(No Model.) 4 Sheets—Sheet 1.

J. H. FOGARTY.

STEAM PLOW.

No. 258,046. Patented May 16, 1882.

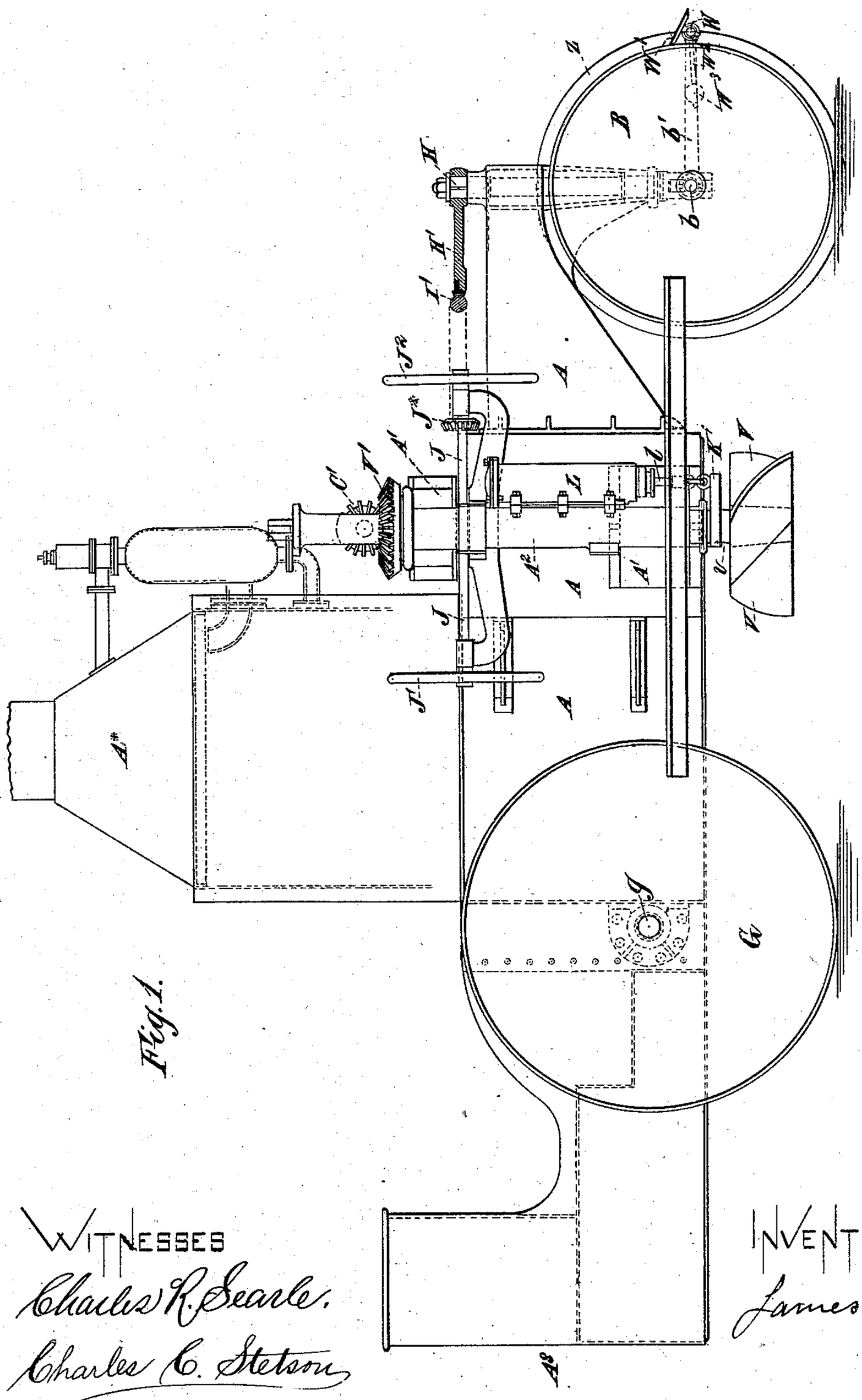

Fig. 1.

WITNESSES

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(No Model.) 4 Sheets—Sheet 2.

J. H. FOGARTY.

STEAM PLOW.

No. 258,046. Patented May 16, 1882.

