(No Model.)

4 Sheets—Sheet 1.

J. MILLER & M. J. HOGAN.

PORTABLE ENGINE.

No. 384,922. Patented June 19, 1888.

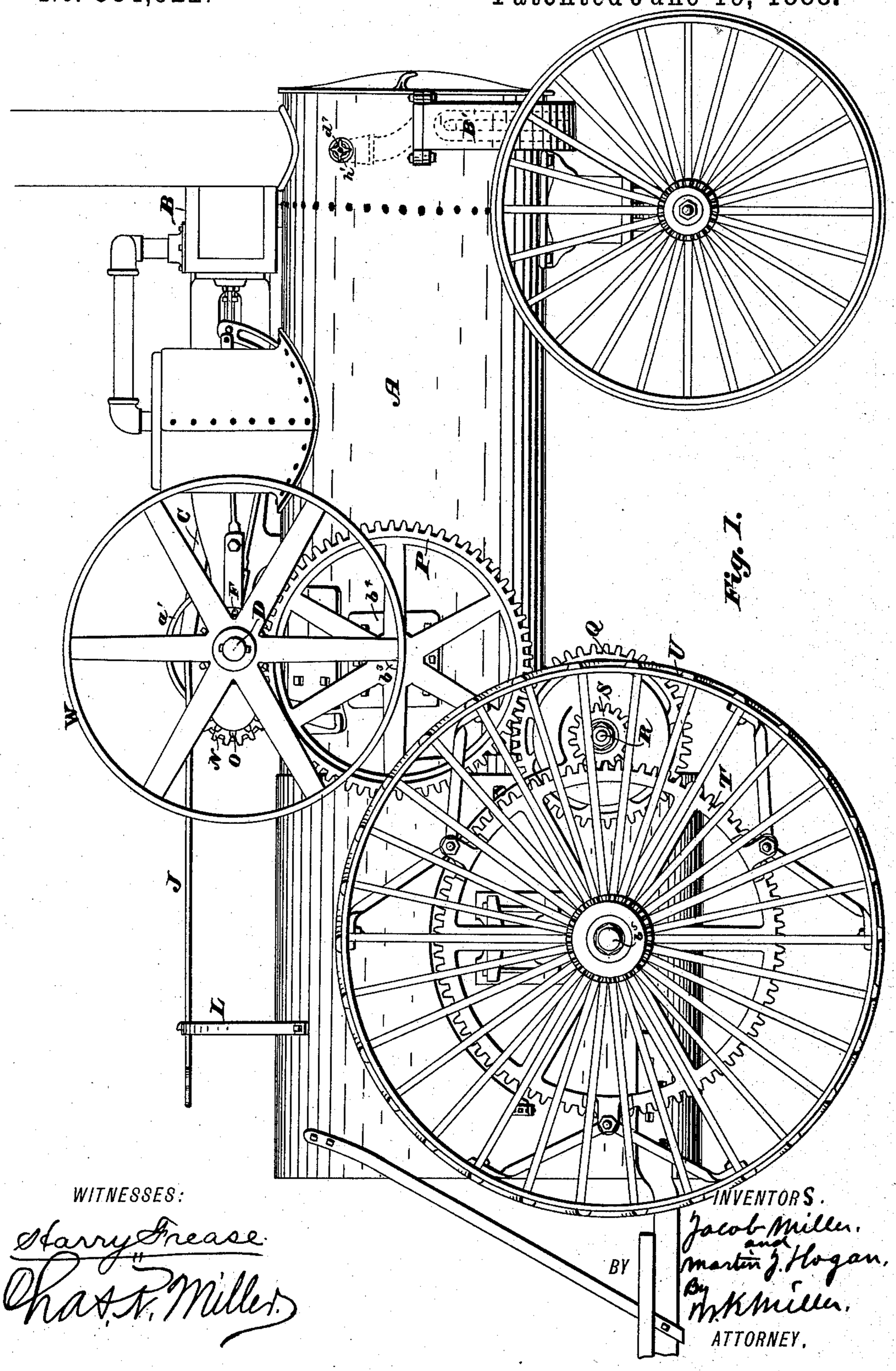

Fig. 1.

