

(No Model.)

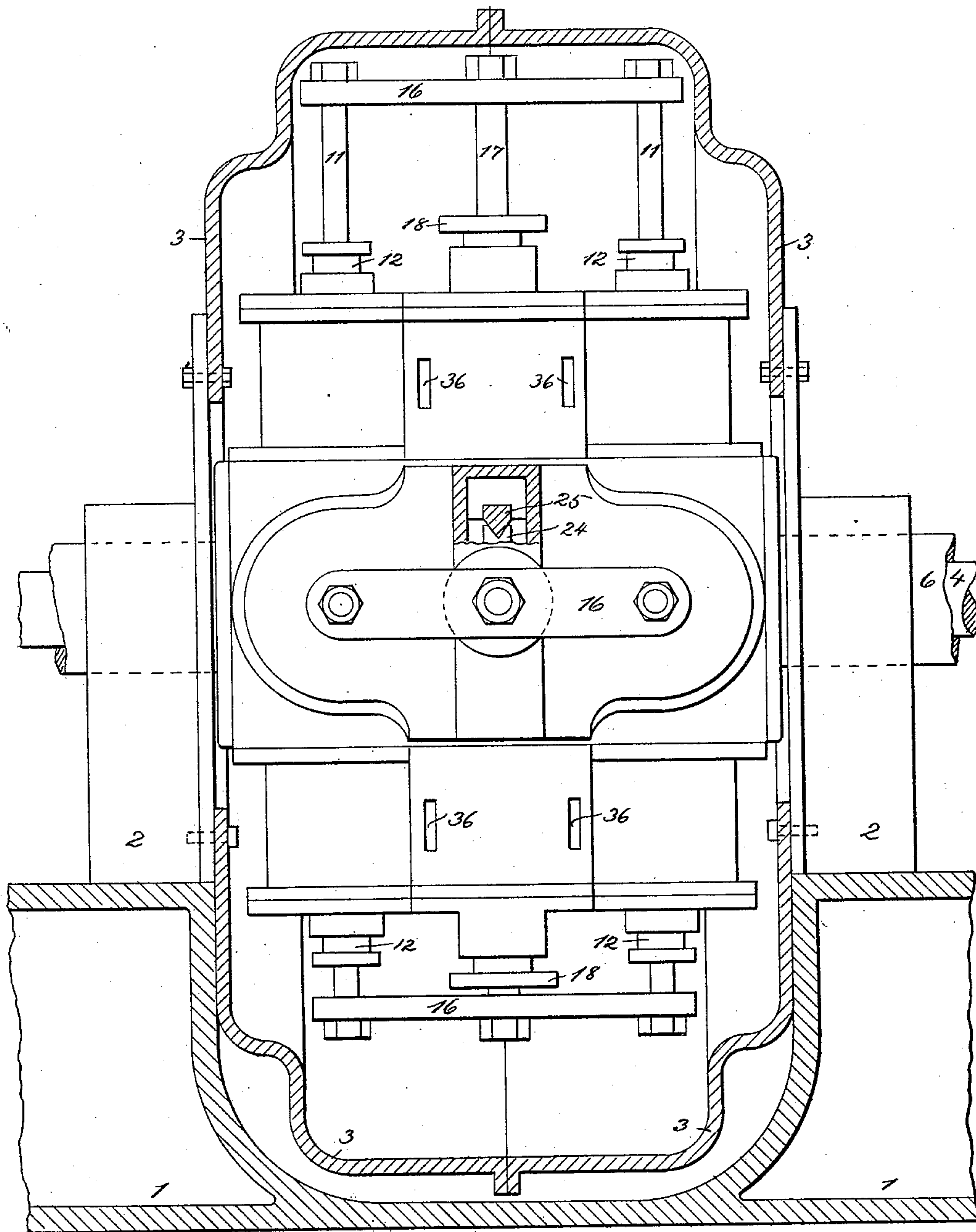
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G. WHITE.
ENGINE.

No. 454,192.

Patented June 16, 1891.

Fig. 1.



