3 Sheets—Sheet 1.

J. S. HALL.

Steam-Carriage.

No. 16,919. Patented Mar. 31, 1857.

Fig. 1.

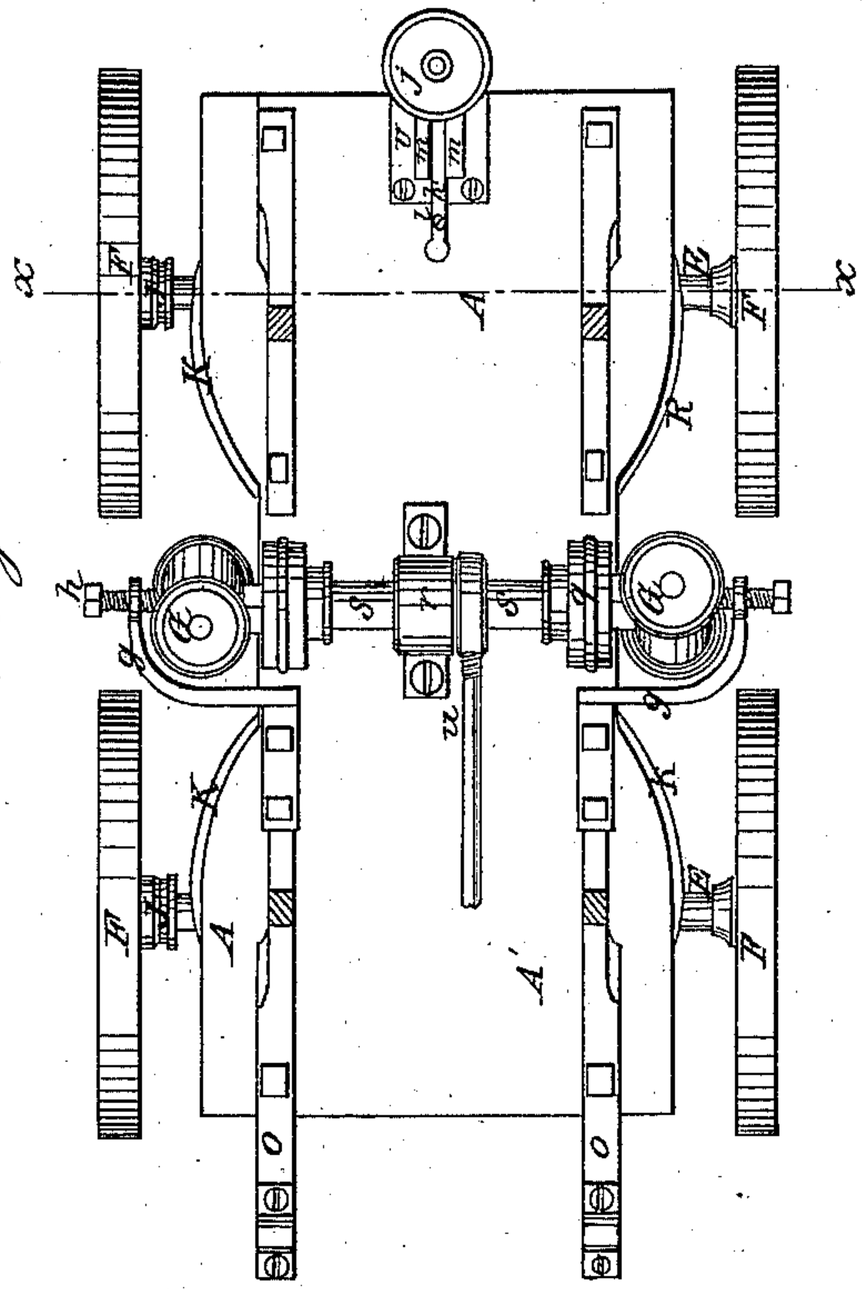


Fig. 2.