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(No Model.) 4 Sheets—Sheet 2.

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PORTABLE ENGINE.

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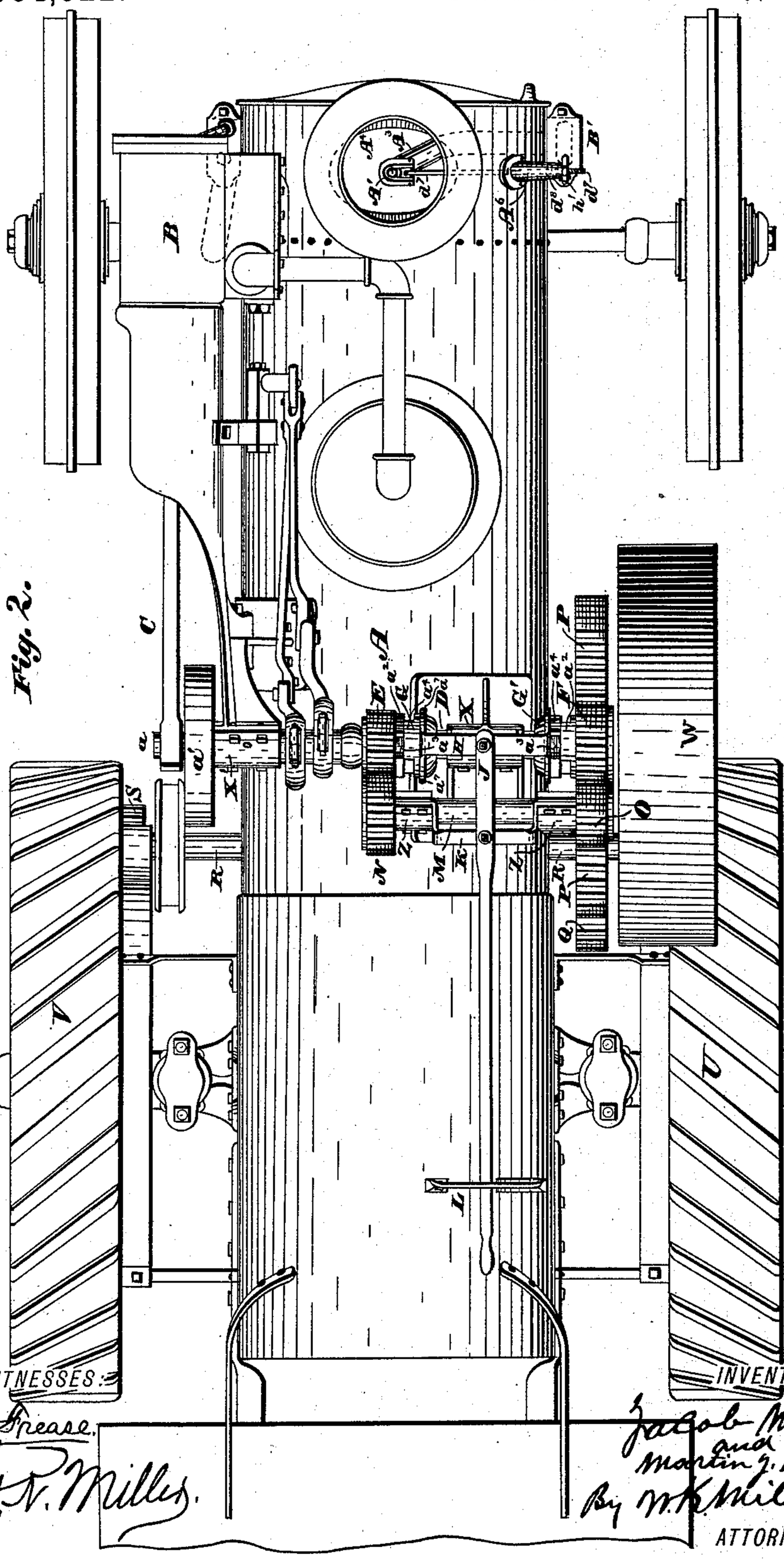
Fig. 2.