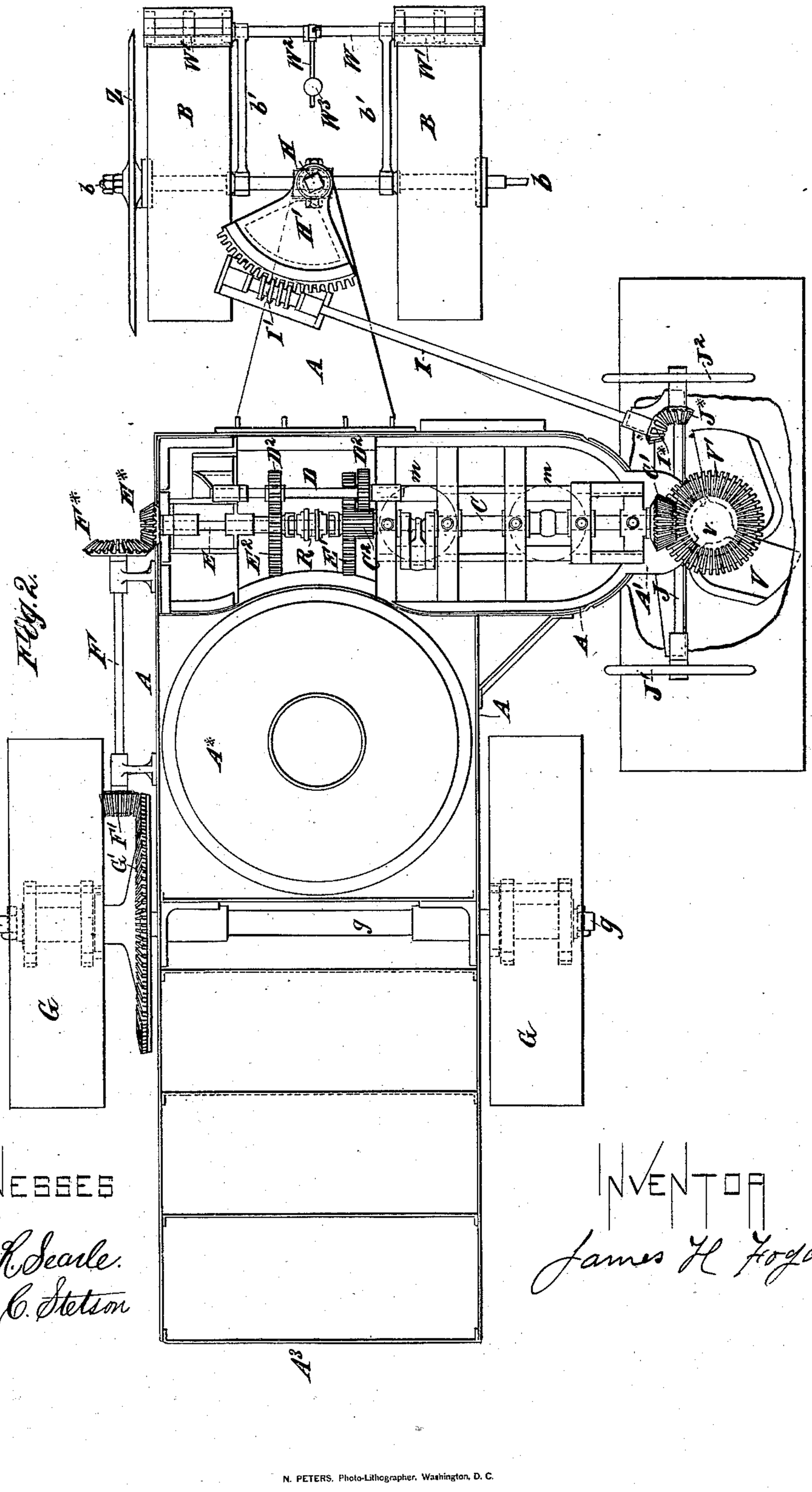

Fig. 2.

WITNESSES

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(No Model.)

4 Sheets—Sheet 3.

J. H. FOGARTY.

STEAM PLOW.

No. 258,046. Patented May 16, 1882.

Fig. 3.