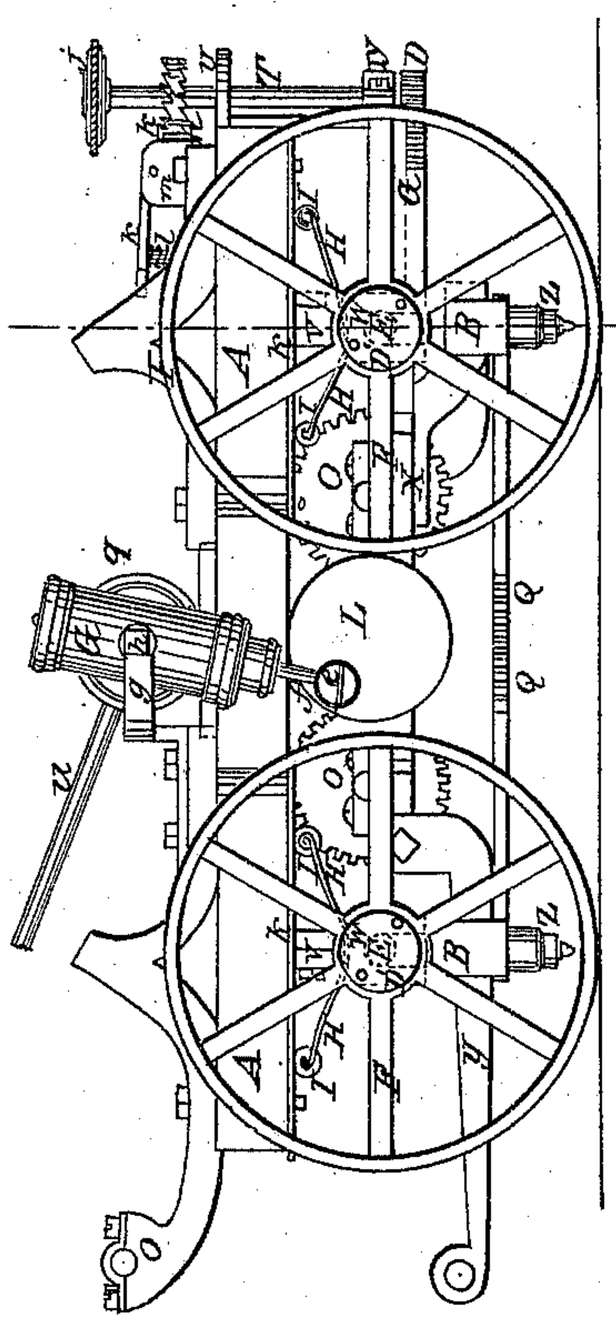


Fig. 4.

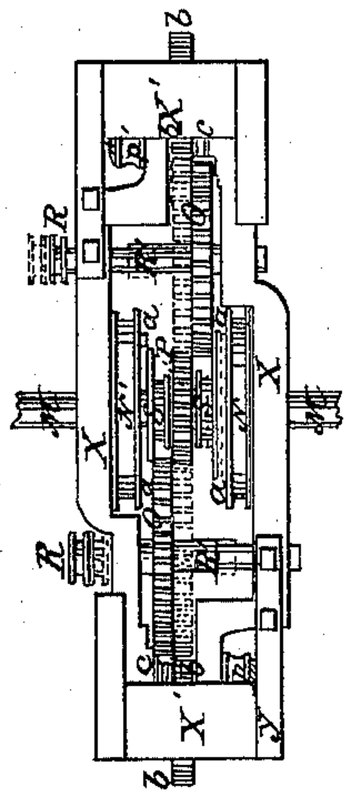
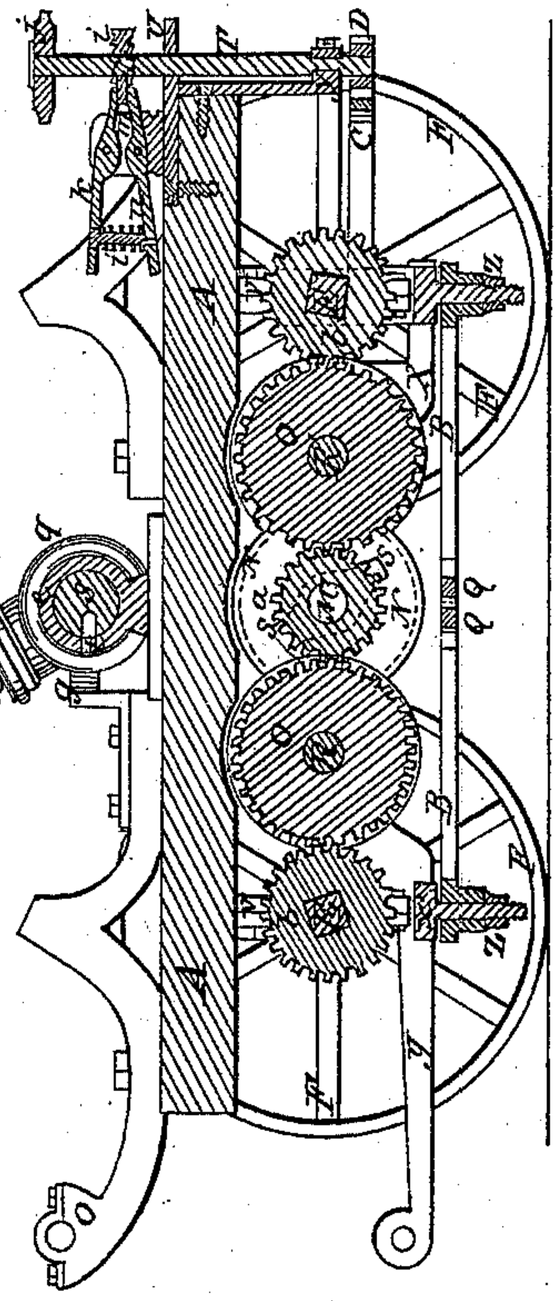


Fig. 3.