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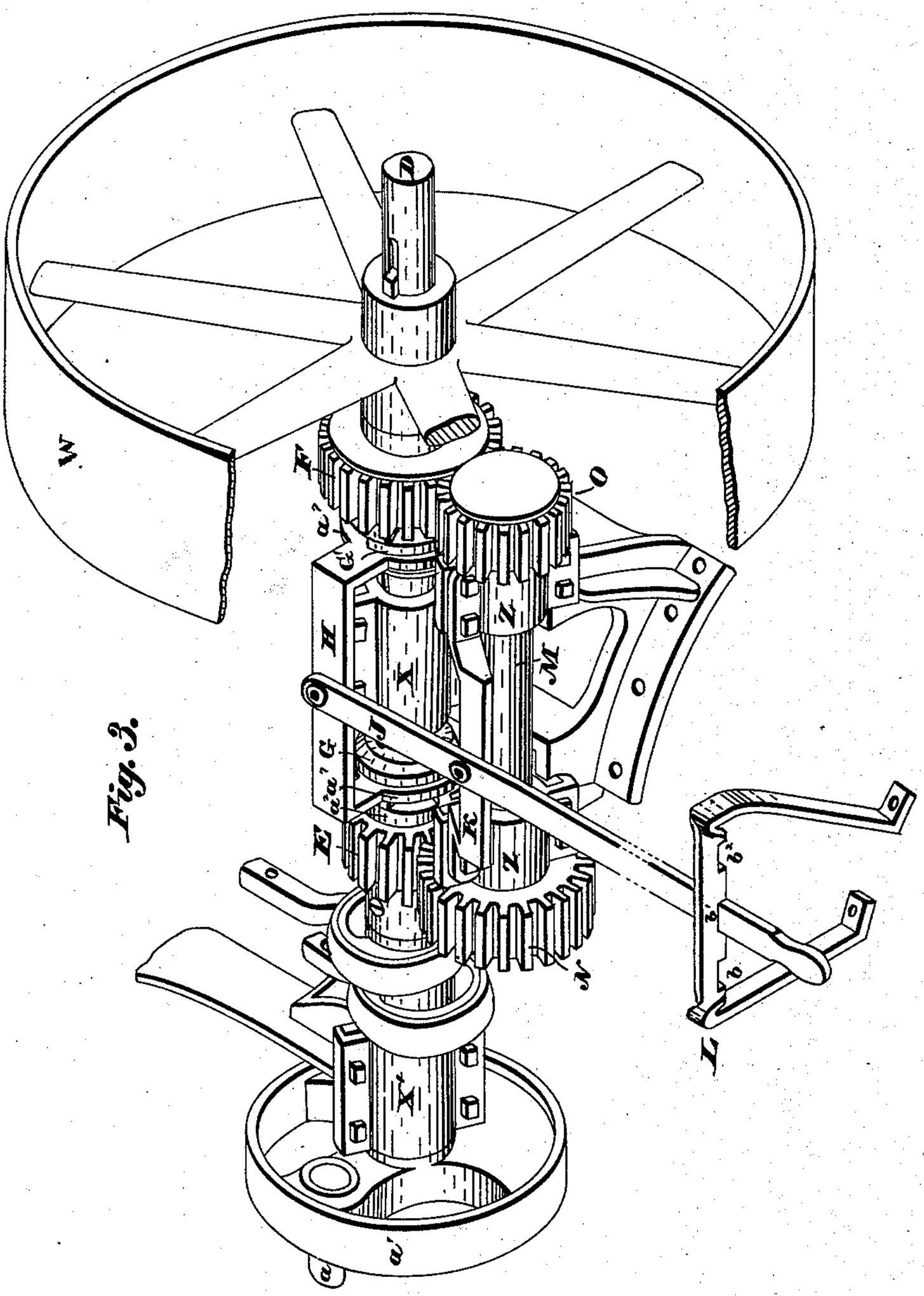

Fig. 3.

