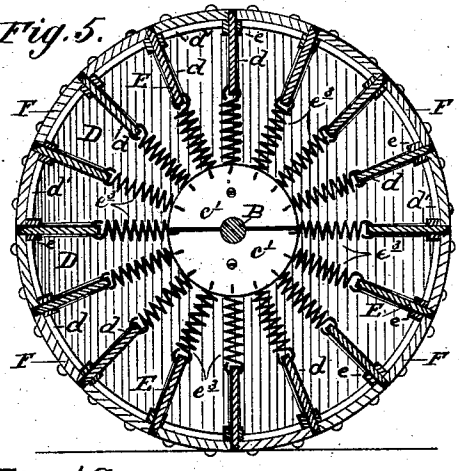
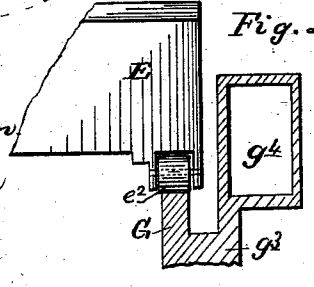


Fig. 4a



WITNESSES:

Thos. Houghton

Solon C. Kemon

INVENTOR:

E. M. Miles

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ATTORNEYS.

UNITED STATES PATENT OFFICE.

ENOS M. MILES, OF LAWRENCE, KANSAS.

COMBINED REVOLVING PLOW OR SPADER AND ROLLER.

SPECIFICATION forming part of Letters Patent No. 260,596, dated July 4, 1882.

Application filed September 24, 1881. (Model.)

To all whom it may concern:

Be it known that I, ENOS M. MILES, of Lawrence, in the county of Douglas and State of Kansas, have invented a new and Improved Combined Revolving Plow or Spader and Roller; and I do hereby declare that the following is a full, clear, and exact description of the same.

My invention is an improvement in the class of cultivating-machines in which a series of cutters or spades are successively forced out of a revolving cylinder through slots in the periphery of the same and caused to cut or slice and dig up the soil. In connection with such machine, and virtually as part thereof, I employ rollers which are aligned with the slotted cylinder and mounted on the same axis or extensions thereof.

The invention consists in the construction and arrangement of parts, as hereinafter described and claimed.

In the accompanying drawings, Figure 1 represents a side elevation of the machine. Fig. 1ª is a perspective view of one of the cutters or spades and a slat of the revolving cylinder detached; Fig. 2, a top view of the same with one of the rollers broken away and shield *k* and parts above it removed. Fig. 3 is a vertical transverse section of the spader, showing upon one side a front view of parts of the shaft of one of the rollers and upon the other a front view of parts of one of the rollers. Fig. 4 is an end elevation of the spader-body with one of the end plates removed. Fig. 4ª is a detail sectional view. Fig. 5 is a vertical section of the same through the line *x x* of Fig. 2. Figs. 6 to 9 are detail views of various parts of the machine.

The frame-work A of my machine consists of the transverse bars *a*, the curved tongue-supports *a'*, and the longitudinal bars a^2 a^3, the latter, a^3, being detachably connected with the remainder of the frame to allow access to the spader.

B is the shaft of the revolving plow or spader, in general shape square, but provided with round bearings *b* and threaded extremities *b'*. The ends of said shaft pass through the slots a^5 in bars a^2 a^3. Revolving about the shaft B is the spader-body C, constructed and borne by said shaft in the following manner:

Loose upon the round bearings *b* of the shaft are the collars *c*, provided with flanges *c'*, for purposes hereinafter described. Fitting about said collars are the circular disks D, provided with radial slots *d*, in which fit and slide the spades or cutters E. In extensions d^2 of the slots *d* the spade-guards *e* are secured, said guards being provided upon one side with lugs *e'*, Figs. 3 and 1ª, having threaded perforations therein. The transverse slats F are of a width to occupy the spaces between the spades E, and curved to conform to the periphery of the disks D, and they thus, together with said disks, form a slotted cylinder. Said slots have their edges beveled in order that the same may be parallel in the line of their depth, and thus allow only space for the passage of the spades. They are of a length sufficient to extend a short distance beyond the sides of the spades, and are provided with lateral end lugs, *f*, of a size to occupy the spaces without the knives and between the slats, and thus prevent said spaces from becoming clogged with dirt.

The spades or cutters E are beveled upon their outer or cutting edges. On their inner edges, on the outside of the disks D, they are furnished with rollers e^2, as shown in Fig. 4ª, and on the inside of said disks they are connected by coil-springs e^3 with the flanges *c'* of the collar *c*. The rollers e^2 act upon shifting disks in the manner hereinafter described, and by such action the spades are at intervals driven out, and then retracted between times by the aforesaid coil-springs. It will be seen that by this construction when the spades are at rest the spader-body will present the appearance of a cylinder or roller having transverse angular spaces formed in its outside surface, but no space for the admission of dirt to the interior. When the spades are thrust out they will entirely occupy the slots in the cylinder, and when retracted the spade-guards will prevent the admission of the dirt, which would otherwise be allowed to enter in consequence of the sharpened or beveled edges of the spades. The sharpened edges and the guards therefore allow the spader-body to be of much lighter construction than would otherwise be practicable.