3 Sheets—Sheet 2.

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Steam-Carriage.

No. 16,919.

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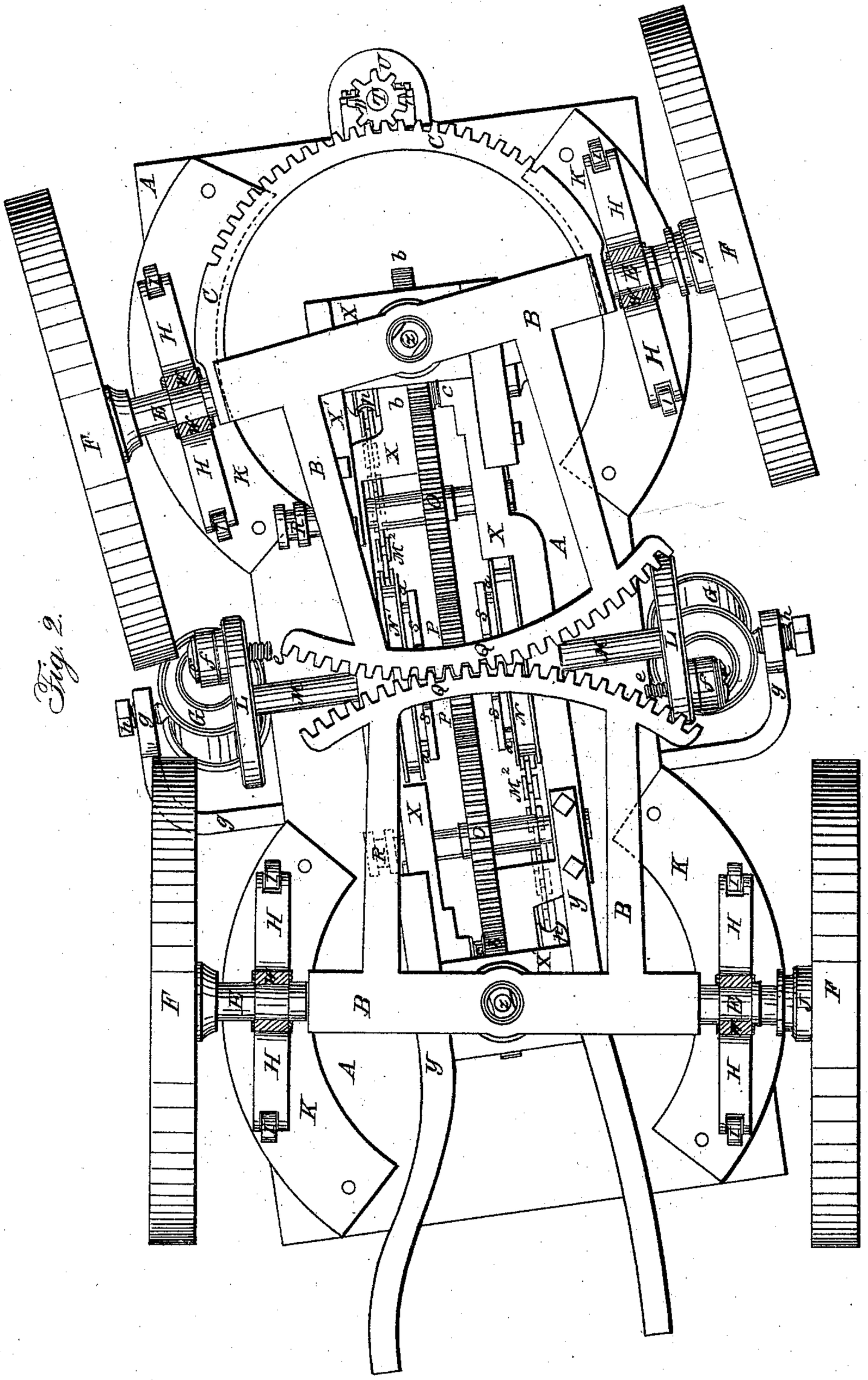
Fig. 2.



J. S. HALL.

Steam-Carriage.

3 Sheets—Sheet 3.

16,919.

Patented Mar. 31, 1857.

