

No. 762,377.

PATENTED JUNE 14, 1904.

S. L. BERRY.
ENGINE VALVE GEAR.
APPLICATION FILED FEB. 25, 1904.

NO MODEL.

2 SHEETS—SHEET 1.

Fig. 1.

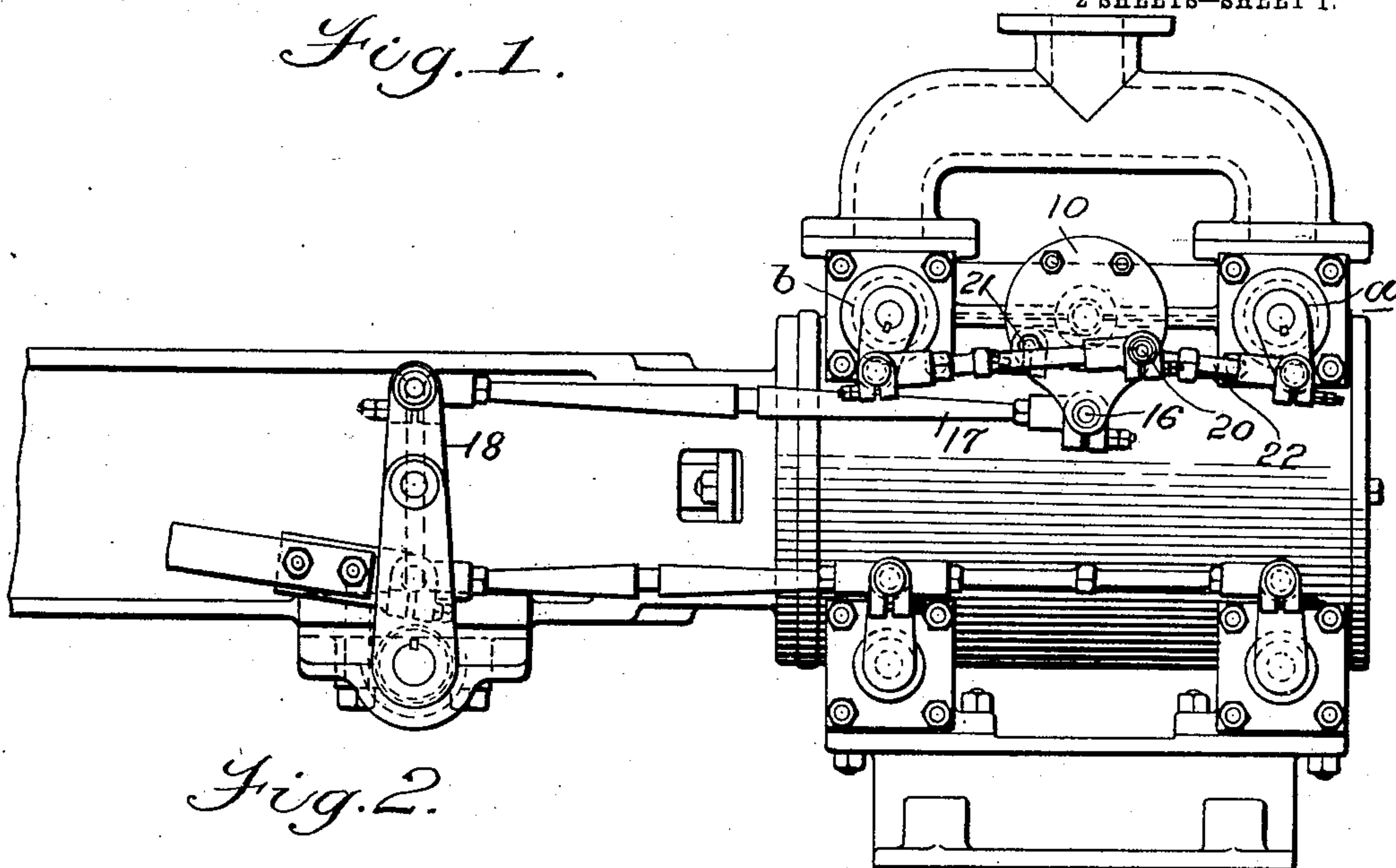
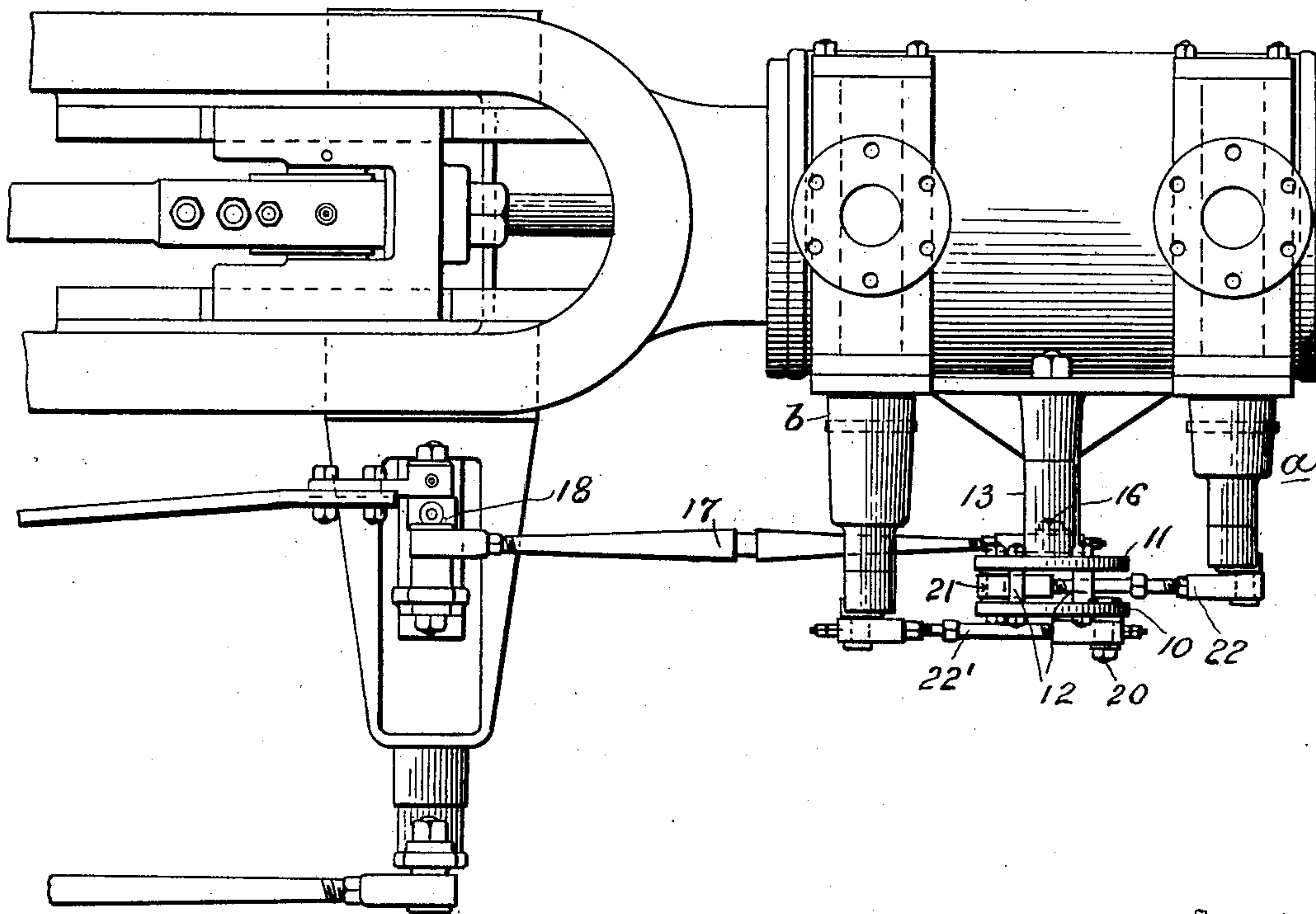


Fig. 2.