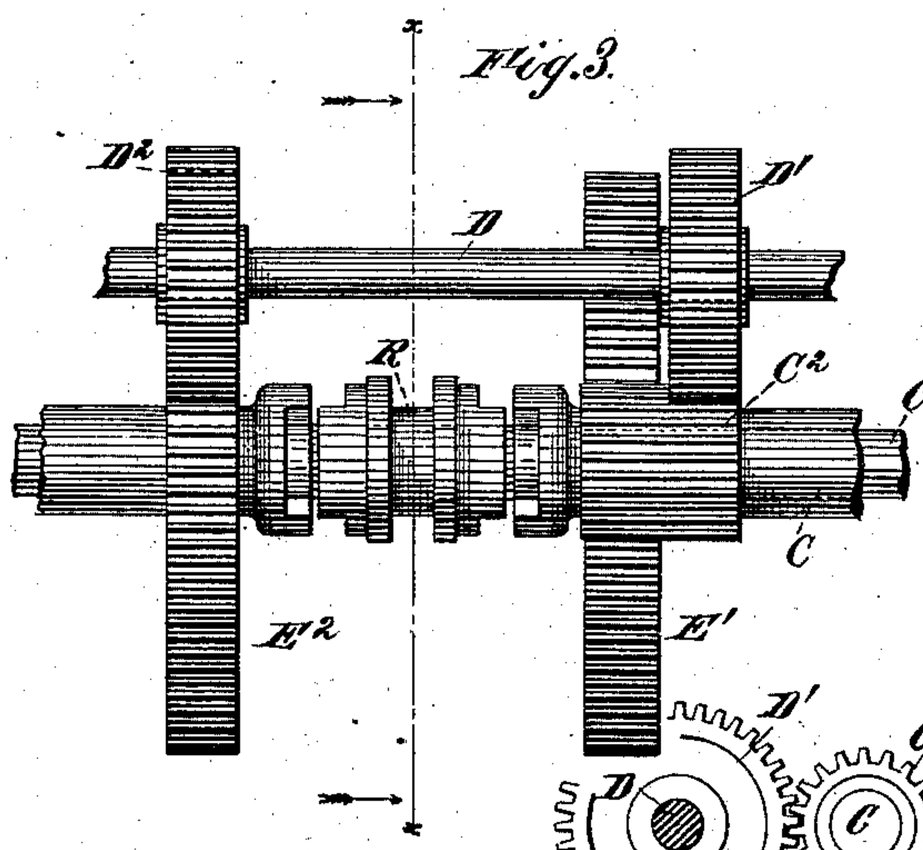


Fig. 4.

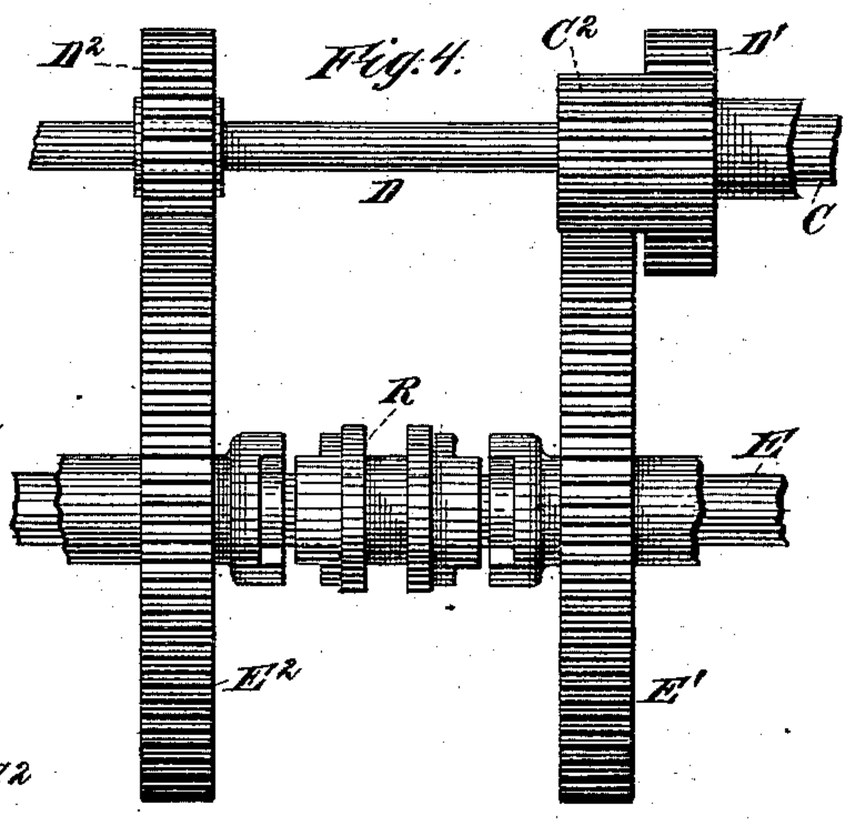


Fig. 5.

Fig. 6.

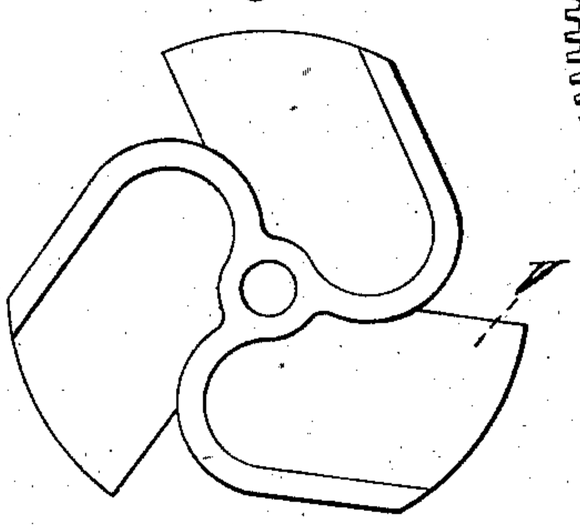


Fig. 7.

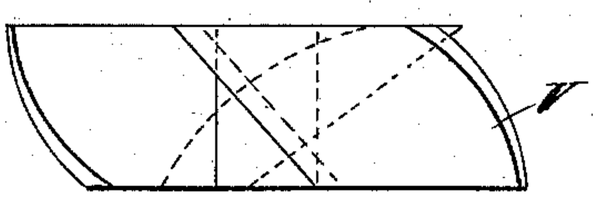


Fig. 8.

