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 Albert L. Dewey's Improvement in Toy Locomotive's.

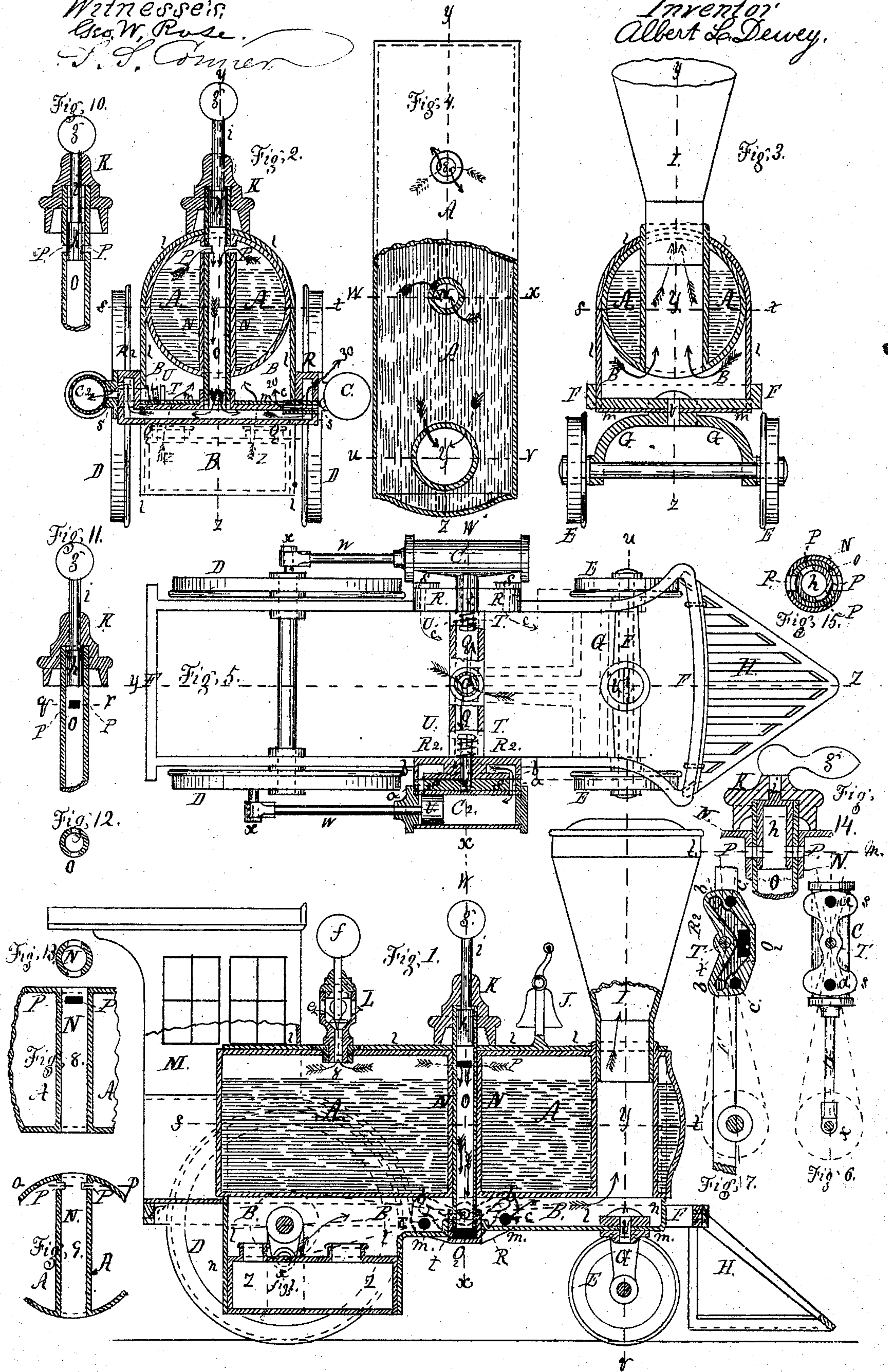
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ALBERT L. DEWEY, OF WESTFIELD, MASSACHUSETTS.