Inventor

Seneca L. Berry

By

J. Walter Fowler
His Attorney

Witnesses

C. H. Walker
C. M. Fowler

No. 762,377.

PATENTED JUNE 14, 1904.

S. L. BERRY.
ENGINE VALVE GEAR.

APPLICATION FILED FEB. 25, 1904.

NO MODEL.

2 SHEETS—SHEET 2.

Fig. 3.

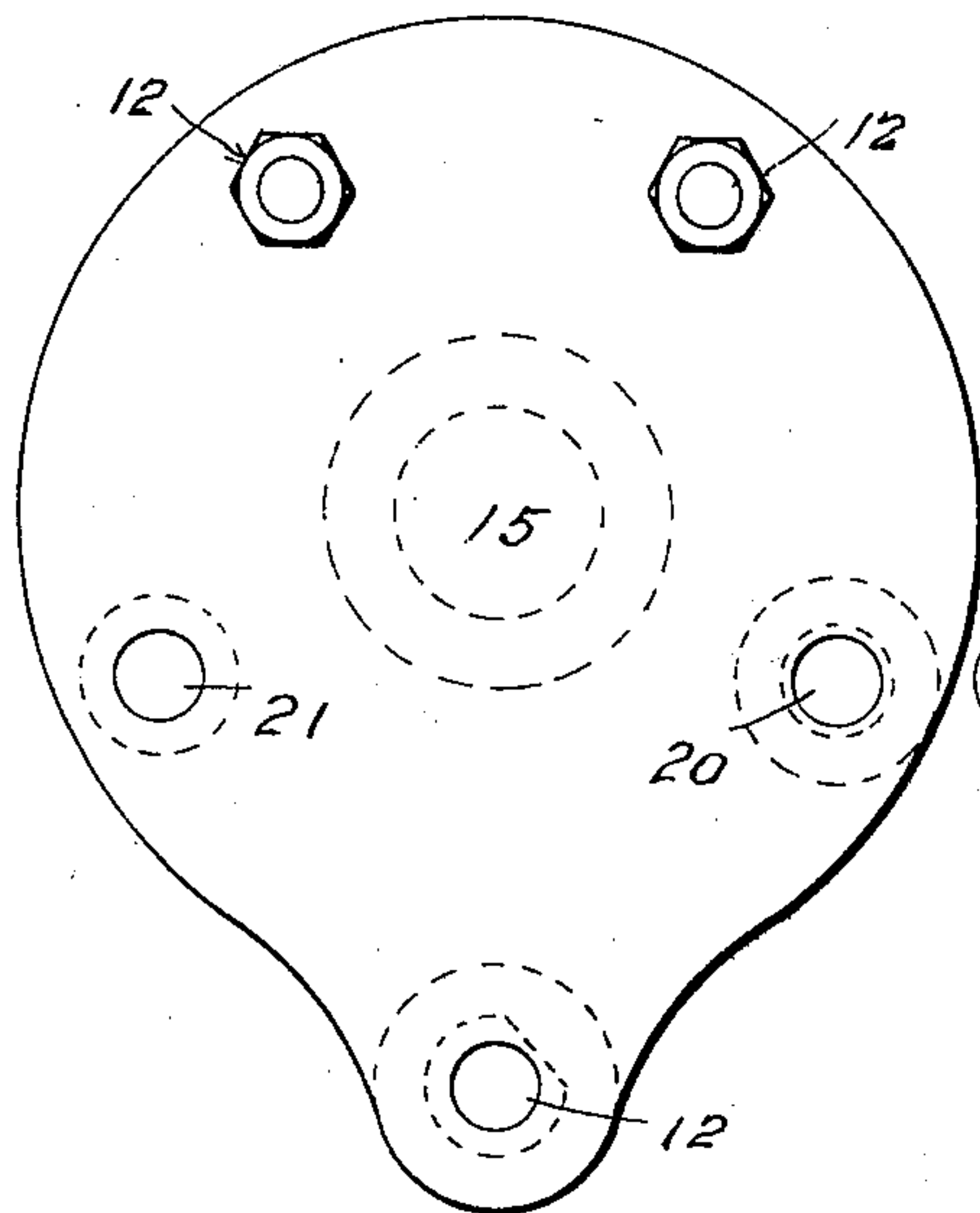


Fig. 4.

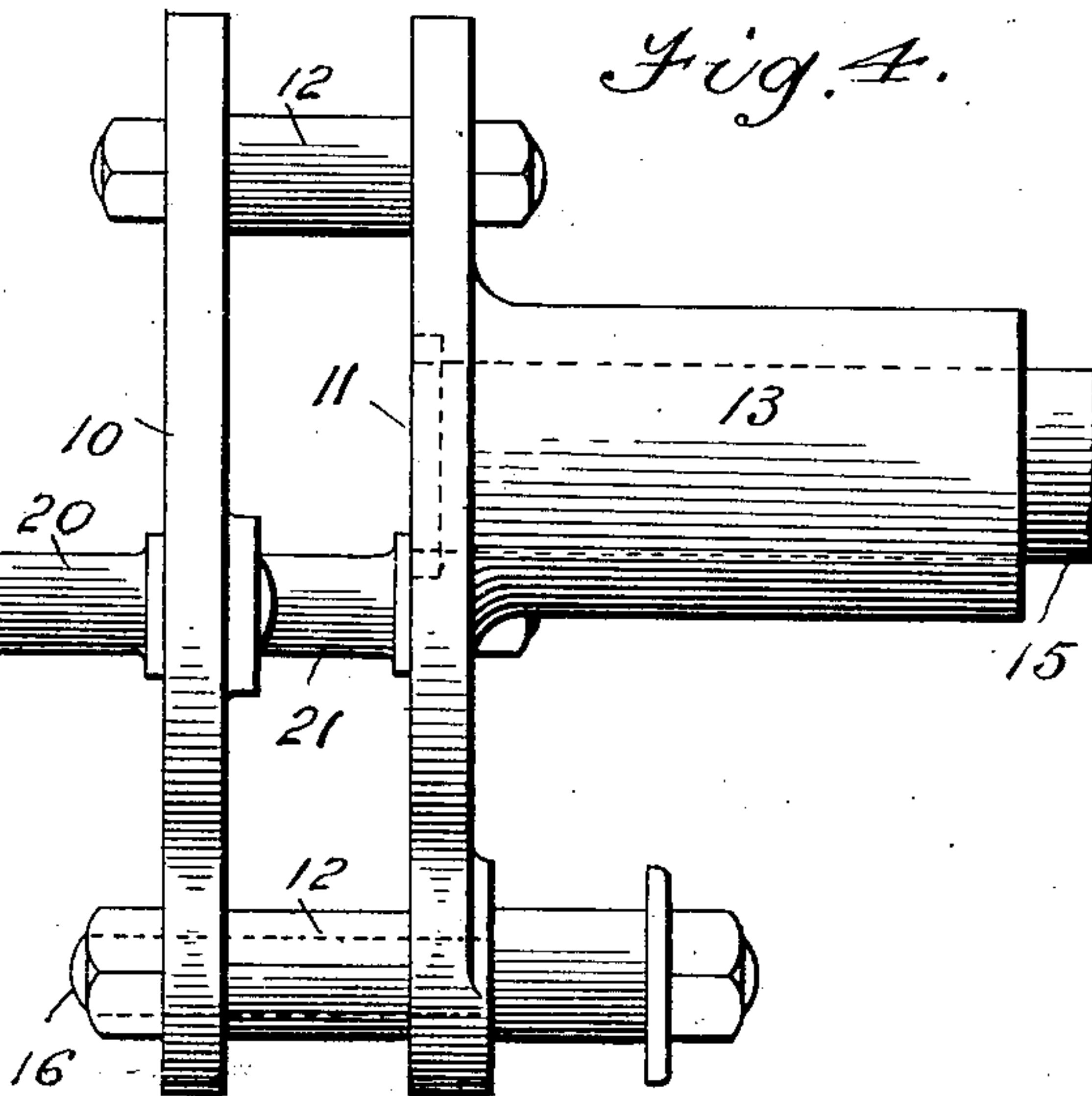
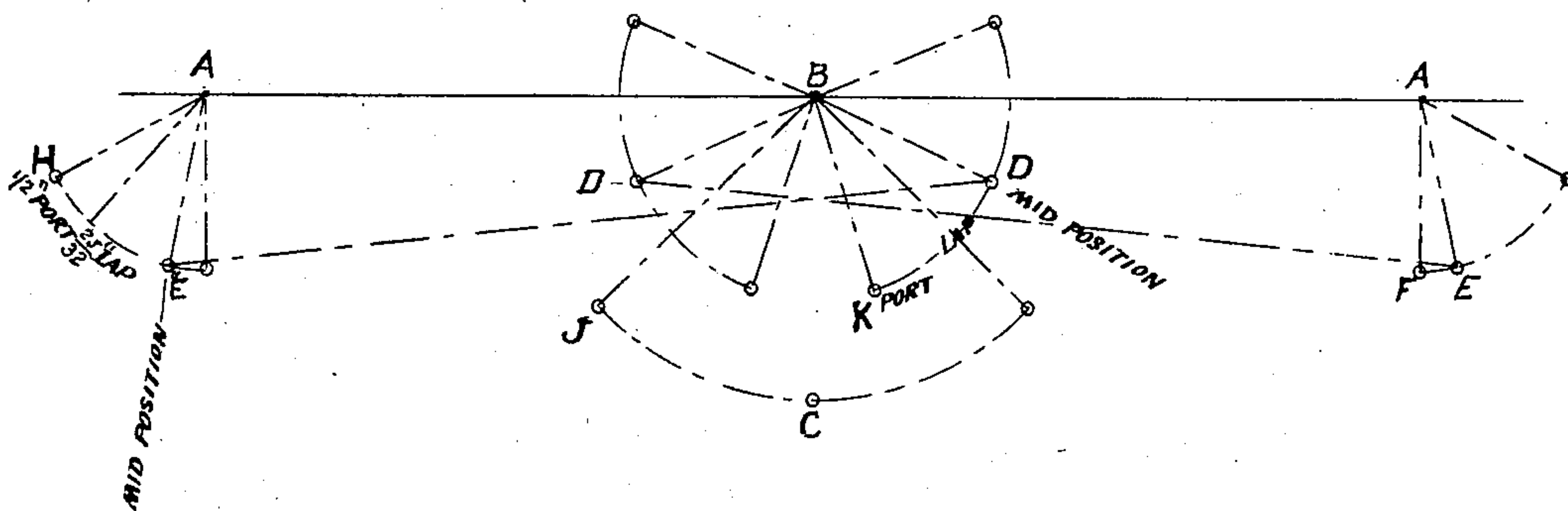