WITNESSES:

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INVENTOR

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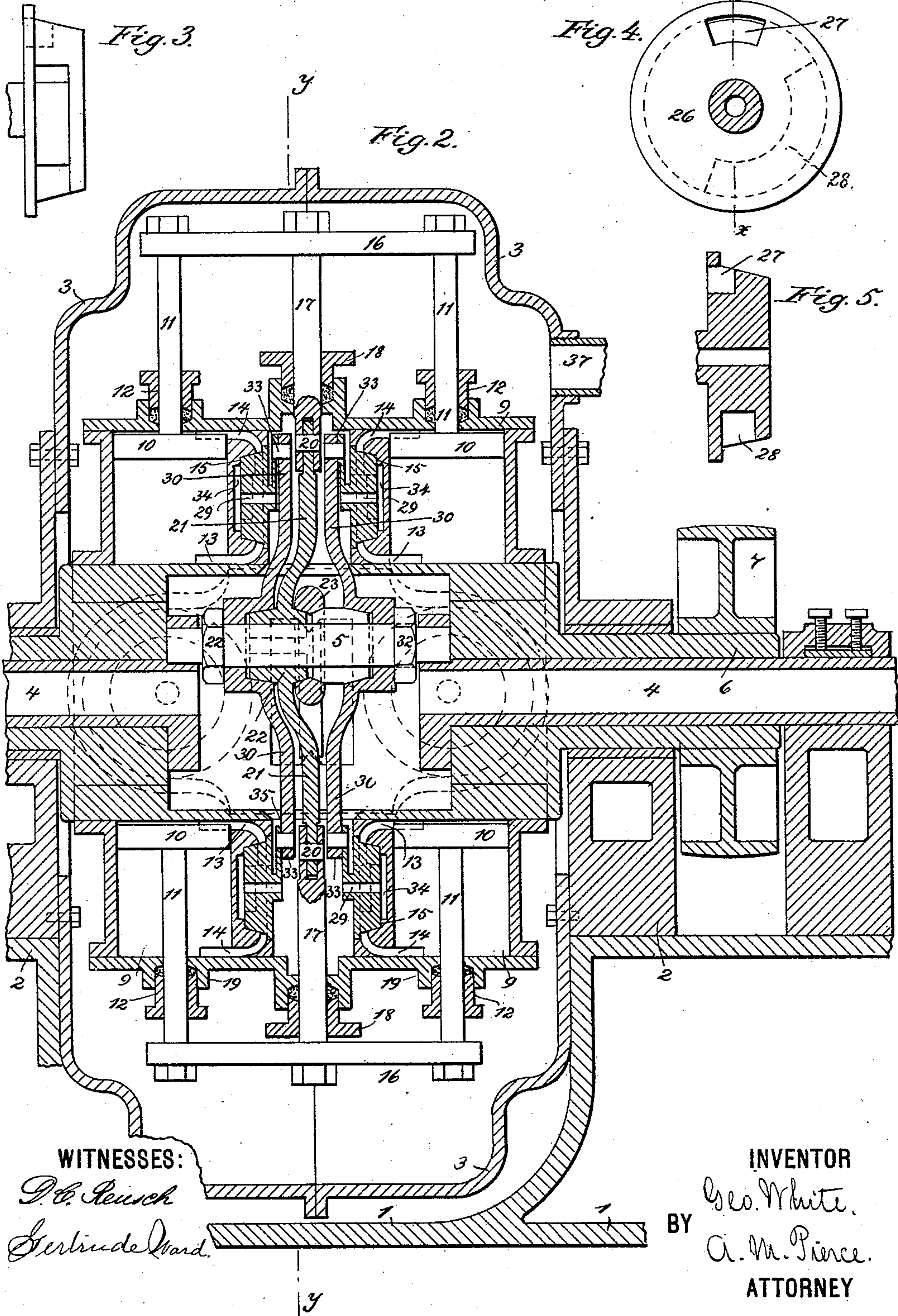
