

No. 656,164.

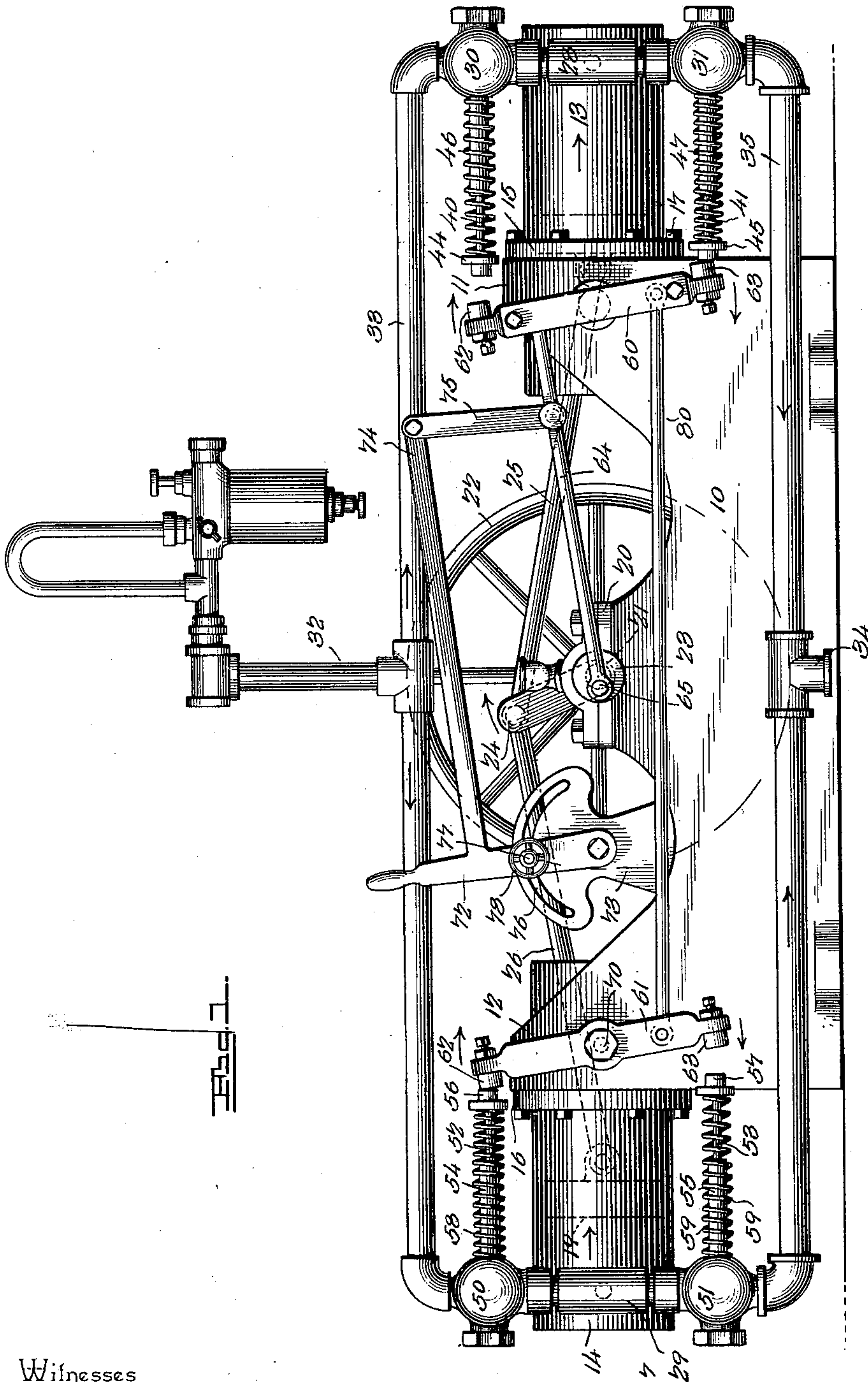
Patented Aug. 21, 1900.

A. W. J. BEST.
VALVE GEAR FOR ENGINES.

(Application filed Nov. 17, 1899.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses

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C. A. Snow & Co.