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PORTABLE ENGINE.

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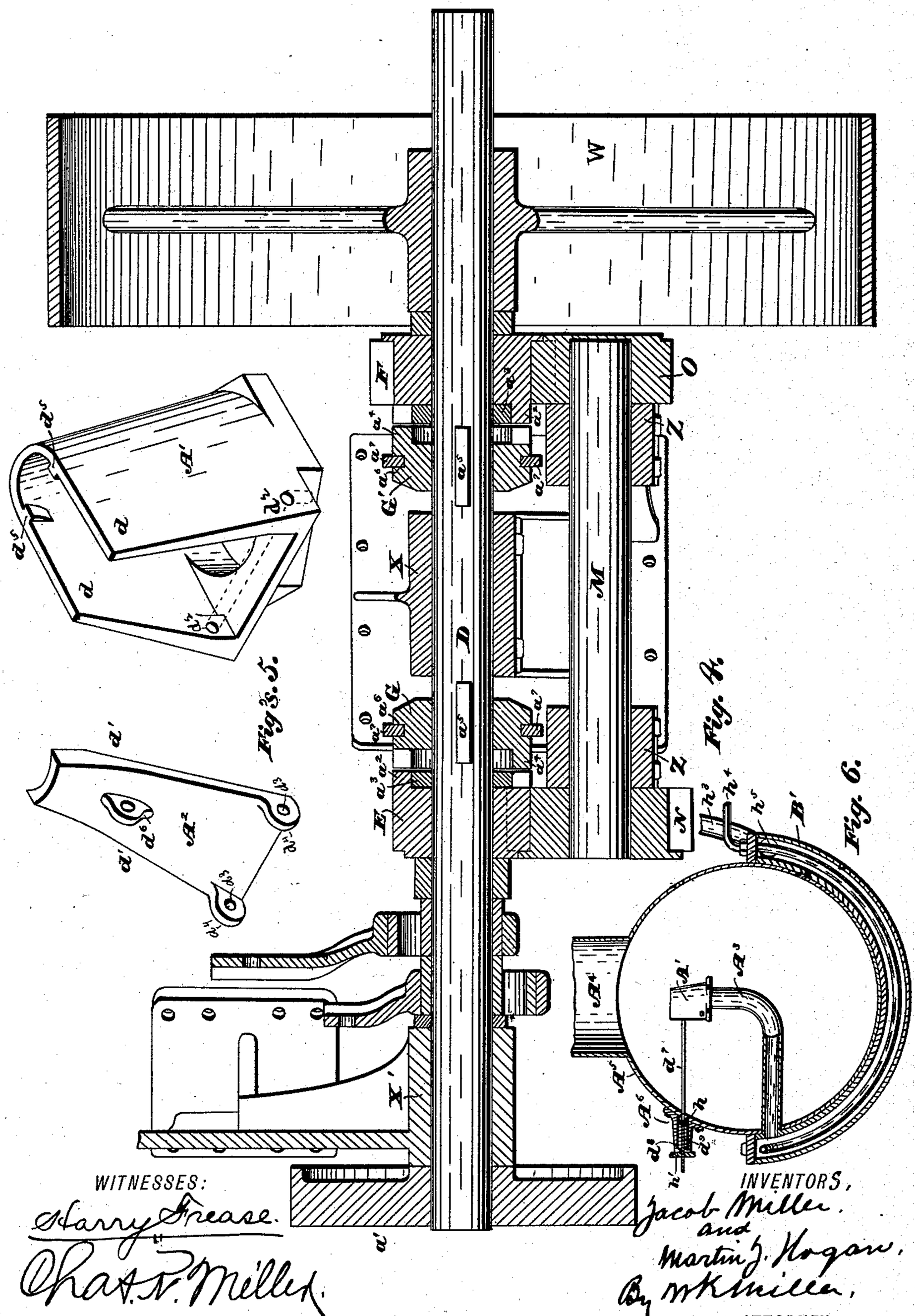

Fig. 5.