Fig. 2.

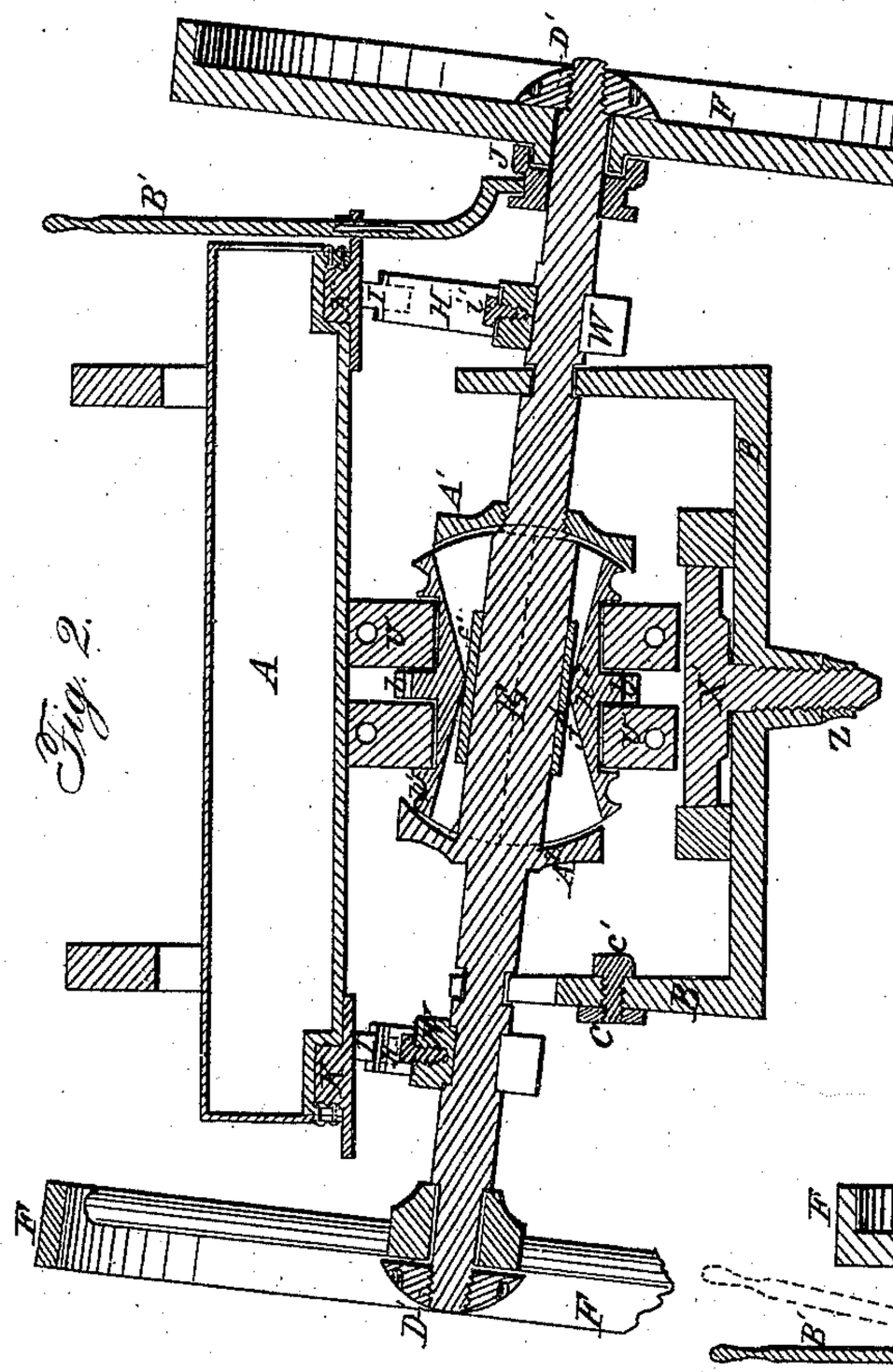


Fig. 3.

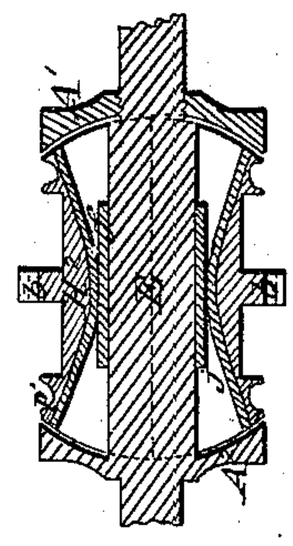


Fig. 4.

