

(No Model.)

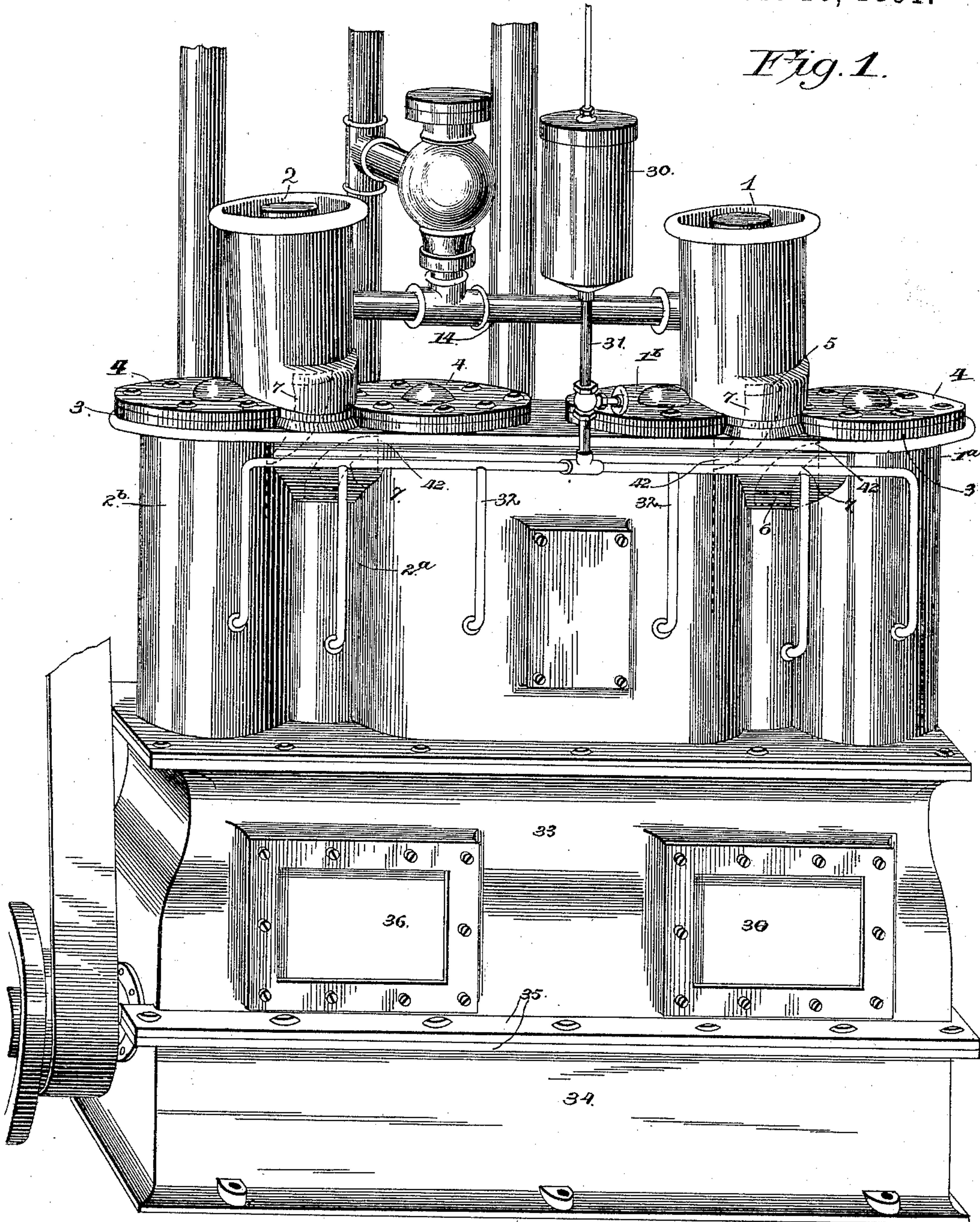
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R. W. BASOM.
STEAM ENGINE.

No. 445,967.

Patented Feb. 10, 1891.

Fig. 1.