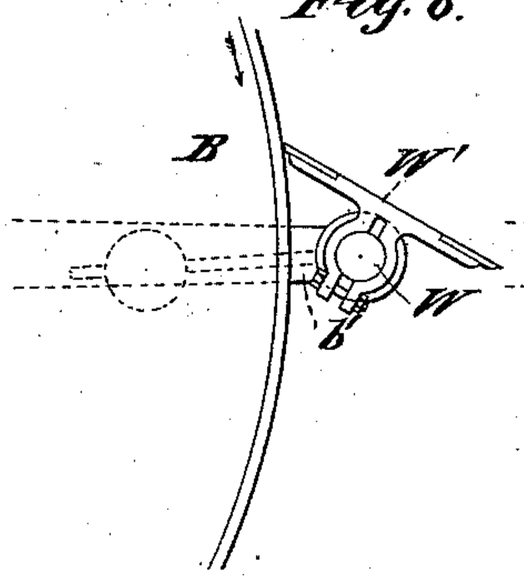
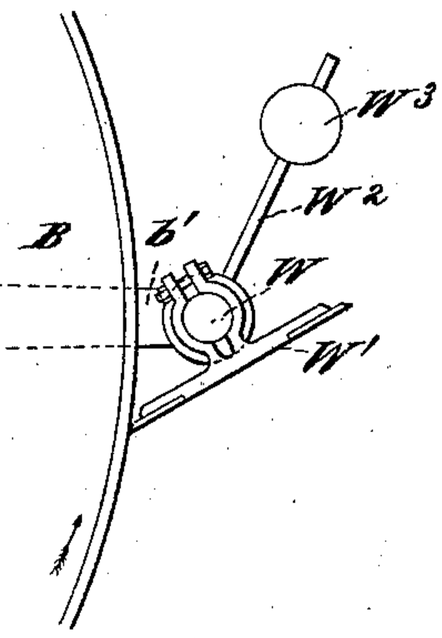


Fig. 9.



Witnesses

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4 Sheets—Sheet 4.

J. H. FOGARTY.

STEAM PLOW.

No. 258,046. Patented May 16, 1882.

Fig. 10.

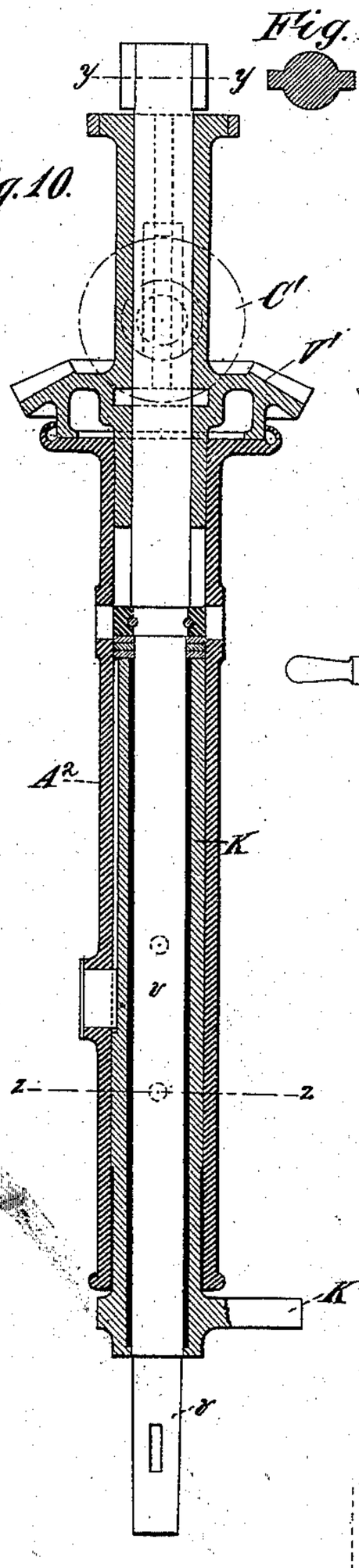


Fig. 10ª

Fig. 11.

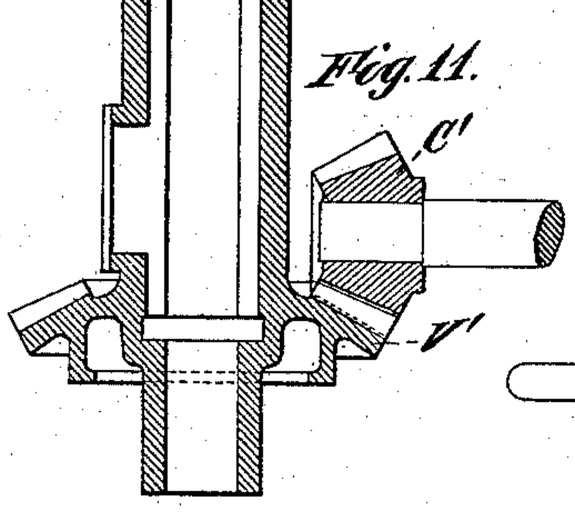


Fig. 13.