IMPROVEMENT IN TOY-LOCOMOTIVE STEAM-ENGINES.

Specification forming part of Letters Patent No. 116,568, dated July 4, 1871.

To all whom it may concern:

Be it known that I, ALBERT L. DEWEY, of Westfield, in the county of Hampden and State of Massachusetts, have invented certain Improvements in Locomotive-Toy Steam-Engines, of which the following is a specification:

The first part of my invention relates to the peculiar construction and arrangement of the boiler, together with its supporting-jacket or furnace; the object of this part of my invention being to cheapen and simplify the construction of these details and at the same time to obtain a large heating-surface for the boiler. The second part of my invention relates to the peculiar construction and arrangement and combination of the parts composing the engine-frame, steam-chests, pilot, and truck-frame; the object of this part of my invention being to cheapen and simplify the construction of these details, and also to provide for a direct and simple steam communication between the steam-chests and the boiler. The third part of my invention relates to the peculiar construction, combination, and arrangement of the parts composing the throttle-valve and steam-pipe communication from the boiler to the engine-frame; the object of this part of my invention being to cheapen and simplify its details and construction, and also to place the same at a convenient location for practical use. The nature and object of my invention as a whole consist in the peculiar construction, simplification, and combination of the details composing a genuine miniature locomotive-engine to such a degree as to enable it to be produced and sold as a toy.

The novel details of construction and arrangement will be described in connection with the drawing, which represents a machine embodying the improvements.

Figure 1 is a vertical section of my invention taken in the line *y z*, Figs. 2, 3, 4, and 5. Fig. 2 is a transverse section of my invention taken in the line *w x*, Figs. 1, 4, and 5. Fig. 3 is also a transverse section of the same taken in the line *u v*, Figs. 1, 4, and 5. Fig. 4 is a detached plan view of the boiler, shown partly in section in the line *s t*, Figs. 1, 2, and 3. Fig. 5 is a plan view, showing the engine-frame and pilot, &c., complete, with the boiler and its furnace removed. Fig. 6 is a detached view of the cylinder, showing its port-face with its steam-ports. Fig. 7 is a de-

tached side or face view of the engine-frame, showing the steam-chest with the cylinder removed to show its live-steam and exhaust-ports. Fig. 8 represents a sectional elevation of the boiler-pipe N, used to incase the steam-pipe O of the engines. Fig. 9 is also a sectional elevation of the same taken at right angles to Fig. 8. Fig. 10 is an elevation of the engine steam-pipe O, showing its steam-port closed by the throttle-valve *k*. Fig. 11 is also an elevation taken at right angles to Fig. 10, and showing its steam-ports open by the throttle-valve *h*. Fig. 12 is a section of the same taken on the line *q r*, Fig. 11. Fig. 13 is a section taken on the line *o p*, Fig. 9. Fig. 14 is a vertical section, showing a modification of the throttle-valve *h*. Fig. 15 is a transverse section of the same taken on the line *t m* of Fig. 14.

Similar letters and figures of reference indicate corresponding parts.

A represents the steam-boiler. B is the furnace to the same. CC² represent two oscillating steam-cylinders. D represents the driving-wheels. E are the front truck-wheels. F is the main frame of the engines. G is the front or guiding truck-frame. H is the pilot or cow-catcher. I is the smoke-stack. J is the bell. K *h* is the throttle-valve. L is the safety-valve. M is the cab or engineer's house. N is the boiler-pipe for inclosing the steam-pipe *o* in its passage through the boiler A. O is the steam-pipe of the throttle-valve K *h*. P is the steam-ports to the pipes N and O. Q is a hollow pipe or steam-passage, forming a part of the casting composing the engine-frame F, and serving as a common steam-passage from the steam-pipe O to both of the steam-chests R R², which also form part of the casting F. S S are the valves to the cylinders C C². T T are screw-trunnions, upon which the cylinders C C² oscillate. U U are springs to the same. V is the piston-head. W is the piston-rod. X is the crank-pin and stub end of the piston-rod. Y is the flue-pipe to the boiler, into which is fitted the smoke-stack I. Z represents a lamp for generating the steam. *a a* represent the steam-ports of the cylinders C C². *b b* are the live-steam ports to the steam-chest R. *c c* are the exhaust-steam ports, leading from the valve-seat R into the draught-chamber B, as shown in Figs. 1, 2, and 7. *e* are holes for the escape of steam from the safety-valve. *f* is a lead weight, to load the safety-valve. *g* is the knob of the