Witnesses

M. Fowler

Wm. Bagger

Inventor

Raisford W. Basom

By *Fis.* Attorneys

C. A. Snow & Co.

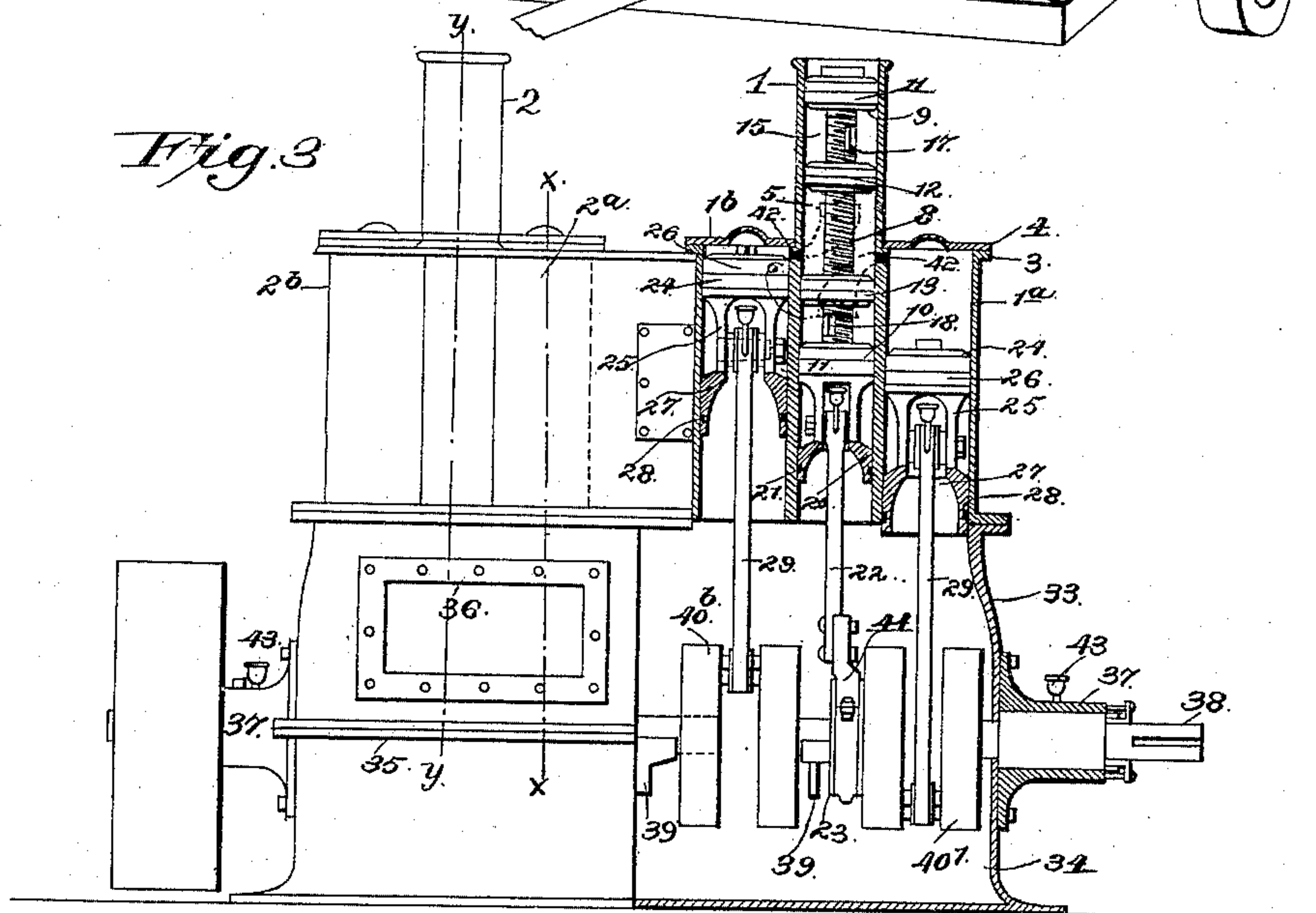
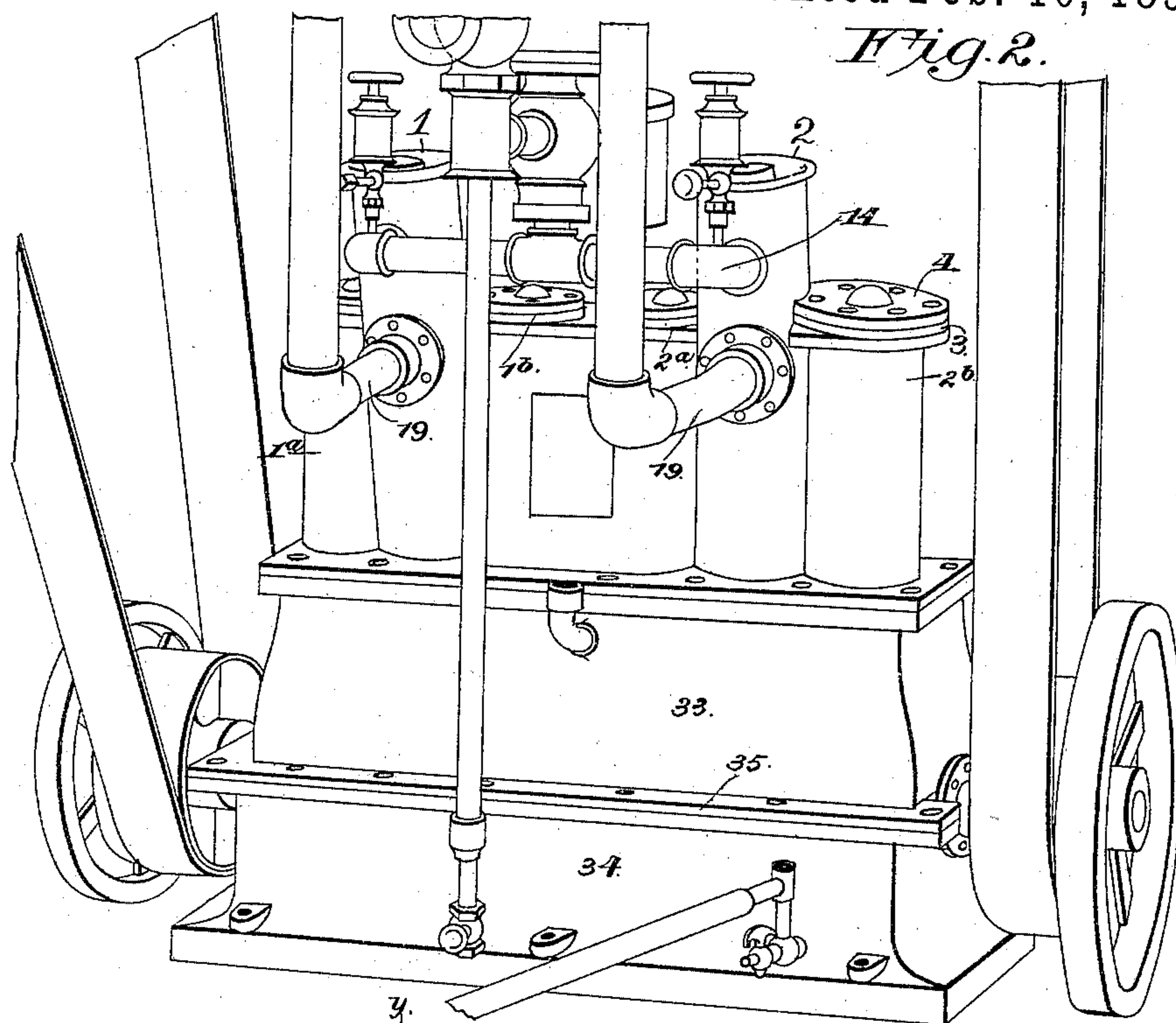
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