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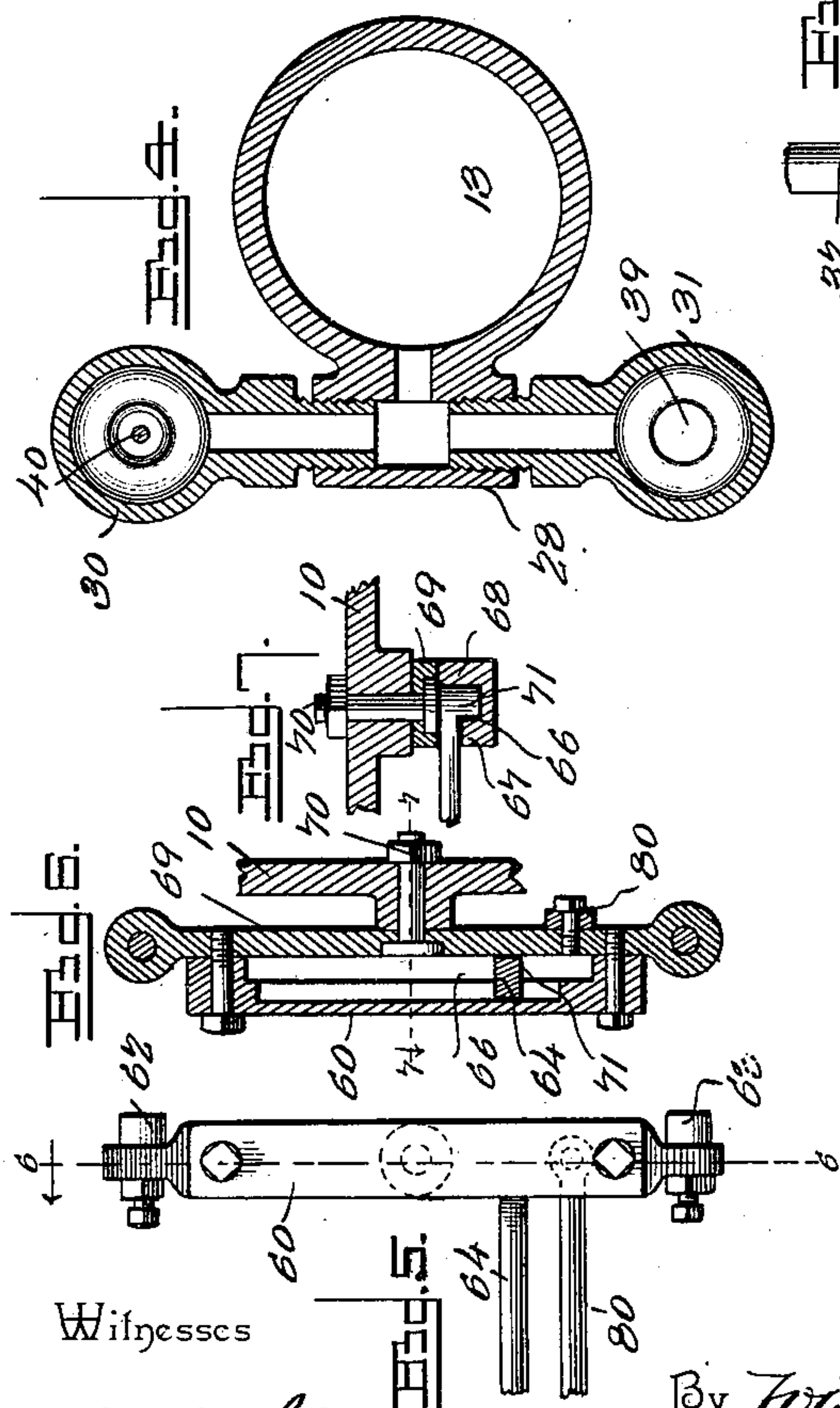