throttle-valve. *i* is the valve-stem. *h* is the piston throttle-valve. *k* is a cap or guide, fastened to the upper end of the steam-pipe *O*. *l l* is a sheet-metal jacket for the boiler, and also serving as the walls or sides of the furnace and draught-chamber *B B*. *m m m* is a sheet-metal floor, fastened at the under side of the engine-frame *F*, and serving as the lower wall of the draught-chamber *B B*. *n n*, Fig. 1, are the end walls supporting the boiler *A*. *8*, Figs. 1 and 4, represents the coupling for the safety-valve. *z*, Fig. 1, represents air-holes for the lamp *Z*.

It will be seen that the driving-shaft, (together with the cylinder, steam-chest, &c.) may be carried forward to the front or outside of the lamp or fire-box *B*, and another pair of wheels may be applied behind, and the steam-connection formed between the steam-pipe *o* and steam-passage *g*, as shown by dotted lines in Fig. 5.

The construction of this invention or improvement is as follows: The boiler *A* is a plain cylinder, of tin or other thin metal, and is furnished at its top with a safety-valve, *L*, screwed into and serving as a plug to the aperture *8*, through which the water is supplied to fill the boiler. There is a pipe, *N*, passing through the boiler in a vertical and diametrical direction, and having each of its ends securely fastened to the same, the use of which will be hereafter described. The boiler *A* is also provided with another and somewhat larger pipe, *Y*, near its front end, said pipe *Y* passing through the boiler in a diametrical direction in the same plane as the pipe *N*, and serving as a flue-pipe through the boiler *A*, and into which the smoke-stack is fitted, the flue-pipe communicating directly into the draught-chamber *B B* of Figs. 1, 2, and 3. The boiler *A* is inclosed by a sheet-metal jacket, *l l l l*, which, after passing snugly over the top part of the boiler, descends directly to each side of the engine-frame *F*, and is fastened to the same, thereby serving as side walls for the furnace and draught-chambers *B B*, Figs. 1, 2, and 3. *n n*, Fig. 1, are end walls to the furnace and draught-chamber, serving, also, to support the boiler in the upper part of the jackets *l l l l*. The boiler *A*, being passed lengthwise through the circular openings, which are left of a proper size in each end of the jackets, and resting upon the end wall *n n*, is held in position by the safety-valve *L*, throttle-valve *H K*, and smoke-stack *I*, all of which pass through holes made for the purpose in the jackets *l l l l*, as shown in Figs. 1, 2, and 3. The opening underneath the engine-frame *F* is closed by the sheet-metal floor *m m m*, which also makes part of one of the end walls to the fire-box and draught-chamber *B B*, as shown in Figs. 1, 2, and 3. It may be seen that by this arrangement nearly one-half the entire surface of the boiler *A* is rendered available as heating-surface; also, that the hot-air and smoke are made to pass directly through the water contained in the boiler *A*, by way of the flue-pipe *Y*, into the smoke-stack *I*, as shown in Figs. 1, 3, and 4. The above description constitutes one of the features of my invention.