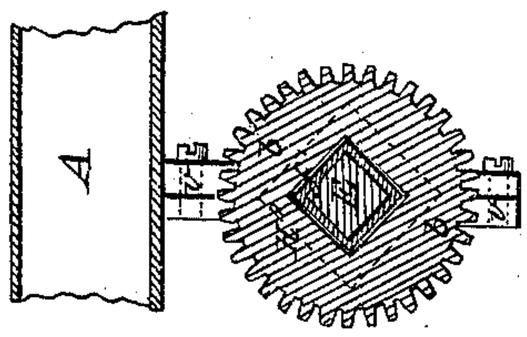


Fig. 1.

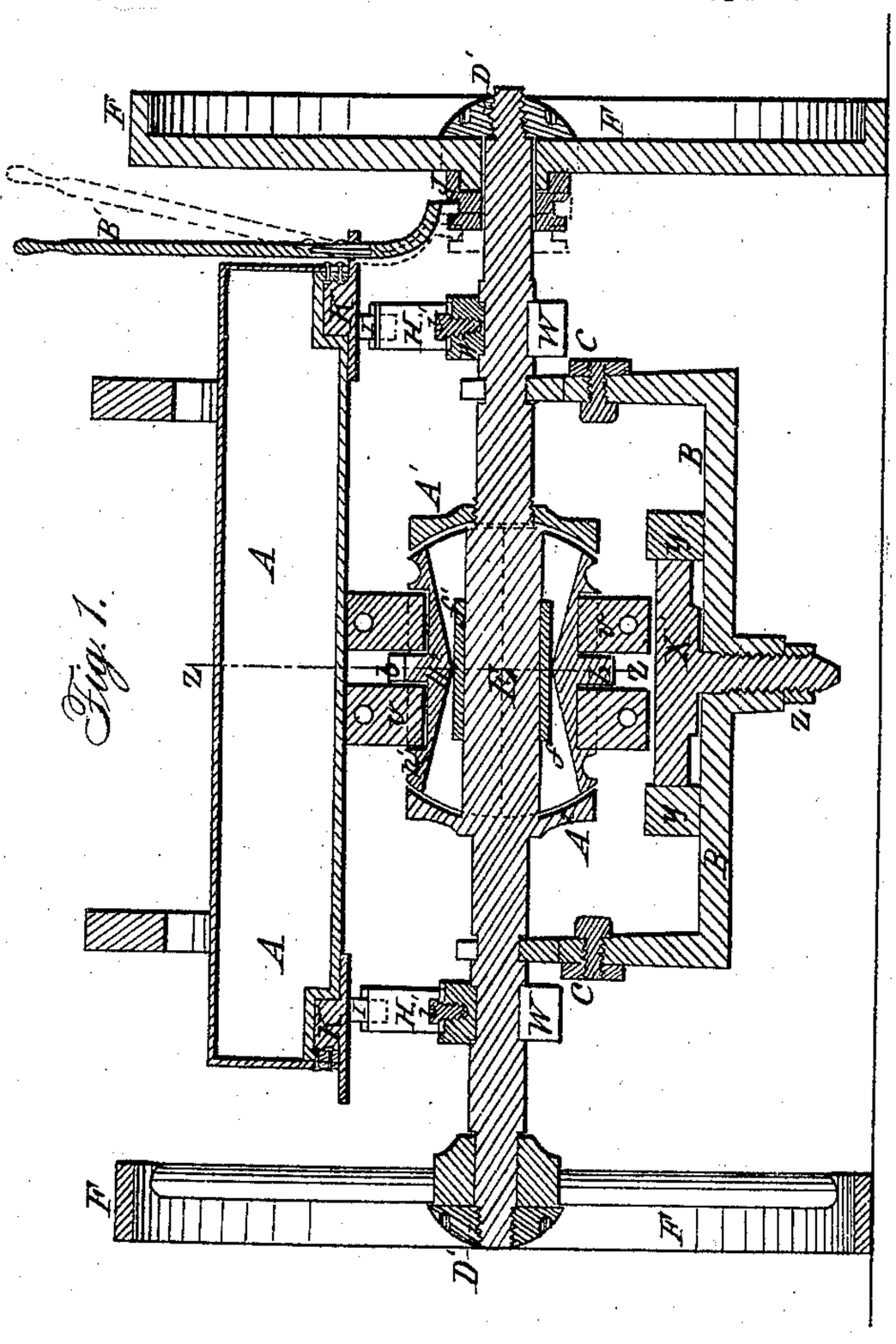


Fig. 6.