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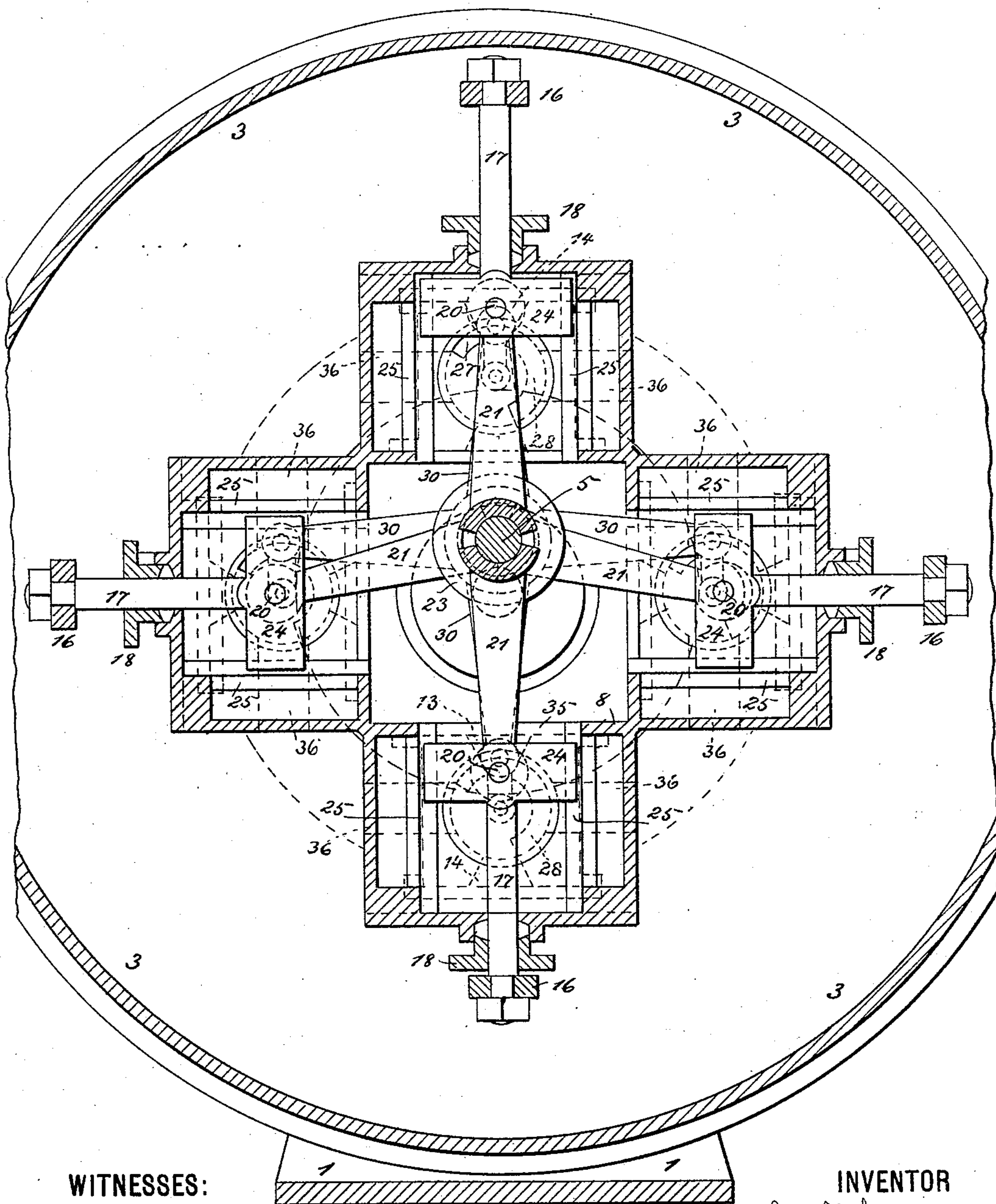
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Fig. 6.