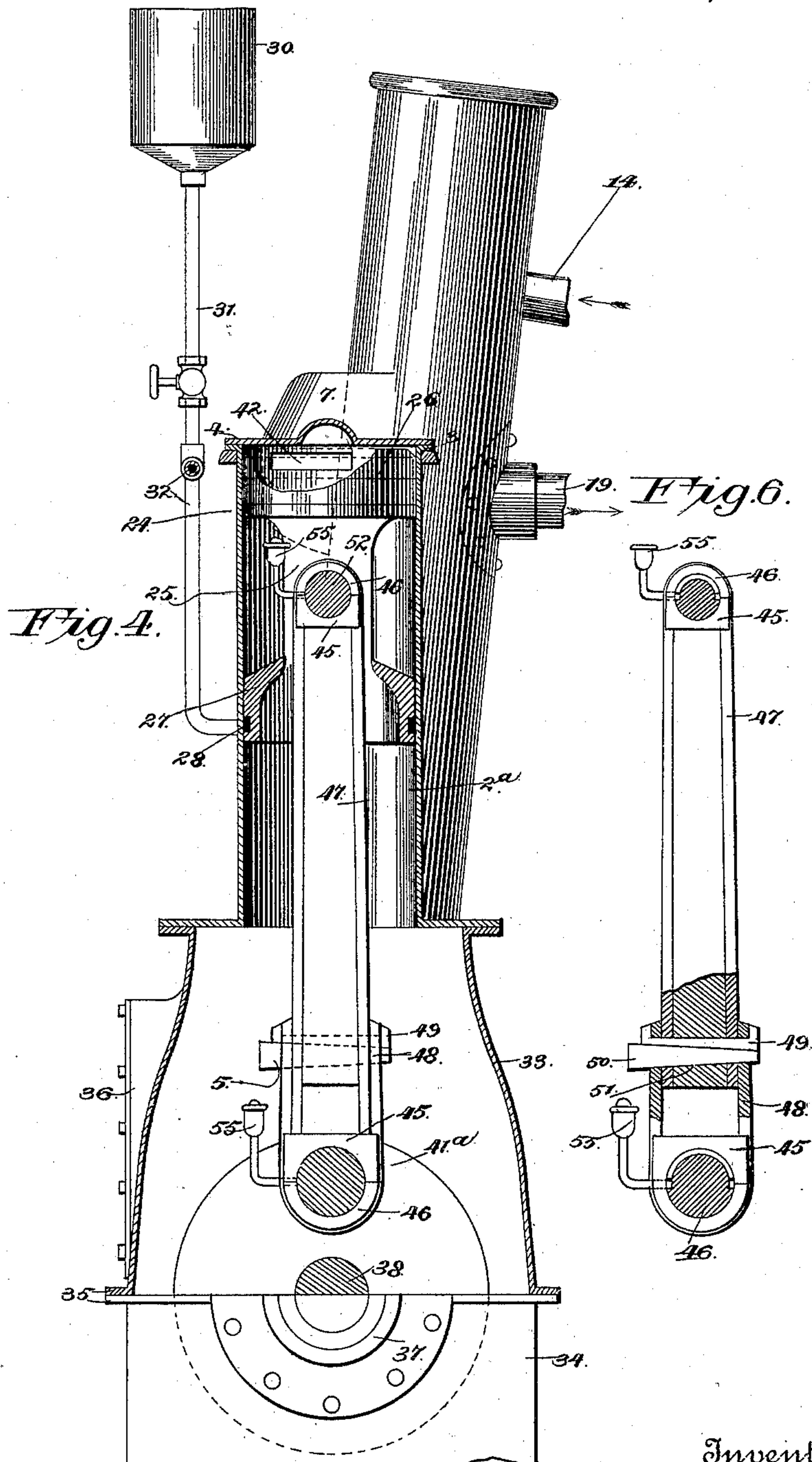
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By *HIS* Attorneys