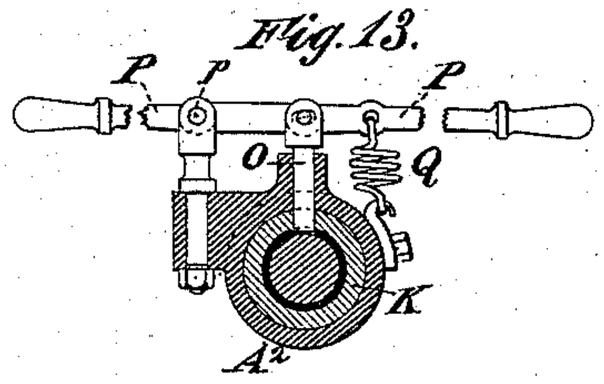


Fig. 12.

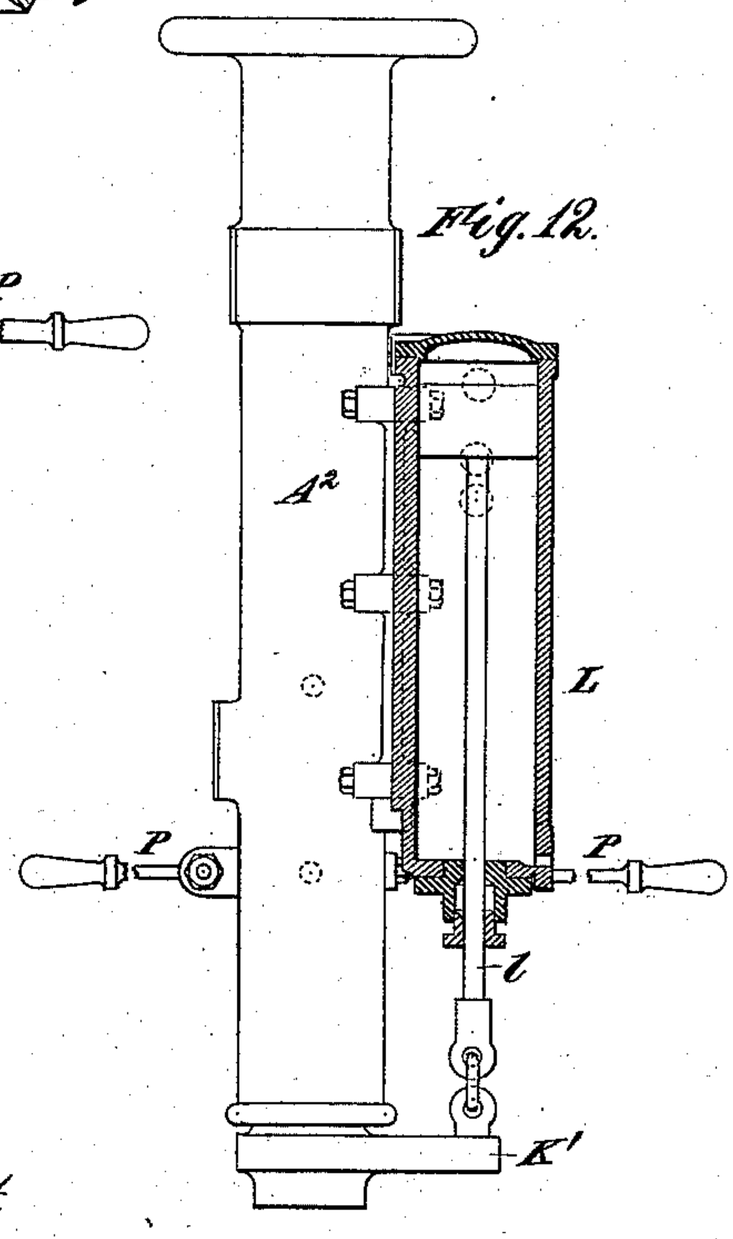
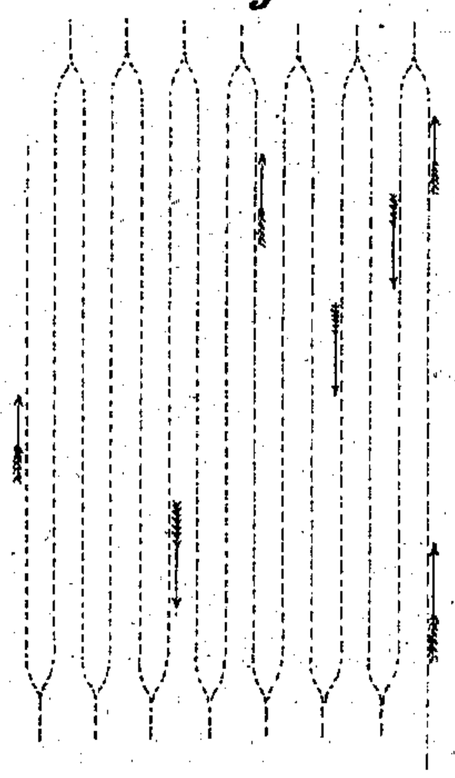


Fig. 14.