The engine-frame *F* is cast in one piece with the hollow steam-passage *Q*, steam-chest *R R*, and

bearings 1, 2, and 3, as plainly shown at Fig. 5. It may be seen, by reference to Figs. 2, 5, and 7, that there are two steam-chests and valve-seats, *R R*², cast on the outside of the engine-frame *F*, and forming a part of the same, being an enlarged continuation of the steam-passage *Q*, common to both cylinders as well as to the steam-pipe *O*. The pilot or cow-catcher is cast in a separate piece from the engine-frame *F*, and is fastened to it at *F F*, Figs. 1 and 5. It may also be seen, by referring to Figs. 1, 2, 5, and 7, that the common steam-passage *Q*, from the steam-pipe *O* to the steam-chest *R R*², is divided into two parts and separating in a right and left oblique direction, and ending in the small circular live-steam ports marked *b b* upon the port-face of the steam-chest *R R*². *c c* are the exhaust-steam ports to the same, leading from the port-face *R* into the draught-chamber *B*. The steam-chamber may be made larger than shown at Fig. 7, and the exhaust-steam carried through the same by means of a pipe passing through both of its walls, as shown at 20 and 30, Fig. 2. *t* is a bearing in the steam-chest *R R*² for the trunnion *T* of the cylinders *C C*². The above description constitutes another feature of my invention.

The two cylinders *C C*² are united with the valve-seat or port-face of the steam-chest *R R*² of the engine-frame *F* by means of screw-trunnions *T T*, and upon which they oscillate, being held snug up to the port-face of the steam-chest *R R*² by springs *U U* surrounding the trunnion *T*, after its passage through its bearing *t*, contained in the steam-chest *R R*², said cylinders connecting directly with the crank-pins *x x* of the driving-wheels *D D* by means of their piston-rods *W W*. The two driving-wheels *D D* are both fastened upon their axles with their crank-pins *x x* arranged at right angles with each other, so as to enable the cylinders to help each other over the dead-centers, as is usually the case in locomotive-engines. The front truck-frame *G* is made so as to swivel stiffly around the pin *V*, and by this arrangement the engine can be made to run in a circle of any desired radius by setting the frame *G* at the proper angle, its wheels *E E* running loose upon their axle. The construction and arrangement of the throttle-valve and steam-pipe communication are as follows: the pipe *N* (attached to the boiler *A* as hereinbefore described) is provided with a caliber of the diameter of the throttle-valve steam-pipe *O*, and thereby forms a steam and water-tight joint for the same in its passage through the boiler to connect with the center of the common steam-passage *Q*, directly over which steam-passage *Q* the pipe *N* of the boiler is located. It may be seen, by reference to Figs. 2, 9, and 11, that the pipe *N* is provided (at its upper end and within the boiler *A*) with steam-ports *P P*, communicating with similar ports opening into the interior of the steam-pipe *O*, as shown in Figs. 1, 2, and 11. The steam-pipe *O* also contains a smooth and true caliber, to allow for the travel of the piston throttle-valve *h*, the office of which is to open or close the steam-ports in the pipes *N* and *o*, and thereby acting as a throttle-valve to start or stop the engines. *g* is

a ball-knob, serving as a stop for the valve *h* when closed, as shown at Fig. 10, and also serving as a knob to pull the valve *h* up to its open position, shown in Figs. 1, 2, and 11. The cap *h* is fastened to the steam-pipe *o*, and serves the treble purpose of a stop for valve *h*, as a guide for valve-stem *l*, and also as a head or knob by which the steam-pipe is screwed into the common steam-passage *g*, as shown in Figs. 1, 2, 10, and 11. The steam-pipe *o*, being fitted to and turning steam-tight within the pipe *N*, allows of its being readily coupled with the steam-passage *g* of the engine-frame *F* by means of the screw-thread cut upon its lower end, and thus furnishing a simple, direct, and cheap throttle-valve and steam-pipe communication between the boiler and engine, thereby entirely dispensing with usual bent pipes, couplings, &c. It may also be seen that the throttle-valve *K h* is in the most available position or location for practical use for an engine of this description; but I do hereby declare that I do not wish to confine myself to a reciprocating throttle-valve working within the pipe *O*, as a tubular and oscillating one, having ports *P P* communicating with its interior, will accomplish the desired result, as plainly shown at Figs. 14 and 15. The above description constitutes another feature of my invention.