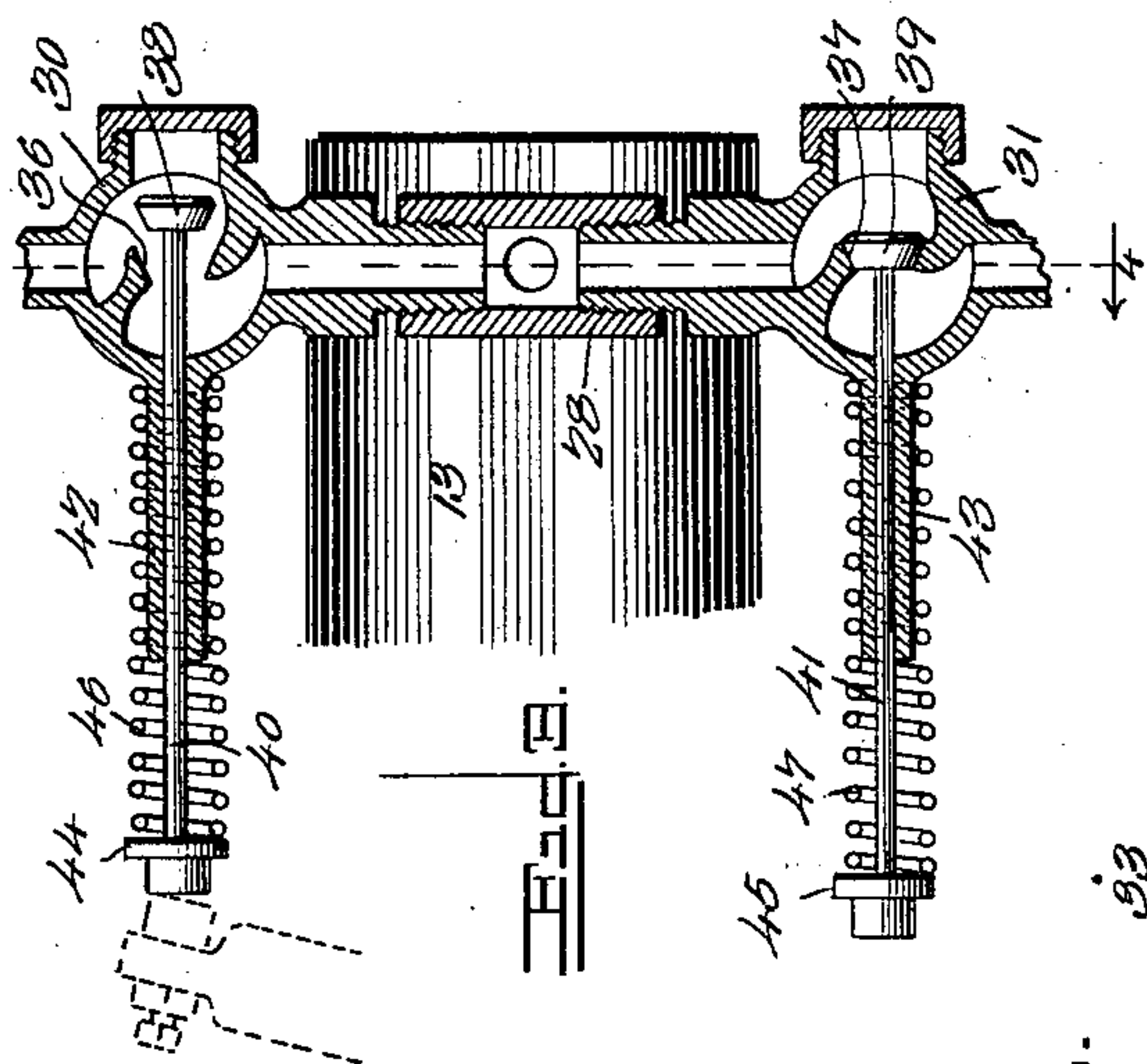
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UNITED STATES PATENT OFFICE.