WITNESSES

Charles R. Searle.
Charles C. Stetson

INVENTOR

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UNITED STATES PATENT OFFICE.

JAMES H. FOGARTY, OF NEW YORK, N. Y.

STEAM-PLOW.

SPECIFICATION forming part of Letters Patent No. 258,046, dated May 16, 1882.

Application filed December 8, 1881. (No model.)

To all whom it may concern:

Be it known that I, JAMES H. FOGARTY, of New York city, in the county and State of New York, have invented certain new and useful Improvements relating to Steam-Plows, of which the following is a specification.

I employ a revolving plow or agitator, carried on an upright shaft and rotated actively by steam-power apparatus mounted on a carriage, supported on wheels, with provisions for impelling the carriage at a moderate rate in one direction or the other, guided by swiveling the wheels at one end. The framing is overhung at one side, so that the upright shaft and the plow or agitator, which revolves in a horizontal plane, cuts and pulverizes the earth in a channel of a width corresponding to the diameter of the cutting instrument, and so that the whole of this channel is outside of the path traversed by the wheels. The machine is traversed alternately across the field and back without turning around, the wheels bearing all the while upon the firm or unplowed earth. I so arrange the parts that the weight of the framing, boiler, and machinery, as also of the fuel and water, is supported mainly on the driving-wheels. The other wheels are preferably nearer together. They bear a sufficient portion of the load to insure their efficiency as guiding means. I use a pair of small coupled engines, driving a shaft overhead which is geared very directly to the plow-shaft. The engines may revolve continuously, and the plow turns in the same direction whether the carriage is traversed one way or the other. I gear with a relatively slow motion to the driving-wheels.

The accompanying drawings form a part of this specification, and represent what I consider the best means of carrying out the invention.

Figure 1 is a side elevation, partly in section. Fig. 2 is a plan view. The remaining figures represent details on a larger scale. Fig. 3 is a plan view of the clutch device and connections. Fig. 4 is an elevation of the same. Fig. 5 is a section on the line *x x*, seen in the direction of the arrows in Fig. 3. Fig. 6 is a plan view of the plow or agitator. Fig. 7 is an elevation of the same. Figs. 8 and 9 are elevations showing the position and application of the scrapers on the forward wheels, Fig. 8 showing a scraper, as in Fig. 1, and Fig. 9 showing the position it will assume when the machine is traversing in the opposite direction. Fig. 10 represents the telescopic bearing for the plow-shaft in central vertical section. Fig. 10ª is a horizontal section on line *y y* in Fig. 10. Fig. 11 is a corresponding section of a portion at right angles to Fig. 10. Fig. 12 is an elevation of the lower part of the telescopic bearing and a central vertical section of the raising device therefor. Fig. 13 is a horizontal section on the line *z z* in Fig. 10, and shows the means for locking the telescopic bearing in its highest or lowest position. Fig. 14 is a diagram showing the line of motion of the center of the apparatus while at work in a field.

Similar letters of reference indicate like parts in all the figures.

A is a substantial frame-work, forming the body of the machine. It carries an upright boiler, A*, with all the necessary accompaniments—smoke-pipe, dampers, safety-valve, water-gage, &c.

The machine is adapted to work with equal facility in both directions; but, for convenience, I will designate as the forward end that end which carries a pair of relatively-light wheels, B, mounted on an axle, *b*, swiveled by means of a train of mechanism operated by a hand-wheel to steer the machine.

G G are driving-wheels mounted on an axle, *g*, having ordinary provisions for making the wheels fast on the shaft, or setting them free by inserting pins through holes in the wheels and engaging with face-plates fast on the shaft, as has long been practiced in many such constructions.

A′ A′ indicate stout portion of the framing A, extending out on one side, and stiffly braced to support the plow-shaft.

V represents the revolving cutter or plowing device, and *v* the upright shaft thereof, which is supported in peculiar bearings in the framing. A beveled gear-wheel, V′, feathered on the upright shaft *v* of the revolving-plow device V, is engaged by a gear-wheel, C′, keyed on the double-cranked shaft C. The cranks of this shaft, which I sometimes term the "engine-shaft," or "main shaft," receive connecting-rods from pistons working in cylinders *m m*, which are provided with the necessary valves,

worked by eccentrics on the shaft C, constituting a small but complete and efficient double engine, receiving steam from the boiler, A*, and communicating rotary motion to the main shaft C in the usual manner. The power expended on the plow V is communicated through the gears C′ V′. The small power required for moving the structure is transmitted through a train of gearing, varied in its relations by a clutch, so that the engine and cutter may revolve uniformly in one direction, while the driving-wheels are at rest, or are being slowly turned in one direction or the other by the same engine.