Fig. 3.

Fig. 4.

Fig. 6.

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JACOB MILLER AND MARTIN J. HOGAN, OF CANTON, OHIO; SAID HOGAN ASSIGNOR TO SAID MILLER.

PORTABLE ENGINE.

SPECIFICATION forming part of Letters Patent No. 384,922, dated June 19, 1888.

Application filed April 23, 1887. Serial No. 235,851. (No model.)

To all whom it may concern:

Be it known that we, JACOB MILLER and MARTIN J. HOGAN, citizens of the United States, and residents of Canton, county of Stark, State of Ohio, have invented a new and useful Improvement in Portable Engines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, making part of this specification.

Our invention relates to improvements in portable steam-engines; and it consists in providing means by which the progressive movement of the machine can be decreased or increased without changing the speed of the engine.

Our invention also consists in providing an automatic exhaust-nozzle.

Our invention further relates to and consists in providing and locating the feed-water heater; also, relates to and consists of the detail and combination of parts as described, and set forth in the claims.

Figure 1 is an elevation of a portable steam-engine embodying our improvements. Fig. 2 is a plan view of same. Fig. 3 is an isometrical view of a fragment of the machine, showing gearing and gear-shipping devices. Fig. 4 is a sectional view through the engine-shaft, gearing, and counter-shaft. Fig. 5 is an isometrical view of exhaust pipe, nozzle, and valve. Fig. 6 is an elevation of the front end of boiler, showing the location of feed-water heater, exhaust-pipe, and valve-spring.

Similar letters of reference indicate corresponding parts in all of the figures of the accompanying drawings.

Letter A represents a steam-boiler, to which is attached cylinder B, of any of the well-known and approved forms, having a steam-actuated piston connected by pitman C to crank-pin *a* in crank-wheel *a'*, mounted on the end of shaft D, said shaft supported by and rotating in pillow-blocks. On said shaft there is loosely mounted two gear-wheels, E and F, of unequal diameter, said wheels having inwardly-projected hubs a^2, portion of the hubs cut away, as shown at a^3, forming a coupling-clutch. On said shaft there is also provided sleeves G G', having on their outer face coupling-clutches a^4, adapted for engagement with the clutches a^2 on the wheels E and F. Feathers a^5 are set in shaft D, substantially as shown in Fig. 4, the sleeves G G' having a groove provided in the inner face of the annular perforation through which the shaft D is passed, the feathers resting in and adapted to the grooves, so as to allow the sleeves to slide over the feathers in the direction of the length of the shaft, and to so engage and rotate the sleeves with the shaft. The said sleeves are provided with peripheral annular grooves a^6, the sleeves being located on each side of the pillow-block X. A connecting-yoke, H, is provided, (see Figs. 2 and 3), having bifurcated ends. The prongs a^7, adapted to the grooves a^6, embrace the sleeves G and G'. A slipping lever, J, is provided, having a pivotal connection with the yoke H and supporting-bracket K, as shown in Figs. 2 and 3, the free end of said lever extending back to a point within reach of the operator and adapted to the locking-notches *b b' b²* in bracket L, substantially as shown in Fig. 3. Said bracket is attached to boiler A, as shown in Figs. 1 and 2.

A counter-shaft, M, supported by and rotating in pillow-blocks Z Z, is provided, having mounted on one of its ends a gear-wheel, N, corresponding in size with wheel F on shaft D, and on its other end a gear-wheel, O, corresponding in size with wheel E. The wheels N and O are rigidly connected to the shaft M. The wheels E and F are loose on shaft D, so that when not coupled with either of the sleeves G or G' the shaft D may be rotated without moving the gearing hereinbefore described. Said gear-wheels may be of such dimensions as may be required, preferably about two to one—that is, wheel E in diameter about half the size of N and O about half the size of F.