Each steam-cylinder is provided with a steam-port communicating with each of its ends, as shown at *a a*, Fig. 6. These ports *a* in the cylinder communicate alternately with either the live-steam port *b* or the exhaust-steam port *c* (located at each end of the port-face of the steam-chests *R R*²) as the cylinders oscillate from one side to the other of a horizontal center line, as shown in Figs. 6 and 7, and thus alternately taking the live steam through the ports *b b*, from the steam-chest *R R*², into the steam-cylinders *C C*², and discharging the waste steam through the exhaust-ports *c* into the draught-chamber *B B* during the revolutions of the driving-wheels *D D*.

The operation of the machine is as follows: The safety-valve *L* is unscrewed from the boiler and enough water is introduced through the aperture *8* to fill the boiler *a* to the height shown in the drawing. The valve *L* is again replaced, and, the lamp being lit, the steam will form and pass through the steam-ports *P P* of the pipes *N* and *O*, beyond which it cannot go if the throttle-valve *h* stands down or closed, as shown in Figs. 10 and 15, as in that case the steam-ports common to the two pipes *N* and *O* will be closed by reason of the piston throttle-valve filling the caliber of the pipe *O* directly opposite to the steam-ports *P P*; but if the throttle-valve *K h* should now be opened or raised up to the position shown in Figs. 15, 1, 2, and 11, the steam will pass through the ports *P P* into the interior of the throttle-valve steam-pipe *O* and down the same through the water contained in the boiler *A* to the common steam-passage *Q* of the engine-frame *F*, and from that through the steam-port *b* of the steam-chest *R R*², and from thence into the steam-cylinders *C C*², the position of the cylinders allowing of a direct communication of the same with the common

steam-passage *Q*, as shown in Figs. 2 and 5, and thereby causing the rotation of the driving-wheels *D D*, by reason of the steam-pressure upon the piston-head *v*. The action of the steam in the cylinders and their operation are the same as the ordinary ones in common use, and, consequently, require no further description here. The direction of the steam in the boiler *A*, steam-pipe *O*, passage *Q*, and the cylinders *C C*², and the hot and cold air in the furnace and draught-chamber *B*, are clearly shown by the arrows in the several views.

Having now described the nature of my improvement and the manner the same is carried into effect, some of its advantages I claim to be as follows: 1st, cheapness, simplicity, and availability of the boiler *A*, together with its furnace and draught-chamber *B B B*. 2d, the cheapness and simplicity of the parts composing the engine-frame *F*, together with connections forming the driving apparatus. 3d, the cheap, simple, and direct manner in which the throttle-valve and steam-pipe communication is made between the boiler *A* and the engine-cylinder *C C*², together with the available location of the throttle-valve and steam-pipe *K O* for practical use. 4th, its simplicity, cheapness, and practicalness as a whole for the purpose designed.

But I do hereby declare that I do not claim the well-known oscillating-cylinder engine; neither do I claim to be the original or first producer of a miniature steam-working locomotive-engine, for they are old and well-known; but

What I do claim as my invention, and desire to secure by Letters Patent, as an improved article of manufacture, is as follows:

1. The construction, combination, and peculiar arrangement of parts *A N Y*, composing the boiler *A*, together with its supporting-jackets *l l l l*, composing the fire-box and draught-chamber *B B B*, substantially as and for the purpose hereinbefore set forth.

2. The peculiar construction, arrangement, and combination of the parts composing the common steam-passage *Q*, connecting the two steam-chests *R R*², and forming one piece of casting with the engine-frame *F*, together with the separate pieces composing the pilot or cow-catcher *H* and truck-frame *G*, substantially as and for the purpose hereinbefore set forth.

3. The peculiar construction, arrangement, and combination of the parts composing the pipe *N*, throttle-valve *h*, and steam-pipe *O*, with the common steam-passage *Q* of the engine-frame *F*, substantially as and for the purpose hereinbefore set forth.

4. The arrangement and combination of the parts composing the boiler *A* with the furnace and draught-chamber *B B B*, engine-frame *F*, throttle-valve *h*, and steam-pipe *O* of a steam-working toy locomotive-engine, as herein described and set forth.

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