Outside of the outer disks, D, and within the orbit of the rollers e^2, are the aforesaid shifting disks G, provided with vertical radial

slots g, having a width equal to that of the shaft B, and designed to fit over and have vertical movement upon the same. These disks are held in place by annular plates g'. Said annular plates are secured by screws or bolts passing through the ends of the slats F and the flanges d' formed on plates g'.

The shifting disks G are provided upon their outer faces with vertical arms g^3, extending without the annular plate g', and having formed in their upper extremities longitudinal slots g^4. Over these arms, covering the circular spaces formed by the annular plates, and surrounding the shaft B, are the dust-boxes H, Fig. 8, in whose sides are formed openings h, corresponding with the slots g^4, and extensions h' of said openings to admit of the vertical movement of the bifurcated lever I, which works the shifting disks G. Within the aforesaid slots g^4 are contained two halves, i, Fig. 6, of a socket, which receives the spherical ends of the lever I, and in the rear of the dust-boxes the said lever is pivoted in standards i^2, secured to the longitudinal bars of the frame-work. By this construction it will be seen that when the outer end of the lever I is raised the inner ends are depressed, and through the medium of the ball-and-socket joints depress the arms of the shifting disks, whereby as the spader-body revolves the rollers e^2 attached to the ends of the spades, as they approach the lowest part of their orbit, come in contact with the peripheries of the shifting disks and are forced outwardly, thus thrusting the spades beyond the surface of the spader-body. On the other hand, when the outer end of the lever is lowered the shifting disks are raised, the spades drawn inward by the contraction of their springs, and the spader-body made to present an unbroken roller-surface.

Above the spader-body is a cover or shield, K, supported by standards or their equivalents, extending from the aforesaid dust-boxes or from the frame-work of the machine. Rising from the top of said shield is the support k, in which the lever L is pivoted. Said lever consists of a circular disk, l, and handle l', and to the forward edge of the handle is attached a chain, l^2.

Back of the lever extends a bracket or support, l^3, in which directly above the outer end of the lever I, is journaled a pulley, l^4, over which the chain l^3 extends and is connected with the aforesaid outer end of lever I.

The lever-handle l' is provided with suitable mechanism for engagement with the teeth of a semicircular rack, l^5, secured to the cover K. By this construction the lever-handle may be set at any desired angle, and the spades, through the medium of the chain, lever, and shifting disks, be made to enter the ground to any convenient depth.

M is the driver's seat, secured in the ordinary manner to the aforesaid cover.

I employ, in connection with the spader, a corn-planter attachment, for which I propose making a separate application for Letters Patent, but I will briefly describe its construction and operation here. The seed-boxes are secured to the frame-work of the machine by curved supports, in which the axle n has bearings.

Loose upon the axle n revolve the grooved wheels O, provided upon their inner faces with the circular flanges o. Upon the axle, and extending within the said flanges, are secured collars n', Fig. 9, bearing friction-pawls n^2, said pawls being so arranged with reference to the inner surfaces of the flanges as that when the wheels O revolve in a forward direction they (the wheels) are fast with the axle, but when backward move independently of the same.

Upon the axle n, and outside of the bearings of the same, are clutch-boxes P, the inner halves, p, of which have lateral play allowed them by a feather upon the axle, and the outer halves, p', being loose upon said axle and bearing the markers Q.

To arms extending from the segmental supports are fulcrumed the levers q', whose lower ends are bifurcated and embrace the inner halves, p, of the clutch-boxes. By this construction, when the upper ends of the levers are thrust outwardly the clutch-boxes are locked and the markers made to revolve, while when the levers are pushed in the opposite direction the clutch-boxes are unlocked and the markers thrown out of gear. Pivoted to other arms extending from the segmental supports are segmental racks R, whose lower ends, r, are bifurcated and also embrace the halves p of the clutch-box, by which construction, when the clutch-boxes are locked, the racks are thrown in such position as not to interfere with the revolution of the markers, while when the clutch-boxes are unlocked the racks are placed in position to hold the markers away from the earth.

The ends of the axle are provided with nuts to prevent the escape of the markers. On one extremity of the axle, situated between the segmental supports and the clutch-box, a pulley, n^3, is permanently fixed, and from this collar a strap passes over a pulley secured to the cover of the plow-body and up to within reach of the driver's seat, whereby when it is desired to set the marker in a given position, the clutch-box being locked, it becomes only necessary to draw upon the strap, and thus revolve the axle and marker independently of the wheels.