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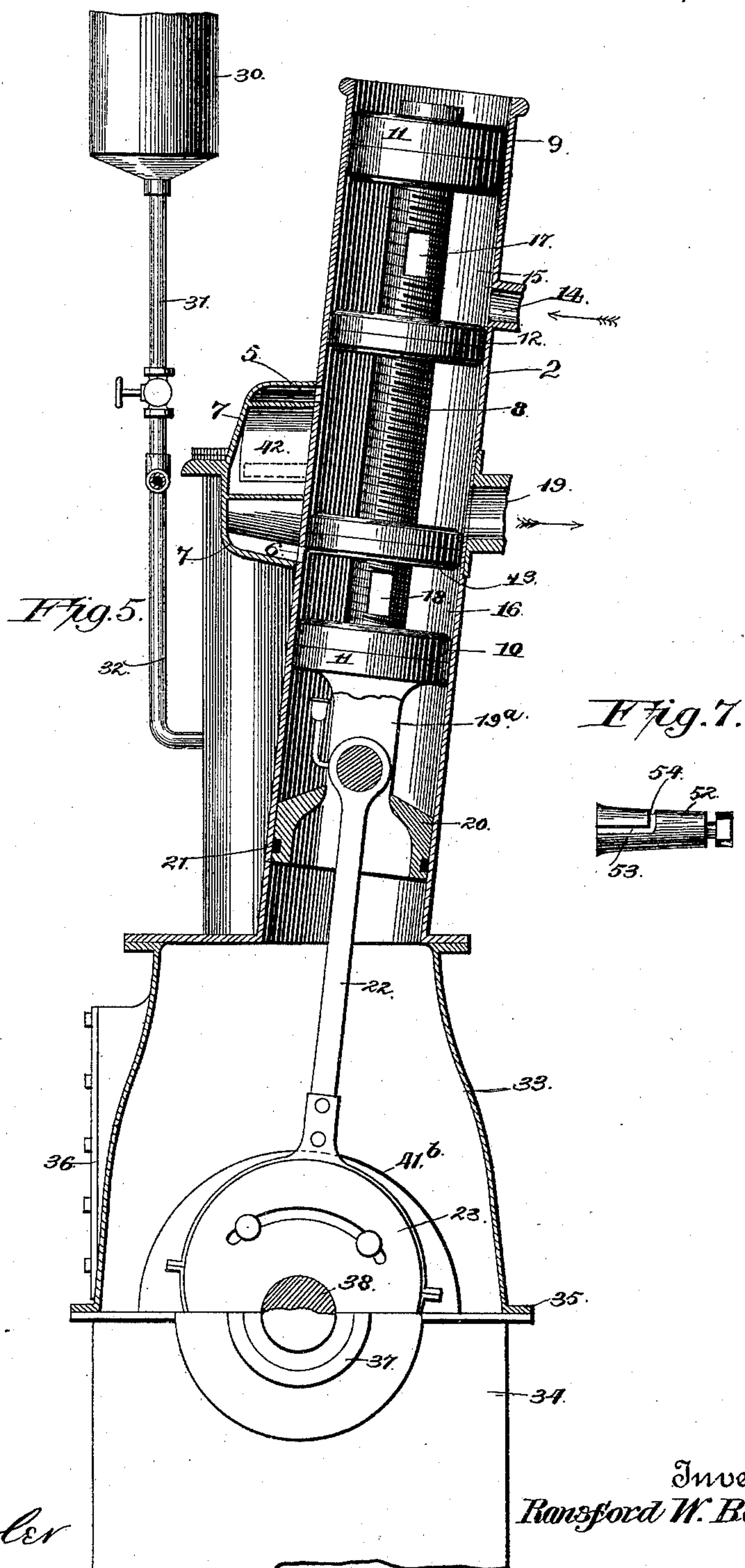
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Witnesses