ANDREW W. J. BEST, OF MACON, GEORGIA.

VALVE-GEAR FOR ENGINES.

SPECIFICATION forming part of Letters Patent No. 656,164, dated August 21, 1900.

Application filed November 17, 1899. Serial No. 737,308. (No model.)

To all whom it may concern:

Be it known that I, ANDREW W. J. BEST, a citizen of the United States, residing at Macon, in the county of Bibb and State of Georgia, have invented a new and useful Valve-Gear for Engines, of which the following is a specification.

This invention relates to steam-engines in general, and more particularly to the duplex type; and it has for one object to provide a construction in which the usual arrangement of cut-off mechanism is omitted and in which the cylinders are so disposed as to eliminate the necessity of cross-heads for the piston-rods, thus saving the friction and the expense of such construction.

A further object of the invention is to so arrange the parts that the highest efficiency of the engine will be secured.

In the drawings forming a portion of this specification, and in which similar numerals of reference designate like and corresponding parts in the several views, Figure 1 is a side elevation showing the complete engine with the valves set for movement of the fly-wheel to the right. Fig. 2 is a view similar to Fig. 1 with the cut-off mechanism reversed to rotate the fly-wheel to the left. Fig. 3 is a view, partly in section and partly in elevation, showing the cut-off valves and their arrangement upon one of the cylinders. Fig. 4 is a section on line 4 4 of Fig. 3. Fig. 5 is a detail elevation of one of the rockers of the cut-off mechanism. Fig. 6 is a section on line 6 6 of Fig. 5. Fig. 7 is a section on line 7 7 of Fig. 6.

Referring now to the drawings, 10 represents the bed-plate or casting of the engine, having upwardly-extending portions 11 and 12 at its ends, which portions have circular openings therethrough in axial alinement for the reception of the cylinders 13 and 14 of the engine. These cylinders have each a peripheral flange 15 and 16, respectively, which are adapted to lie against the outer faces of the upwardly-extending portions 11 and 12, and against which faces they are secured by means of screws 17. The outer ends of the cylinders 13 and 14 are closed, while the inner ends are open, and within each cylinder is disposed a piston 18 and 19, respec-

tively. Pillow-blocks 20 are formed upon the bed-plate 10, and in the bearings thereof is disposed a crank-shaft 21, having at one end, exteriorly of the bed-plate, a fly-wheel 22, and at the opposite end, exteriorly of the bed-plate, a crank-disk 23. The shaft 21 has also a crank 24 between the sides of the bed-plate, and connected with this crank are pitmen 25 and 26, leading from the pistons 18 and 19, and through the medium of which motion is conveyed from the pistons to the shaft 21.

In order to supply steam to the cylinders 13 and 14 and to exhaust therefrom at the proper time, the outer end of each cylinder has the stem of a T-way connected therewith, which T-ways are shown at 28 and 29. Connected with one end of the head of the T-way 28 is a valve-casing 30 and with the other end a valve-casing 31, the casing 30 having communication with a feed-pipe 32 through the medium of a pipe 33, while the casing 31 is connected with an exhaust-pipe 34 through the medium of the pipe 35.

The casing 30 has a valve-seat 36, while the casing 31 has a valve-seat 37, these seats being adapted to receive valves 38 and 39, respectively, the valve 38 being adapted to open against the head of steam supplied to the cylinder, while the valve 39 opens against the head of the exhaust-steam. These valves are provided with stems 40 and 41, which are adapted for reciprocation in extensions 42 and 43 of the valve-casings, and upon the outer ends of the stems 40 and 41 are fixed caps 44 and 45, against the rear faces of which bear the outer ends of springs 46 and 47, which encircle the stems 40 and 41 and the extensions 42 and 43 and bear at their opposite ends against the casings 30 and 31, the tendency of these springs being to hold the valves seated.

The connection 29 upon the cylinder 14 has valve-casings 50 and 51 connected with the opposite ends of its head, which casings contain valves having the same construction and arrangement as those above described, the stems 52 and 53 of these valves being extended through extensions 54 and 55 of the valve-casings and provided with heads 56 and 57 at their outer ends. Helical springs 58 and 59 encircle the extensions and the valve-stems

and bear at their outer ends against the caps 56 and 57 and at their inner ends against the casings 50 and 51, thus tending to hold the valves seated.

5 In order to operate the cut-off valves to cause proper admission and exhaust of steam to and from the cylinders, it is necessary that the valve of the casing 30 and the valve of the casing 51 be opened simultaneously and
10 that this opening of the valves of the casings 30 and 51 be made alternately with the opening of the valves of the casings 31 and 50, which latter are opened simultaneously. Thus while steam is being admitted to one of the
15 valve-casings to supply the cylinders connected therewith, the steam is being exhausted from the opposite cylinder, it being of course understood that the steam-pressure is exerted upon but one face of each piston.
20 In order to thus operate the several cut-off valves, two rockers 60 and 61 are pivotally mounted upon the bed-plate 10 adjacent the cylinders 13 and 14, respectively, and each of these rockers has a cushion 62 at one end
25 and a second cushion 63 at the other, these cushions being adapted for engagement with the caps of the valve-stems alternately as the rockers are operated.