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UNITED STATES PATENT OFFICE.

GEORGE WHITE, OF BROOKLYN, NEW YORK, ASSIGNOR TO CHARLES L. ROWLAND, TRUSTEE, OF SAME PLACE.

ENGINE.

SPECIFICATION forming part of Letters Patent No. 454,192, dated June 16, 1891.

Application filed August 4, 1890. Renewed April 23, 1891. Serial No. 390,105. (No model.)

To all whom it may concern:

Be it known that I, GEORGE WHITE, of Brooklyn, in the county of Kings and State of New York, have invented new and useful
5 Improvements in Engines, of which the following is a specification.

My invention relates, especially, to that class of engines wherein the cylinders rotate with the shaft wherewith they are connected,
10 and has for its object the provision of a simple, cheap, and compact engine, wherein the greatest possible efficiency of the steam may be obtained.

To attain the desired end, my invention
15 consists, essentially, in a number of series of cylinders, each series consisting of two or more, mounted upon or secured to a hollow shaft or projections thereon. The piston-rods of each series of two or more cylinders are
20 connected to a cross-head, which in turn is connected to the crank-pin by a single rod.

The invention further consists in suitable valves, controlling the admission and escape of the steam to and from the cylinders, said
25 valves being connected to rigid arms extending from the crank-pin; and my invention also involves certain other novel and useful combinations or arrangements of parts and peculiarities of construction and operation,
30 all of which will be hereinafter first fully described, and then pointed out in the claims.

In the drawings, Figure 1 is a side elevation of my improved engine, the inclosing case being shown in section. Fig. 2 is a longitudinal central sectional view of the engine.
35 Fig. 3 is a side view of the circular valve-shell. Fig. 4 is a front view thereof. Fig. 5 is a sectional view of said shell at line $x x$ of Fig. 4. Fig. 6 is a sectional view of the engine at line $y y$ of Fig. 2.

Like numerals of reference wherever they occur indicate corresponding parts in all the figures.

1 is the bed-plate, whereon suitable pillow-
45 blocks 2 are mounted.

3 is the wall of a fixed chamber, inclosing the working parts of the engine.

4 are hollow fixed connections passing through the walls of chamber 3 and carrying
50 a crank-pin 5. Surrounding connections 4 is

a shaft 6, arranged to rotate upon said connections.

7 is a driving-pulley mounted upon the shaft 6.

Fixed to the hollow shaft 6 is a box or chest 55 8, forming a central chamber within the chamber 3. I have shown in the present instance a square box, for the reason that I illustrate my invention as having four sets or series of cylinders; but when it is found desirable to
60 use six, eight, or more sets or series of cylinders the said box will be made with six or eight sides, conforming to the number of sets of cylinders.

Secured to the box 8 are cylinders 9, provided with pistons 10, the rods 11 of each piston passing through a stuffing-box 12.

13 14 are the ports formed in each cylinder and passing to a recess 15 in the side of the cylinder, said ports being controlled by a circular valve-shell, to be hereinafter more particularly described.

The outer extremities of the piston-rods 11 are secured to a cross-head 16, and from said cross-head passes a rod 17 through a stuffing-
75 box 18, secured to or formed with the cylinder-heads 19. Each rod 17 is pivoted at 20 to an arm 21, provided with an enlarged extremity 22, having a cavity therein which embraces the side of the crank-pin 5. Each driving-rod 17 is thus connected to the crank-pin,
80 and the embracing arms are held in place by means of a ring 23, encircling the enlargement 22, holding all of the arms in engagement with the crank-pin while permitting
85 them to rotate around said pin.

24 is a guide secured to the inner extremity of rod 17 and playing in ways 25.

It will be observed that I have shown each set of cylinders as consisting of two; but where
90 it is desired to increase the power of the engine, four or more might be employed in each set, arranged side by side, and all of the piston-rods connected to a common cross-head
95 16. The connections to the crank-pin would not be changed and the engine would take up no more room in diameter, the longitudinal size being increased only the width of the added cylinders, thus enabling me to obtain
100 very great power in a small space. When

six, eight, or more than the four sets of cylinders shown are used, the entire engine will take up no more space in any direction, while the power will be greatly increased.

5 26 is a valve-shell having ports 27 and 28 and a central passage 29. This shell fits into the circular seat 15 in each cylinder, and is connected by a crank 33 to an arm 30, passing to a hub 31, encircling the crank-pin 5. It
10 will be observed that the hub 31 is recessed in such a manner as to pass over the parts 23 of the arms 21, the nuts 32 upon the crank-pin holding said hubs in the proper position to permit free rotation without lateral play
15 upon said pin. Back of the valve, in the wall of the cylinder, is a chamber 34, with which passage 29 communicates. By this construction the pressure of the valve-shell upon its seat and consequent friction is overcome, be-
20 cause the pressure of steam beneath the shell is nearly as great as in front, the shell simply resting upon the ledge surrounding the chamber 34.