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Wm. Bagger

Inventor

Ransford W. Basom

By His Attorneys

C. A. Snow & Co.

UNITED STATES PATENT OFFICE.

RANSFORD W. BASOM, OF PITTSBURG, KANSAS.

STEAM-ENGINE.

SPECIFICATION forming part of Letters Patent No. 445,967, dated February 10, 1891.

Application filed October 18, 1889. Serial No. 327,398. (No model.)

To all whom it may concern:

Be it known that I, RANSFORD W. BASOM, a citizen of the United States, residing at Pittsburg, in the county of Crawford and State of Kansas, have invented a new and useful Steam-Engine, of which the following is a specification.

This invention relates to steam-engines; and it has among its objects to construct an upright high-speed engine with single-acting cylinders, which shall be cast in one piece with the valve-chambers or steam-chests, four cylinders and two steam-chests being employed; to so construct the engine that each cylinder shall take steam and exhaust through a single port at its upper end; to so construct and arrange the valves that they shall at all times and under all circumstances be absolutely balanced; to dispense with stuffing-boxes for the valve and piston rods; to insure steadiness and regularity of movement, and to dispense to the greatest possible extent with friction.

With these objects in view the invention consists in the improved construction, arrangement, and combination of parts, which will be hereinafter fully described, and particularly pointed out in the claims.

In the drawings hereto annexed, Figure 1 is a perspective front view of a steam-engine embodying my improvements. Fig. 2 is a perspective rear view of the same. Fig. 3 is a front elevation of the engine, with two of the cylinders, one of the steam-chests, and part of the crank-case in section, for the purpose of exposing to view the interior construction. Fig. 4 is a vertical transverse sectional view taken through one of the cylinders on the line *x x* in Fig. 3. Fig. 5 is a vertical transverse sectional view taken through one of the steam-chests, on the line *y y* in Fig. 3. Fig. 6 is a detail view of one of the piston-rods illustrating the method of connecting it with the crank-shaft. Fig. 7 is a detail view of one of the cross-head or valve-guide connecting-pins.

Like numerals of reference indicate like parts in all the figures.

In the construction of my improved steam-

engine, four cylinders and two cylindrical steam-chests or valve-chambers are employed, each pair of cylinders being arranged to alternately take steam from and exhaust through a single valve-chamber. The cylinders and valve-chambers may of course be constructed separately and independently of each other; but in engines of a moderate size I find it convenient and profitable to construct the said four cylinders and the two valve-chambers in a single piece or casting, as will be seen in the drawings hereto annexed, where 1 and 2 designate the valve-chambers, and 1^a 1^b 2^a 2^b the cylinders. The cylinders are arranged vertically and the valve-chambers are arranged in a diagonal or rearwardly-inclined position between each pair of cylinders, as will be clearly seen by reference to Figs. 4 and 5 of the drawings. The valve-chambers are open at both ends; but the cylinders are provided at their upper ends with flanges 3, to which heads or caps 4 of ordinary construction are securely bolted.

Each of the valve-chambers is provided with ports or openings 5 6, located one above the other and each connected by a pipe 7 with the upper end of one of the adjacent cylinders. The valve-stem consists of a tubular rod 8, exteriorly screw-threaded throughout its length and closed at its upper and lower ends. At or near its upper and lower ends the valve-stem carries the heads or pistons 9 10, having packing-rings 11, by which they are fitted tightly in the chest or casing. Each valve-stem is also provided with intermediately-located piston-heads 12 13, which are a distance apart equal to the distance between the ports 5 6. The live-steam pipe 14 is connected with the compartment 15 of the valve-chamber which lies between the upper heads 9 and 12, and this compartment is in turn connected with the compartment 16 between the heads 10 and 13 by means of the tubular valve-stem, which is provided with ports 17 18, communicating with the said compartments. The exhaust-pipe 19 is connected to the compartment of the valve-chest between the two central piston-heads 12 13. It is obvious that the steam-supply pipe may, when desired, be con-

needed to the lower compartment 16 instead of to the upper compartment 15 of the valve-chamber. It will be seen that owing to the fact that the valve-stem is exteriorly threaded throughout its length the several piston-heads may be very readily adjusted to their proper position. This having been done, any suitable means may be employed for securing them in place.

To the lower end of the valve-stem is secured the valve-guide 19^a, which has a cylindrical portion 20, fitting nicely in the cylindrical chamber and provided with an annular lubricating-groove 21. The valve-guide is connected with the upper end of the pitman 22, the lower end of which is in turn connected with the eccentric 23 upon the crank-shaft, the size and adjustment of which are such as to insure the desired movement of the valve.

The pistons 24, working in the steam-cylinders, are cast or formed integrally with the guides or cross-heads 25 and are provided with packing-rings 26, making steam-tight joints. The cross-heads are provided with cylindrical portions 27, having annular lubricating-grooves 28, and they are pivotally connected with the upper ends of the pitmen 29, the lower ends of which are connected with the cranks upon the crank-shaft, as will be hereinafter described.

30 designates a lubricator or oil-reservoir, which is connected by a main pipe 31 and distributing-pipes 32 with the several cylinders and valve-chambers, all of which are thus supplied with lubricating material from a single source or receptacle for the lubrication of the valve-guides and cross-heads, in the annular grooves of which a sufficient quantity of the lubricating material will soon accumulate to keep the inner walls of the cylinders and valve-chambers well lubricated at the points where they are in contact with said cross-heads and valve-guides.