In order to oscillate the rockers, a connecting-rod 64 has a bearing at one end upon the
30 crank-pin 65 of the crank-disk 23, while its opposite end is slidably connected with the rocker 60. This rocker 60 consists of a plate having a groove 66 in its inner face, one wall
35 67 of this groove being lower than the opposite wall 68, and upon the outer face of this higher wall 68 is secured a second plate 69, through the medium of which the rocker is secured to the bed-plate 10 by means of a
40 bolt 70. The end of the connecting-rod 64 has an enlarged head 71, which is disposed within the groove 66 and in which it has slidable movement, the connecting-rod being extended outwardly between the lower wall 67
45 and the plate 69. By this means the connecting-rod 64 may be shifted to engage the rocker adjacent either its upper end or its lower end, and in order to thus shift the connecting-rod a hand-lever 72 is pivotally
50 mounted upon an extension 73 of the bed-plate, and this lever has an arm 74, the outer end of which is connected with the connecting-rod by means of the link 75. Thus as the lever 72 is oscillated the outer end of the arm
55 74 will be raised and lowered and will correspondingly move the headed end of the connecting-rod. The extension 73 has a segmental slot 76, through which is passed a headed bolt 77, which is continued through
60 the perforation of the lever 72 and is provided with a hand-nut 78, by means of which the head of the bolt may be drawn against the rear face of the extension 73 to hold the lever in its adjusted position.

65 With the lever 72 (shown in Fig. 1 of the drawings) the upper end of the rocker 60 will

strike the cap 45 simultaneously with the striking of the lower end of the rocker 61 upon the cap 57, and this striking will occur
70 just before the piston 18 has reached the limit of its motion in the direction of its closed outer end of the cylinder 13, the caps 44 and 56 having been previously engaged by the rockers to exhaust the prior charge from the cylinder 13 and to supply steam to the cylinder 14. If, however, the position of the lever
75 72 be reversed, as shown in Fig. 2, the time of operation of the several valves will be reversed, and instead of the cylinder 13 exhausting, which it would do when the parts
80 are as shown in Fig. 1, the valve 38 will be pressed from its seat and the piston 18 will be moved toward the open end of the cylinder and will thus move the fly-wheel 22 to the left instead of to the right, the valve in the
85 casing 51 at the same time being opened to permit the steam from the cylinder 14 to exhaust.

In order to transmit motion from the rocker 60 to the rocker 61, a connecting-rod 80 has
90 one end pivotally connected with the lower end of the rocker 60, while the other end is similarly connected with the lower end of the rocker 61.

From the foregoing description it will be
95 seen that the present structure employs no cross-heads whatever, the pistons being connected directly with the crank-shafts through the medium of their pitmen or piston-rods, and also that instead of the usual link-motion
100 and slide-valve for supplying and exhausting and for reversing is employed a structure having less friction and greater efficiency.

What is claimed is—

1. In a steam-engine, the combination with
105 oppositely-disposed cylinders and a common crank-shaft, of pistons in the cylinders connected with the crank-shaft, a steam-supply pipe connected with the cylinders, valves between the supply-pipe and the cylinders, an
110 exhaust-pipe connected with the cylinders, valves between the cylinders and the exhaust-pipe and rockers operatively connected with the crank-shaft and adapted to open an inlet-valve and an outlet-valve simultaneously and
115 alternately with the opening of the remaining inlet and outlet valves.

2. In an engine, the combination with oppositely-disposed cylinders, and a crank-shaft, of pistons in the cylinders, pitmen connected with the pistons and with the crank-shaft, steam supply and exhaust pipes connected with the cylinders, inlet-valves between the supply-pipes and the cylinders,
120 outlet-valves between the exhaust-pipes and the cylinders, mutually-connected rockers adjacent the cylinders and adapted to open an inlet-valve and an exhaust-valve simultaneously, and alternately with the opening of the remaining inlet and outlet valves, and
125 connections between the crank-shaft and one of the rockers for moving the rockers.
130

3. In a steam-engine, the combination with
cylinders and a crank-shaft, of pistons within
the cylinders and connected with the crank-
shaft, steam supply and exhaust pipes con-
5 nected with the cylinders, inlet-valves be-
tween the supply-pipes and the cylinders,
outlet-valves between the exhaust-pipes of
the cylinders, pivoted rockers having mutual
connection and adapted to operate the inlet
10 and outlet valves, a connecting-rod con-
nected with one of the rockers and with the

crank-shaft to move the rocker, and means
for shifting the connecting-rod with respect
to the attached rocker to reverse the engine.

In testimony that I claim the foregoing as 15
my own I have hereto affixed my signature in
the presence of two witnesses.

ANDREW W. J. BEST.

Witnesses:

F. F. BEST,

E. P. JOHNSTON.