Gear-wheel F engages wheel P, which is supported by and rotates about a spindle, b^3, projected from plate b^4, bolted to boiler A, as shown in Fig. 1. Gear-wheel P engages wheel Q, mounted on shaft R, which is supported in journal-boxes (not shown in the drawings) which are attached to the boiler. On the end of shaft R is mounted pinion S, which engages gear-wheel T, which is bolted or riveted to supporting or driving wheel U, and with said wheel rotates about the supporting-spindle b^5. On the other end of shaft R there is provided a pinion, S, engaging a wheel, T, (not shown,)

which is connected to driving-wheel V, thus forming a gear-connection of the wheel F, which engages gear-wheel P, and through it and the intermediate wheels, Q, S, and T, motion is communicated to the propelling-wheels U and V. With the gear-wheels sized and arranged as hereinbefore shown and stated, with the engine running at the rate of two hundred revolutions per minute, by coupling sleeve G to wheel E shaft M, with its wheels N and O, would be revolved one hundred times and wheel F fifty times, and the propelling-wheels U and V seven times per minute, and with the sleeve G coupled to gear-wheel F, (the wheels N and O and shaft M running idle,) which now connects the engine directly with wheel P, the speed of the propelling-wheels would be increased to fourteen revolutions per minute.

The object and operation of the hereinbefore described part of our improvements are as follows: When the engine is in use for driving a thrashing-machine or such other local purpose, a driving-belt is used on wheel W, the engine in motion, the handle end of lever J in notch b', the clutches disengaged, the shaft D will revolve freely through the wheels E and F, shaft M not being revolved, and to move the machine on the highway or over fields of ordinary grade the sleeve G will be clutched to wheel F by placing the lever J in notch b. The engine-shaft, revolving at the rate of two hundred revolutions per minute, as hereinbefore stated, when geared to drive-wheels U and V, substantially as shown in Fig. 1, will impart to the said drive-wheels U and V a speed of about fourteen revolutions per minute, and when passing over obstructions or climbing heavy grades the lever J may be placed in notch b^2, shifting the yoke H so as to uncouple the clutch on sleeve G′ and engage coupling-sleeve G with wheel E, thus reducing the speed of the drive-wheels U and V from fourteen to seven revolutions per minute, the engine maintaining its maximum rate of speed, thus reducing the rate of progressive speed of the machine, but greatly increasing its power to not only raise itself on grades, but by reversing the engine the machine may pass down a bank or grade that otherwise could not be traveled by such machinery. This change of progressive speed may be used to adapt the machine to draw heavy loads as well as in passing obstructions. There is also provided an automatic exhaust-nozzle of the form substantially as shown in Figs. 5 and 6, having a conical U-shaped body, A′, and a valve, A^2, of the form substantially as shown, said body A′ having projected converging sides d d. The edges d' of the valve A^2 are conformed to the inner face of the converging sides d of the body A′ and have a pivotal connection therewith. Said valve being placed in the open side of body A′ between the converging sides, the perforations d^2 of the body coinciding with the perforations d^3 in the lugs d^4 of the valve, a bolt or pin may be passed through, and about which the said valve may vibrate from a vertical position at the ends of the converging sides to the stops d^5. Said valve is also provided with a perforated lug, d^6, to which the regulating-rod d^7 is attached, as shown in Figs. 2 and 6, the body A′ attached in the usual way to the end of the exhaust-pipe A^3 under the smoke pipe or stack A^4.