The casting comprising the four cylinders and the two valve-chambers is mounted upon and securely bolted to the crank-case, which is composed of two pieces—viz., the top or upper portion 33 and the base 34—which are provided at their meeting edges with flanges 35 to receive bolts by which they are securely connected. The top of the crank-case is also provided with openings or man-holes having closely-fitting covers 36, which may be removed when it shall be desired to have access to the interior.

To the outside of the crank-case, at the ends of the same, are bolted the boxes or bearings 37 for the crank-shaft 38, and additional bearings 39 for the latter are formed within the crank-case. The crank-shaft is provided with four sets of cranks 40^a 40^b and 41^a 41^b which are connected, respectively, with the pitmen of the cylinders 1^a 1^b and 2^a 2^b. The cranks 40^a 40^b, connected with the pitmen of the first pair of cylinders 1^a 1^b, are diametrically op-

posite to each other upon the crank-shaft, and the cranks 41^a 41^b, which are connected with the pitmen of the second set of cylinders 2^a 2^b, are likewise diametrically opposite to each other, but at right angles to the cranks 40^a 40^b. It follows that when the pistons of one set of cylinders are at the extreme upper and lower limits of their strokes those of the other set of cylinders are at the center of their strokes and traveling in opposite directions. The valves are so set that at any time at least one of the cylinders will be taking steam. Thus when the piston in cylinder 1^a is at the upper end of its stroke and said cylinder is ready to take steam the piston in cylinder 1^b will be at the lower limit of its stroke and said cylinder will be ready to exhaust at the same time the piston in cylinder 2^a will be traveling downwardly, working on the expansion of steam, and the cylinder 2^b, in which the piston is moving upwardly, will be exhausting. From this it will be seen that there is no dead-center, and hence it will be possible to start the machine at any position of the crank-shaft by simply opening the throttles. It will furthermore be observed that each one of the cylinders takes steam and exhausts through a single port 42, which is connected by one of the pipes 7 with the port 5 or 6 of the valve-chest, as the case may be. Taking the cylinders 1^a 1^b as an example, it will be seen that when the valve is at the upper limit of its stroke live steam will be passing from the upper compartment 15 of the steam-chest through the stem 8, port 6, and pipe 7 to the cylinder 1^a, while the cylinder 1^b exhausts through the pipe 7 and port 5 into the compartment between the central heads 12 13 of the valve and thence through the exhaust-pipe 19. When the position of the valve is reversed, or when the valve is at the lower limit of its stroke, the cylinder 1^b will take steam through the pipe 7 and port 5 from the upper compartment 15 of the steam-chest, to which the live-steam pipe is connected, and the cylinder 1^a will exhaust through the pipe 7 and port 6. It will also be seen that the upper and lower compartments 15 and 16, formed by the pistons of the valve, are at all times in connection with each other through the ports 17 18 and the tubular-valve stem. Hence the valve is at all times absolutely balanced; and when this is taken into consideration in connection with the fact that absolutely no stuffing-boxes are used or required upon any part of my improved engine it will be readily understood that friction is almost entirely done away with and that the engine may be run at high speed and with little or no loss of power.

The external bearings of the crank-shaft may be provided with oil-cups or lubricators of any suitable approved construction, as shown at 43. For the lubrication of the crank-pins upon the crank-shaft I prefer to partially fill the base of the crank-case with water, upon

which the lubricant may float, and which may be replenished by such condensed water as may leak from the cylinders and valve-chambers. The cranks splashing in the lubricant will be amply lubricated. Other methods of lubricating the crank-pins and the internal bearings of the crank-shaft may, however, be employed when desired.

The lower ends of the pitmen 22, connecting the valve-guides with the eccentrics 23 upon the crank-shaft, are provided with straps 44, of ordinary construction, encircling the said eccentric-disks.