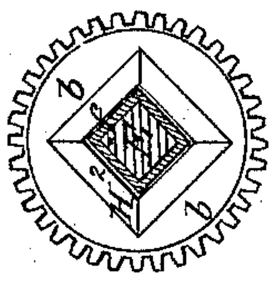
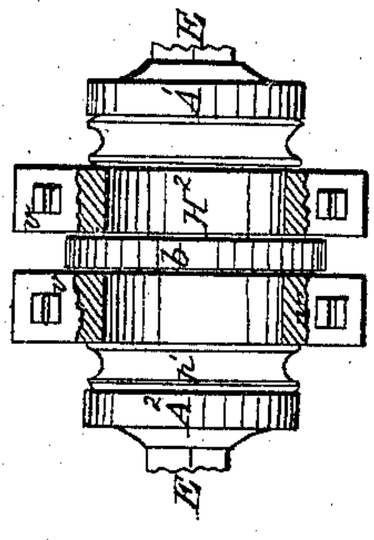


Fig. 5.



UNITED STATES PATENT OFFICE.

JOHN S. HALL, OF PITTSBURGH, PENNSYLVANIA.

STEAM-CARRIAGE.

Specification of Letters Patent No. 16,919, dated March 31, 1857.

To all whom it may concern:

Be it known that I, JOHN S. HALL, of Pittsburgh, in the county of Allegheny, in the State of Pennsylvania, have invented new and useful Improvements in Steam-Carriages; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings and to the letters of reference marked thereon.

The nature of my invention consists in certain improvements as hereinafter described, by which I am enabled to construct a very simple and practical "steam carriage" or locomotive for common roads, for plowing, &c., and which also embraces the advantages of a stationary motive power for driving any kind of machinery.

To enable others skilled in the art, to make and use my invention, I will proceed to describe its construction and operation, reference being had, to the accompanying drawings, forming part of this specification. The character of the views of the different plates may be readily understood, from the explanations following, viz:

Plate I: Figure 1, represents a top view of carriage. Fig. 2, represents a side elevation of carriage. Fig. 3, represents a vertical section of carriage. Fig. 4, represents a skeleton bottom view of carriage.

Plate II: Fig. 2, represents a bottom view of carriage.

Plate III: Fig. 1, represents a vertical section of carriage at line "*x x*," Fig. 1, Plate I. Fig. 2, represents, similar view, with axle (E) in an oblique position or with one of its wheels, elevated. Fig. 3, represents a modified form of box (H^2), (seen in Figs. 1 and 2, Plate III). Fig. 4 represents a vertical section of driving box, on line "*z, z*," Fig. 1, Plate III. Fig. 5, represents a side elevation of box (H^2) and portion of shaft (E) on which are collars (A' A^2). Fig. 6, represents an end elevation of driving box (H^2).

I construct the body or floor (A,) of my carriage, of any desirable size or form, (for instance, the shape represented in the drawings,) of boiler iron, or hollow (best seen in Plate 3,) for the purpose of serving as a tank, for containing water for feeding the boiler during travel or the operation of the engines. I also design constructing the frame work or large beams supporting the machinery, in the same way, for the same purpose.

(G, G,) represent two oscillating engines, the pistons (*f*,) of which, are connected by a crank pin at (*e*,) to the face plates (L,) which are fast on the main driving shaft (M).

(*q*, *q*,) are the steam chests, (S,) the steam pipe, and (*u*,) the reversing lever, by which latter, the engines are reversed, for backing or other purposes. To the bottom of the floor of the carriage near either end and in a central position, laterally are firmly secured, two stands, (V, V,) provided with caps, and which form bearings for the universal driving boxes (H^2, H^2,); the peculiar construction of said boxes, is readily comprehended by examining the different views of the same in the drawings; it will be seen that these boxes are so constructed as to adapt themselves to the boxes (V, V,) or straps, which pass around them in grooves or between shoulders, and that the former are thus enabled to revolve as a shaft or spindle, without having any lateral motion, and that either of said boxes has, formed around the center of its outer surface a pinion (*b*,) and near either end, a groove (P, P′,), which grooves, act as pulleys, and that the opening through the center of each of said boxes is of the form represented by two frustums of square pyramids joined together at their smaller bases. And the ends of said boxes, it will readily be perceived, are formed in the plane of a sphere, whose center is at the center of the box.

(E, E,) are the axles which are made square, where they pass through the boxes (H^2,) or between the collars (A', A^2,) one of which (A^2,) is made solid or fast with the axle, the other (A') to screw on as a nut, upon a thread cut on a portion of the axle, the said collars have their adjacent sides, formed in the plane of the same sphere as the ends of the box, (H^2,) and are for the purpose of retaining the axles in the box (H^2,) or in position longitudinally; on either end of the axles (E,) are suitable shoulders and bearings adapted to the hubs of the wheels (F, F,) which are secured in place, by means of nuts (D') or in any other desirable manner. (W, W,) are two straddle boxes, one near either end of the axle (E,) and immediately under the center of the track, or friction plate (K) on

the top of said boxes are fastened, by means of bolts (*i*,) the springs (H,) which support the body of the carriage;—in either of the ends of the springs (H,) are friction rolls (I,) which bear on the plates or tracks (K,) which are circular in a horizontal plane (best seen at Plate 2).