In front of the wheels, and secured to the forward segmental supports, are the boxes S for containing the seed-corn, and in the bottoms of said boxes, and extending out through slots in the sides, are the cut-off valves s, whose outer extremities are hinged to levers s' extending upwardly and fulcrumed in arms s^2 borne by the front segmental supports.

Beneath the cut-off valves are the dropping-plates T, constructed in the ordinary manner and connected by the rod t.

Pivoted to a second bar, t^2, is a lever, t^3, whose

front extremity bears a ball working in the aforesaid socket, and whose posterior extremity is given lateral movement by a cam, t^4, attached midway of the axle n, by which construction it will be seen that the dropping of the corn is made automatic, and that when the machine backs the dropping ceases. Secured to the bottom of the boxes S are the shoes u, having pivoted thereto the circular cutters or rollers w', whose function is to cut the weeds or sod, and thus lighten the draft and remove much of the strain from the shoes.

To the curved tongue-supports a' is pivoted the tongue W, so that the ends of the same may have vertical freedom of movement. The posterior extremity of this tongue is hinged to a connecting-rod, w, whose other end is connected in like manner with the lever w', said lever being fulcrumed to an upright, w^2, attached to the forward transverse bar of the frame-work. The free end of this lever extends within reach of the driver's seat, and is provided with a catch-rack, w^3, to hold said lever in any position in which it may be placed. With this construction, by raising or lowering the lever the tongue is made to assume any desired angle with the plane of the machine, and the corn-planter adjusted or lifted from or returned to its working position. Furthermore, the lever is also used when the machine is about to start for swinging the body of the spader forward and backward, the spades beneath serving as fulcrums, and thus sinking the spades into the soil, whereby the first furrows will be made of equal depth with the remainder.

To the threaded extremities b' of the shaft B are screwed the roller-shafts X, provided upon one extremity with a flange, x, serving to separate the rollers Y from the dust-boxes of the spader-body, and upon the other extremity with nut-cap x' to retain the roller in place.

The rollers and spader-body are separated such a distance as that the grooved covering-wheels of the planter shall act upon the intervening space. Furthermore, the spader-body is constructed with a width of four feet, (that distance usually dividing the corn-rows,) and each of the rollers is of like width.

The operation of the machine is as follows: The lever I having been raised and set at such point as gives the required thrust to the spades, and the lever w' depressed so that the planter is lifted from the ground, the cut-off and the marker-levers of the planter are respectively drawn inwardly and pushed outwardly to shut the boxes and ungear the marker, and the machine is ready for action. Let it be supposed that work is begun in the northeast corner of a plot, and that the machine is started in a westward direction. The first row is thereupon simply spaded, while the rollers act to crush down the weeds and stubble on either side. Arriving at the end of the row, the lever I is depressed and the machine turned half-way around, thus bringing it in such position that the left-hand roller rests upon the spaded row. The lever I is then raised, the lever w' lifted in order to allow the planter to come in operative position, the upper end of the left-hand cut-off lever of the planter drawn inward to open the seed-box on that side, and the left-hand marker-lever also drawn inward to throw the marker on that side in gear. Driving then eastwardly, so that the left-hand edge of the spader shall work upon the near line of the already-spaded row, the corn is dropped and covered a short distance within the said line of spaded ground at regular intervals, and the spots marked by the markers, while the roller upon one side rolls the spaded ground and upon the other crushes the weeds, stubble, &c. Arriving at the eastern corner of the plot, all the levers are reversed and the machine turned in a westwardly direction, the right roller resting upon the second spaded row. The driver then proceeds until the seed-boxes are in line with the marker-prints of the last row. The levers governing the right-hand seed-box and marker are then drawn inward, the levers I and w' reversed from their last position, and the machine driven westwardly. The last two series of operations are thereafter repeated again and again until the whole plot has been planted, the machine all the while remaining upon the same side of the unworked portion of the field.

It will be seen that in consequence of the construction of my machine the parts may be used separately or together—*i. e.*, the side rollers may be removed and the spader used alone as a single roller or spader, or the said rollers and the ungeared spader may be used together simply as one roller.

Having thus described my invention, what I claim as new is—

1. The combination, with the frame-work A, shaft B, disks D, spades E, and slats F, of the collars c, provided with flanges c', springs e^3, disks G, having arms g^3, and lever I, substantially as and for the purposes specified.

2. In a spader, the combination, with the disks G, lever I, and cover K, of the lever L, support k, chain l^2, support l^3, pulley l^4, and rack l^5, substantially as described, whereby the spades may be adjusted to any desired depth of thrust, as set forth.

3. In combination with the cylindrical body of the spader and its shaft B, the rollers V V, supplementary roller-shafts X, screwed on shaft B, and having flanges x and nuts x', all arranged as shown and described.

4. The combination, with the shaft B, disks G G, and lever I, of the arms g^3, having slots g^4, and the dust-boxes H, having side openings, h h', all as shown and described.

ENOS MONROE MILES.

Witnesses:
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