A sliding clutch-piece, R, equipped with ordinary means, not represented, for imparting end motion, is feathered on a shaft, E, parallel to the main shaft C. As the piece R is shifted one way or the other it engages with the corresponding clutch-faces of one of the two wheels E′ E², which are mounted loosely on the shaft E. The wheel E² engages with a gear-wheel, D², which is keyed on a counter-shaft, D. The other wheel, E′, engages with a broad gear-wheel, C², which is mounted on the main shaft C. These shafts are so arranged that the broad gear-wheel C² engages also with a wheel, D′, on the counter-shaft D. The shaft E engages, by means of a beveled-gear wheel, E*, with a beveled-gear wheel, F*, on a longitudinal shaft, F, which latter engages, by a beveled-gear wheel, F′, with a beveled-gear wheel, G′, on the axle *g*, and thus turns the large driving-wheels G G and moves the whole structure. When the clutch R is moved in one direction it engages with the wheel E′, and the engine-shaft C acts, through the broad gear-wheel C² and the wheel E′, to turn the shafts E, F, and *g*, and consequently the driving-wheels G, in one direction, and thus to move the machine in the direction which I have called "forward." When the clutch R is, on the contrary, moved in the opposite direction, it engages with the gear-wheel E², which receives motion not directly from the main shaft C, but through the interposition of the counter-shaft D, and the gear-wheels D′ and D². This induces a reverse motion. It turns the shaft D in the same direction as the shaft E was before turned. It consequently, by the duplication of gears, turns the shaft E in the reverse direction and turns the shafts F and *g*, and consequently the connected driving-wheels G, in the direction to make the machine move "backward." The machine is not required to turn around at the end of its course across a field, but the oblique movements required to shift its position laterally, and the proper guidance when it is on its course across a wide field, require that the steering-wheels B shall be capable of swiveling. This is effected through an upright shaft, H, carrying a worm-segment, H′, which is engaged by an endless screw, I′, mounted on the shaft I, turned by the operator. The turning is effected by turning either of the hand-wheels J′ J², which are mounted on opposite ends of a longitudinal shaft, J, mounted in suitable bearings near the plow-shaft *v*. A beveled-gear wheel, J*, on the shaft J engages with a beveled-gear wheel, I*, on the shaft I. The attendant can shift his position, and steer by either wheel J′ or J², according to the direction in which the machine is moving.

Fig. 14 gives an outline of the path described by the center of the machine in traversing across a field and in shifting its position at the end of the course to act on a fresh breadth of earth on the return movement. If it be necessary, or desired in any case, the machine may make two or more oblique movements at the end of each furrow.

The form of the framing and the arrangement of the parts causes but a small portion of the weight to rest on the steering-wheels B. Each of these wheels may be loose on the shaft *b*, and a moderate force applied through the hand-wheels J′ J² is sufficient to turn the segment H′, and consequently shift the position of the wheels B rapidly.

The boiler is placed close to the axle *g*. The engine and gearing, as also the plow and its connections, rest their weight on the framing close to the boiler and near the driving-wheels G. The framing A is extended much beyond the axle *g*. The supply of fuel and of water is carried in that overhung end A³. When the machine is light (by which I mean, when the water and fuel are nearly or quite consumed) some three-quarters of the weight rests on the driving-wheels G. When a full stock of coal and water is taken on a still larger proportion is carried on the driving-wheels.

I propose for soft alluvial soils, where this class of machine is most useful, to make the cutter or revolving plow V three feet in diameter, with a capacity for plowing twelve inches deep, or of being lifted to any extent up to eight inches clear. I propose for such machine cylinders nine inches in diameter, with twelve-inch stroke, cutting off at about one-quarter, and an upright boiler four feet six inches in diameter, containing one hundred and eighty-three two-and-one half-inch tubes, so as to present a total of five hundred and sixty-five square feet of heating-surface.

The mechanism for lifting the plow by steam, when required, differs from that in the patent to me, dated March 16, 1875, in having the cylinder and piston mounted alongside, instead of above, fixed casing A², which surrounds the telescopic bearing K. The latter is lined with Babbitt metal, and forms a long and reliable bearing and a stiff support efficiently guided by the fixed casing A². From the lower extremity of the telescopic bearing K a horizontal arm, K′, projects. The piston-rod *l* is connected thereto, and when steam is admitted in the base of the lifting-cylinder L lifts the telescopic part K K′, and with it the plow, as will be obvious.

The provision for gaging the depth to which

the plow V descends when the steam is released from the piston may be the same as set forth in the patent of 1875 referred to.

When the steam has, by its tension on the piston-rod *l*, acted through the arm K′ to lift the sleeve and plow, the pressure of the steam need not be maintained to hold the parts elevated. This function is performed by a latch, O, arranged to engage in recesses in the telescopic bearing K, and actuated by the lever P turning on a fixed center, *p*, and provided with a handle at each end, so that the latch can be disengaged by the attendant standing at either of the hand-wheels J′ or J². A spring, Q, urges the lever into the position which engages the latch.