The springs (H, H,) are designed to support the carriage and maintain it in nearly a horizontal plane, under any and all circumstances; the operation or tendency of these springs to accomplish the desired object may be partially understood from (Fig. 2, Plt. 3), where the axle (E,) is represented in an oblique position, and the body or floor of the carriage supported in a horizontal plane. I do not pretend to say that by means of these springs constructed, and operating as they do, that the floor of the carriage will remain in a horizontal position no matter how excessively the wheels on one side may be elevated, but that the desired position will be maintained against any reasonable elevation, or that which will be likely to be caused by any unevenness of the ground over which the said carriage may pass. It will also be seen that although the carriage rests literally upon the springs (H,) or the friction rolls in their extremities, that the said springs are not at all confined to said carriage body, but that they travel around in the arc of a circle, struck from a point exactly over, or in the same vertical line with the center of the box, (H^2). (I, I,) are the friction rolls, which bear on plates or tracks (K, K,) on the bottom of the carriage floor. (*f'*) is a sliding or adjustable bushing, on which the universal box (H,) takes its bearing, (see Plt. 3,) the advantage of this sleeve, is its capability of being adjusted on the shaft (E,) for the purpose of renewing the bearing of box (H^2,) on said shaft (or bushing), which box, it will be seen bears, on a very small portion of said bushing consequently soon wears the latter, and requires a new bearing which is presented by slipping the said bushing (*f'*,). I would here remark that the universal box may be made with its bearing point, slightly curved or rounded off as seen at (Fig. 3, Plt. 3) instead of being angular (as represented at Fig. 1, Plt. 3) and also that the said boxes may be provided with internal bushings, (as represented by that portion of (Fig. 3, Plt. 3) which is colored (blue) for the purpose of renewing their interiors or bearing surfaces economically). (J, J,) are clutches on the axles (E,) which are operated by means of shippers (B', B') (see Plt. 3,) and which are designed to couple to, or uncouple from the axle (E,) their respective wheels (F,) it being necessary so to do, when the carriage is required to turn around as those wheels traveling in the larger circle must necessarily go faster than their opposites.

(X) is the frame work solid with the stands (V, V,) and through them secured to the bottom of the carriage; on said frame work are constructed the boxes, or bearings of the main shaft (M,) and those of the shafts of the intermediate gears (O, O,) at either end of the frame work, lower down than the rest, are cross beams or plates (X') which plates have projecting downward from their bottom sides, studs (Z,). The projecting arms (Y, Y,) at the rear end of the frame work, together with the brackets and stands (*o*,) on top of the carriage, though represented in the drawings, require no description here, as they were originally designed for attaching a series of plows, but are not considered as part of this invention. (B, B,) are two swiveling frames the construction of which is best understood by reference to the drawings, where it will be observed that these frames are supported by the pivots or studs (Z, Z,) and their nuts (see Plate 3,) on which studs they turn freely in a horizontal plane; at either side of these frames project upward arms, which are slotted to receive the axles (E,)—and in which said axles may freely swing in a vertical plane, but by which they are confined horizontally; to the said arms of the forward frame are also secured the steering arcs (C,) by means of bolts, (C',) (see Plate 3,). The said frames (B,) have also each two horizontal arms, (see P. 2,) with which are cast the arcs, or segments of spur gears (Q, Q,) by means of which the two axles are geared to each other: whereby they derive the peculiarity of always moving together, and in such directions as that their adajcent ends shall always approach toward, or depart from each other, and of always being locked the one with the other.

(C,) is the steering or swiveling arc which is bolted to the upward arms of the forward frame (B,) by bolts (C',) as before described, and which meshes into the pinion (D) (see Plates 1, and 2,); said pinion (D,) is keyed on a vertical shaft (T,) which is supported by the box (V',) in which it has its lower bearing, the upper bearing of said shaft is formed in plate (U,) which latter is firmly secured to the top surface of the carriage floor; on the top of said plate (U,) is a stand (*m*,) in which are pivoted the pawls, (*k*, and *n*, see Fig. 3, Plt. I,) said pawls or fingers bite into the double ratchet wheel (*i*,) on shaft (T,) and are kept locked into said wheel by means of the spiral spring on the stud or pin (*l*,) which is fast to pawl (*n*,) and works loose in a slot, in pawl (*k*,); the operation and advantages of this peculiar mechanism, are as follows:—When the shaft (T,) is required to be turned to the left which is done by the hand wheel (*j*,) the back end of pawl (*n*,) is raised up and its front end thus thrown down or

out of the lower ratchet, while said elevation of the back end, compresses the spiral spring on stud (*l*,) and causes it to exert sufficient pressure on pawl (*k*,) as to insure its biting successively into the notches of the upper ratchet; when it is required to turn the shaft in the opposite direction, the back end of pawl (*k*,) is depressed, which unlocks it, and causes the spring to operate on the lower pawl, as it before did on the upper one.