The upper and lower ends of the pitmen 29, connecting the cross-heads of the pistons 24 with the crank-pins, are provided with permanent half-boxes 45 and movable half-boxes 46, which latter are retained in position by means of the straps 47 48, the meeting ends of which are connected by transverse gibs 49 and keys 50, extending through transverse slots 51 in the said pitmen. By this construction it will be seen that wear upon the boxes or bearings may be readily compensated for by simply tightening the gibs and keys.

The cross-head pins 52, which connect the pitmen 22 and 29, respectively, with the valve-guides 19 and the cross-heads 25, are provided with longitudinal openings 53, the inner ends of which communicate with transverse openings 54, thus forming L-shaped channels or passages, the inner ends of which communicate with lubricators or oil-cups 55, attached to the bearings, which are thereby kept supplied with oil.

The operation and advantages of my invention will be readily understood from the foregoing description, taken in connection with the drawings hereto annexed, by those skilled in the art to which it appertains.

The construction of the engine is exceedingly simple, and a multiplicity of steam and exhaust ports is avoided, thereby greatly facilitating the construction and rendering the operation simple and certain. The valve mechanism for regulating the supply and exit of steam is likewise of the most simple character, and all the parts are so constructed that they may be fitted and adjusted by a novice in the art. The engine may be run under high pressure and at a great rate of speed, and may be started at any position of the crank-shaft. Again, the parts of the engine proper are comparatively few and light, and an engine of comparatively great power may, on account of the vertical disposition of the cylinders and valve-chambers, be constructed occupying comparatively little floor-space. The cylinders are set centrally over the main shaft, which therefore receives the direct action of the pistons and pitmen, and piston-rods and stuffing-boxes are entirely dispensed with.

Having thus described my invention, I claim and desire to secure by Letters Patent of the United States—

1. In a steam-engine, a cylindrical valve-chamber open at both ends, in combination with a hollow or tubular exteriorly-screw-threaded reciprocating valve-stem closed at both ends, four piston-heads interiorly screw-threaded and adjustably mounted, respectively, near the ends and near the center of said valve-stem, ports or openings formed in the latter between the two upper and the two lower piston-heads, respectively, and connecting the upper and lower compartments formed by said piston-heads, exhaust and live steam pipes connected with the valve-chamber to register, respectively, with the central and with one of the communicating chambers formed by the piston-heads upon the valve-stem, and a port connecting the valve-chamber with each of a pair of single-acting cylinders, substantially as and for the purpose set forth.

2. The combination, with a pair of single-acting cylinders closed at their upper ends and having the reciprocating pistons, of the single ports connecting the upper ends of said cylinders with a valve-chamber open at both ends, a valve arranged to reciprocate in said chamber and having a tubular exteriorly-screw-threaded stem and four interiorly-screw-threaded adjustable heads or pistons forming two end compartments that communicate through said tubular stem and a central separate compartment, and the exhaust and live steam pipes connected, respectively, to the said central and to one of the said communicating compartments, substantially as set forth.

3. In a steam-engine, the combination of two pairs of vertical cylinders arranged centrally over a single crank-shaft and having closed upper ends, the reciprocating pistons, the pitmen connecting the pistons of each pair of cylinders with diametrically-opposite cranks, the cranks of the two pairs being disposed at right angles to each other, two cylindrical valve-chambers open at both ends, single ports connecting the upper end of each cylinder with one of said valve-chambers, the reciprocating valves arranged in said valve-chambers and comprising each a tubular stem and four heads or pistons forming two end compartments that communicate through said tubular stem and a central separate compartment, the exhaust and live steam pipes connected, respectively, to the said central and to one of the said communicating compartments, and the pitmen connecting the valves with eccentrics upon the crank-shaft, substantially as set forth.

4. In an engine, the combination, with a cylindrical casing open at both ends, of a reciprocating valve comprising two communicating end compartments and a separate central or intermediate compartment formed by the walls of the casing, and disks or pistons mounted so as to be longitudinally adjustable upon the valve-stem, said casing being provided

with suitably-located openings for the admission and escape of steam and for its passage to and from the cylinders, and said valve-stem being provided with a longitudinal opening
5 having ports whereby communication is established between the end compartments, substantially as set forth.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in presence of two witnesses.

RANSFORD W. BASOM.

Witnesses:

CON. RIORDAN,
R. Y. FORD.