In operation steam is supplied to the cen-
25 tral box or chamber through the hollow fixed connections 4, passing through the openings 35 in the sides of said box or chest to the space between the cylinders. When the pistons occupy the position indicated by Fig. 2,
30 the course of the steam is through the supply-ports 27 and into the cylinders through ports 13. At the same time the ports 14 are open for exhaust, the course of the steam being from said ports through ports 28 to the
35 outlets 36 into the outer chamber, from whence it is conducted through a pipe 37. (See Fig. 2.) The cylinders revolve about the fixed crank-pin, being carried around by the pressure of the connecting-rods there-
40 against, and the valves are caused to rotate in their seats, supplying and cutting off the steam to each cylinder twice during each revolution, thus causing live steam to be present at all times in some of the cylinders.
45 The steam in the engine herewith illustrated is cut off at half-stroke, and expansion takes place for the remainder of the stroke. As the cut-off takes place in one set of cylinders, steam is admitted to the next set, and conse-
50 quently live steam is being admitted at all times. In case six sets of cylinders are employed the cut-off would take place at one-third of the stroke, and this principle is applied in accordance with the number of sets
55 of cylinders employed. By the compact arrangement of the cylinders and their ports and the location of the crank-pin and the connections to the piston-rods the live steam has but a short distance to travel, reducing
60 condensation to a minimum and keeping all of the parts hot, the cylinders being surrounded by the outer casing, which forms an effective steam-jacket.

If it is found desirable to rotate the crank-
65 pin and the connections thereto, instead of the outer shaft, by fixing the cylinders and the box to which they are attached and loos-

ening the connections to the crank-pin, a very compact and complete engine is produced of a reciprocating type. 70

Having now fully described my invention, what I claim as new therein, and desire to secure by Letters Patent, is—

1. In an engine of the character herein specified, the combination, with the rotatable 75 shaft and fixed crank-pin, of several series of cylinders, each cylinder being provided with a piston-rod connected to a cross-head, said cross-head being connected to the crank-pin by a single rod, substantially as shown and 80 described.

2. The combination, with the rotatable shaft, the cylinders connected therewith, and the valve-shells mounted upon said cylinders, of the rigid arms extending from the crank- 85 pin to said valve-shells, substantially as shown and described.

3. In an engine of the character herein specified, a central chamber wherein is a fixed crank-pin, a hollow shaft whereon the walls 90 of said chamber and the cylinders are mounted, and a chamber surrounding the cylinders and into which the exhaust-steam escapes, the whole combined and arranged substantially as set forth. 95

4. In an engine of the character herein specified, a single connecting-rod for each series of cylinders, in combination with a driving-rod pivoted to the connecting-rod, said driving-rod having a depression at its ex- 100 tremity which embraces one side of the crank-pin, substantially as shown and described.

5. In a steam-engine of the character herein specified, a fixed case forming an inclosing chamber, a rotatable box whereon the cylin- 105 ders are mounted, hollow fixed shafts passing to the interior of said box and bearing a fixed crank-pin, and the connections between the piston-rods and the crank-pin, combined and arranged substantially as shown and de- 110 scribed.

6. The combination, with the central box or steam-chest, of the several series of cylinders mounted thereon, and the supply for live steam communicating with said box, sub- 115 stantially as shown and described.

7. The combination, with the revoluble box or steam-chest and the steam-supply communicating therewith, of the cylinders mounted upon said box, the supply and ex- 120 haust ports communicating with said cylinders, and the valve-shells controlling said ports, substantially as shown and described.

8. In an engine of the character herein specified, a number of cylinders mounted 125 upon a revoluble box or chest, each of said cylinders being provided with a rotary valve and each valve connected to an arm radiating from a common hub around the crank-pin, substantially as shown and described. 130

9. An engine in which is comprised an outer casing into which the exhaust-steam passes, a central box or chest into which live steam passes, a revoluble shaft connected to said

box, a number of series of cylinders mounted upon said box and arranged to revolve therewith, connections between the piston-rods and a crank-pin fixed within the central box
5 or chamber, and valve-shells also connected to said crank-pin and controlling the supply and exhaust of steam, the whole combined

and arranged to operate substantially as shown and described.

GEORGE WHITE.

Witnesses:

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GERTRUDE WARD.