Rigid arms *b′* extend forward from the front axle, *b*, and form supports for a transverse shaft, W, capable of being rocked either automatically or by the attendant. This shaft has rigidly fixed near each end a reversible scraper, W′, adapted to remove any mud which may adhere to the peripheries of the forward wheels, B. It also has rigidly attached an arm, W², carrying a weight, W³, which tends to hold it in one extreme position or the other. When the machine travels in one direction the earthy accumulations on the wheels are carried forward over the top of the wheels and removed by the scraper standing in the position shown in Fig. 8. When the machine travels in the opposite direction the earth is carried up and is scraped off by the scrapers standing in the position indicated in Fig. 9. The change of position may be made by the attendant. If neglected by him, if a hard coating adheres to the wheels, the scrapers change their positions automatically. They do this by the force received from the motion of the hard mass acting on the back of the scraper, as will be readily understood. The scrapers only require attention under unusual conditions.

Z is a removable cutter-wheel having a thin cutting-edge extending out beyond the periphery of one of the wheels B to which it is adjacent. It is confined on the extended end of the axle *b* by means of nuts or other suitable fastenings. Its function is to cut a thin score in the earth and take hold thereof to steady the front of the machine by guarding it against any motion laterally. This cutter-wheel Z, equally with all the other parts, performs its functions successfully with the machine traversing in either direction. The mark in the earth made by the wheel Z is also useful as a guide in steering the machine on the next passage across the field. I provide two of the cutter-wheels Z, and extend, as described, both ends of the axle *b;* but it will usually be necessary to use but one. It can be used on either side. I prefer the side represented.

Modifications may be made in the forms and proportions of many of the details, and obviously in the size of the entire structure. The breadths of the several wheels may be varied. The steering-wheels B will serve if quite narrow. One wheel of moderate width mounted on a swiveling support may serve.

A friction-clutch of any approved form may be used instead of the positive clutch R to engage the wheels E′ E² alternately, as required.

Duplicate collars or any of the approved forms of thrust-bearings may be used to engage the plow-shaft *v* with the telescopic bearing K.

Some of the advantages due to certain features of the invention may be separately enumerated, as follows:

First, by reason of the upright shaft *v* and plow V revolved, as shown, outside of the line of travel of the wheels, and of the capacity for reversing the motion of the carrying-wheels, I am able to plow backward and forward across the field without turning around, and with all the wheels resting on the firm and unplowed portion while moving in both directions.

Second, by reason of the counter-shaft D, with its wheels D′ D² mounted parallel to the shaft C, with its broad gear-wheel C² in combination with the other parts, as shown, I am able to transmit the power required for the slow traversing motion of the carriage in either direction at will by simply shifting the clutch R, while the plow V and its operating mechanism is revolved always in the same direction.

Third, by reason of the arm K′ at the base of the telescopic part K, and of the piston-rod *l* and its connections arranged at the low level shown, I materially reduce the height of the structure.

Fourth, by reason of the latch O, lever P, and spring Q serving, as shown, relatively to the telescopic bearing K, shaft *v*, and plow V, and its impelling gear-wheel V′ and its connections, I am able to hold the plow elevated or depressed, and to release it efficiently and conveniently.

Fifth, by reason of the scrapers W′ on the rocking shaft W, supported by the arms *b′* from the steering-axle *b*, provided with the loaded arm W² W³, as shown, I am able to scrape the steering-wheels B efficiently whether traveling in one direction or the other, and to insure the automatic adjustment of the scraper for the motion of the machine in either direction.

Sixth, by reason of the cutter-wheel Z, arranged as shown, I am able to avoid the tendency of the machine to swing around in consequence of the resistance offered by the earth to the motion of the plow V.

I claim as my invention—

1. In a steam-plow having capacity for moving in both directions without turning around, the arrangement of the revolving plow V and upright shaft *v* outside of the line of travel of the wheels, as and for the purposes herein specified.

2. The revolving plow V, mounted on the upright shaft *v*, in combination with the engine-shaft C, with its gear-wheel C², counter-

shaft D, with its wheels D′ D², wheels E′ E², clutch R, and shaft E, with its gear-wheel E*, and the train of connections therefrom to the driving-wheels G, as herein specified.

3. In a steam-plow, the lifting-cylinder L and piston-rod *l*, arranged alongside the telescopic bearing K, and connected by the arm K′, and adapted to serve relatively to each other and to the plow V, and its operating means, as herein specified.

4. In a steam-plow, the latch O, lever P, and spring Q, in combination with the telescopic bearing K and the connected plow V *v*, as herein specified.

5. In a steam-plow, the scrapers W′, carried on a rocking-shaft, W, supported and loaded as shown, and serving relatively to the wheels B, as herein specified.

6. In a plowing-machine, the driving-wheels G G, plowing device V, operated outside of the path of the driving-wheels, and the cutter-wheel Z, mounted at one end of the machine, combined and arranged as herein specified.

In testimony whereof I have hereunto set my hand, at New York city, this 22d day of November, 1881, in the presence of two subscribing witnesses.

JAMES H. FOGARTY.

Witnesses:
CHARLES R. SEARLE,
CHARLES C. STETSON.