(P) is the main driving pinion; it is keyed to the shaft (M,) and meshes into the intermediate gears (O, O,) which are fast on the shipable shafts (R′, R′); said shafts may be shipped or moved longitudinally in their bearings, by means of any desirable shipping arrangement, operating in the shipper grooves, (R, R,) for the purpose of throwing the intermediate gears (O, O,) in or out of gear with the driving pinion (P,) and box pinions, (*b*, *b*, see Fig. 4, Plt. I,) in which the said gears (O, O,) are represented in gear by red lines, and out of gear by black lines.

(N′, N,) are two loose pulleys on the main shaft (M,) which are connected with the driving boxes (H^2,) by means of chain belts (M^2) passing around them and over the pulleys (*p*, *p*′,) on the driving boxes; said pulleys are made fast with the main shaft, by means of splined clutches (*s*, *s*,) which are operated by suitable levers, and take into the clutch pins (*a*, *a*,) in said pulleys (N, N′,) for the purpose of driving the boxes (H^2,) by the endless chains (M^2) at a greater speed, which it is necessary they should run with, when the carriage is performing slight draft. The peculiar construction of the parts of the machine, can only be understood from the drawings and model.

Having given as full a description of the construction as is practicable, I will now proceed to explain the operation of my improved steam carriage which is as follows viz: The oscillating engines (G, G,) being supplied by a steam boiler and furnace (not represented) which boiler is fed from the tank formed in and as a part of the carriage, drive the main shaft (M,) on which is the fast pinion (P,) meshing into the intermediate gears (O, O,) and they into the pinions (*p*, *p*′,) of the boxes (H^2,) by which arrangement of gears the said boxes are driven at the required speed; the said boxes drive the square axles (E,) on which are made fast the wheels of the carriage (F, F). When it is necessary to turn the carriage in either direction the pawls and ratchet wheel (*i*,) and shaft (T,) are operated as hereinbefore described, which operation causes the pinion (D,) meshing into segment (C,) to rotate said segment around its center, and as said segment is secured to the frame (B,) (as before described) it causes said frame to swivel or turn on the stud (Z,) which frame carries with it, by means of its slotted upright arms, the axle (E,) and its opposite one (the two always moving together by means of the arcs (Q, Q,) as before described) and thus causes the adjacent wheels of the carriage to approach toward or depart from each other; when the wheels on either side of the carriage are uncoupled from their axles by means of the clutches (J, J,) and shipper (B′,) (as described) and the carriage is allowed to run in a circle. When it is designed to "back," the engines are reversed by means of the reversing lever (*a*,) and when the carriage is required to run fast, having little labor to perform, the intermediate gears (O,) are thrown out of gear, by means of the shipable shafts (R, R′,) operated by suitable levers, and the pulleys (N, N′,) are made fast with the shaft (M,) by means of clutches (S, S,) when the axles or boxes (H^2,) are driven rapidly by the endless chain (M^2). By throwing the gears (O, O,) and pulleys (N, N′,) both out of connection, the driving shaft is allowed to run without effecting any motion of the carriage, and may be connected to stationary machinery or used to run the pumps for feeding the boiler (without running the carriage).

Having thus fully described the construction and operation of my steam carriage, what I claim as my invention and what I desire to secure by Letters Patent is—

1. So combining and arranging the driving machinery, and body of the carriage, with the wheels and axles as described so that the lathe may be both swiveled, moved, or adjusted in any and all directions, without in the least changing the relation of the parts of or otherwise affecting the said driving machinery or body of the carriage.

2. The stationary, universal driving bearings, or boxes (H^2, H^2), or their equivalents, whereby the axles and wheels may be readily rotated or driven, in all their variable relative positions, with the driving machinery and body of the carriage.

3. The double ratchet wheel (*i*) in combination with the pawls (*k*, and *n*,) and spiral spring, constructed and operating as hereinbefore set forth.

In testimony whereof I have hereunto set my hand and seal.

JOHN S. HALL. [L. S.]

Witnesses:
Jos. Tomlinson,
R. C. Caughey.