On the outside of and attached to the smoke-box shell A^5 there is provided a bracket, A^6, having a cylindrical chamber, d^8, in which is placed a coil-spring, d^9, the outer end of said spring resting against the bottom of the chamber d^8 on the rod d^7. There is provided a disk, h, rigidly connected to rod d^7, against which the energy of the spring d^9 is exerted to close the exhaust-aperture so far as allowed by the regulating-nut h', turned onto the threaded end of the rod d^7, as shown in Fig. 6, and by which the minimum size of exhaust-opening may be regulated by turning the nut on the rod, the nut resting against the end of the bracket.

The object of this improvement is to obtain an even (or nearly so) exhaust, and consequently a more even fire-draft. The valve A^2 is set by the use of the hereinbefore-mentioned appliances to produce the required amount of draft with the minimum of steam to be used, and if for any reason the use of steam should be increased the pressure of the steam on the underside of the valve will force it back against the rod and spring, enlarging the exhaust-opening in the nozzle, so as to maintain about an equal force of exhaust and about an equal fire-draft.

There is further provided a feed-water heater, B′, semicircular in form and rectangular in cross-section, and is located under and attached to the smoke-box, as shown in Figs. 1, 2, and 6, the exhaust-steam entering the heater through steam-pipe h^3 and passing through the heater and out through the exhaust-pipe A^3, the water entering the pipe h^4. Said pipe, passing to the opposite end of the heater, is doubled back on itself to near the place of entrance, where it is passed through the side of the heater to the check-valve, and from thence into the boiler.

The advantage of a heater so constructed and attached over a heater attached horizontally to the side of the boiler is that it is so located as to be out of the way of other machinery and is attached to the smoke-box, having no direct fastening or connection to the boiler proper, and the injurious effect of the constant variation of the expansion and contraction between boiler and heater experienced with heaters attached to the side of the boiler obviated.

Having thus fully described the nature and object of our invention, what we claim, and desire to secure by Letters Patent, is—

1. In a portable steam-engine, the combination of the engine-shaft, means for rotating

the same, gear-wheels of different diameters loosely mounted on the engine-shaft, a shaft counter to the engine-shaft, a pair of gear-wheels of different diameters fixed on said counter-shaft and meshing with the gear-wheels of the engine-shaft, clutches attached to the gear-wheels on the engine-shaft, clutch-sleeves secured on the engine-shaft to slide longitudinally on the shaft and fixed to rotate with the shaft, a pillow-block on the engine-shaft between the said clutch-sleeves, a yoke the branches of which loosely embrace the said clutch-sleeves, a shifting-lever pivoted to a support on the said counter-shaft and to the said yoke, a lever-retaining bracket secured in position to engage the handle of the lever, and detents in the bracket to lock the lever in the several adjustments for running the machine independent of the ground-wheels and for driving the ground-wheels at different speeds, substantially as set forth.

2. An exhaust-nozzle consisting, essentially, of a U-shaped body having converging sides, and a vibrating valve pivoted to said U-shaped body and having converging edges, thereby allowing said valve to freely operate within the U-shaped body, substantially as set forth.

3. In an exhaust-nozzle, the combination of a U-shaped body having converging sides, a valve pivoted to said U-shaped body and having converging edges, a spring-actuated rod loosely pivoted to said valve and extending through the smoke-box, and means whereby the tension of the spring can be regulated, substantially as set forth.

4. In an exhaust-nozzle, the combination of a U-shaped body having converging sides, a valve having converging edges and ears on its lower portion, whereby it is pivoted to said U-shaped body, stops located on the U-shaped body, whereby the inward movement of the valve is limited, a spring-actuated rod loosely connected to said valve, and a nut located on the outer end of said rod, for the purpose substantially as set forth.

5. In a portable steam-engine, the combination, with the boiler and smoke-box, of a detachable feed-water heater attached to and adapted to conform to the outside of the smoke-box, an exhaust leading from the feed-water heater into the smoke-box, a steam-inlet pipe to the heater, and a water-pipe extending within the heater, substantially as set forth.

In testimony whereof we have hereunto set our hands this 20th day of April, A. D. 1887.

JACOB MILLER.
MARTIN J. HOGAN.

Witnesses:
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