Fig. 5.



Inventor

Witnesses

C. M. Walker.
C. W. Fowler

Seneca L. Berry
By *J. D. Walter Fowler*
His Attorney

UNITED STATES PATENT OFFICE.

SENECA L. BERRY, OF NOGALES, ARIZONA TERRITORY, ASSIGNOR TO
ARIZONA & SONORA MANUFACTURING COMPANY, OF NOGALES,
ARIZONA TERRITORY, A CORPORATION OF ARIZONA TERRITORY.

ENGINE VALVE-GEAR.

SPECIFICATION forming part of Letters Patent No. 762,377, dated June 14, 1904.

Application filed February 25, 1904. Serial No. 195,191. (No model.)

To all whom it may concern:

Be it known that I, SENECA L. BERRY, a citizen of the United States, residing at Nogales, in the county of Santa Cruz and Territory of Arizona, have invented new and useful Improvements in Engine Valve-Gear, of which the following is a specification.

My invention relates to certain new and useful improvements in valve-gear for steam-engines; and the invention consists of the parts and the constructions, arrangements, and combinations of parts, which I will hereinafter describe, and point out in the claims.

The primary object of my invention is to obtain an earlier cut-off of the valve by a positive movement and without employing trips or releases and to provide means whereby the engine cannot take steam later than the point of maximum cut-off, the objective points being an early positive cut-off—say before half-stroke—with ample valve area and quick valve movements at opening and closing obtained by a simple mechanism.

In the accompanying drawings, forming part of this specification, and in which similar characters of reference indicate like parts throughout the several views, Figure 1 is a side elevation of a portion of an engine embodying my invention. Fig. 2 is a plan view of Fig. 1. Fig. 3 is a detached side view of the double wrist-plate. Fig. 4 is an edge view of Fig. 3. Fig. 5 is a diagrammatic view showing the travel of the valve-levers and wrist-plate when the eccentric is at full throw.

In the accompanying drawings I illustrate so much of a four-valve center-crank engine as will be sufficient for a complete understanding of my present improvements and the general construction and operation of which are well known and need not be set up with particularity.

In the ordinary valve movement of the "Corliss" type the action of the eccentric, rods, levers, and single wrist-plate on the valves with the laps as usually given is to provide a cut-off at about three-quarter stroke, the earlier cut-off, which characterizes the

class of engines of the Corliss type from its predecessors, being obtained by one of the various forms of trips or release mechanisms.

As a substitute for the ordinary single wrist-plate, such as has heretofore been used, I employ a double wrist-plate, which enables me to operate each steam-valve (Corliss type) from a pin or stud placed on the opposite side of the center line of the plate and to thereby obtain a more rapid movement of the valve at the time of opening and closing and full-port opening at cut-offs below fifty per cent.

In the said drawings the inlet and exhaust valves are of the regular Corliss type, with the exhaust-valve designed to be controlled by a separate eccentric on the engine-shaft and the steam-valve designed to be controlled by a variable eccentric which is operated by a shaft-governor, these eccentrics and connections not being herein shown, as they and their operations are well known and form no particular part of the present improvement.

The double wrist-plate, which forms the essential part of my present invention, is shown in Fig. 1 as located between the front and back steam-valves *a b*, said plate consisting of two disk-like members 10 11, appropriately spaced from each other by means of thimbles 12, disposed around their outer portions, thereby leaving the central portion open and unobstructed. One of the members, 11, is formed or provided with a hub 13, by which it may be fitted in position, and which hub may contain a suitable bushing which receives the pin 15, upon which the wrist-plate is carried. Through the lower thimble 12 passes a pin or bolt 16, the inner end of which projects rearward of the wrist-plate and is designed to be connected to the end of the rod 17, which extends from the rocker-arm 18 of the engine, whereby the wrist-plate is oscillated about the pin 15 in the usual manner. Projecting from the outer face of the outer member of the double wrist-plate at one side—say to the right—of the vertical center of said plate is a pin 20, and extending across the space between the inner faces of the members of the double wrist-plate and appropriately fixed to said members

is a second pin 21, which lies in a plane equidistant from but on the opposite side of the vertical center of said plate, as shown in Fig. 3. To the aforesaid pin 21 is connected the rod 22, which operates the front valve *a*, and to the other pin, 20, is connected the rod 22', which operates the back valve *b*. Thus it will be seen that the rod from the rocker-arm is connected behind the inner member of the wrist-plate, the rod which operates the front valve extends across the space between the members of the wrist-plate and to the farther side of the plate, and the rod which operates the back valve extends across the outside of the front member of said plate. Thus each steam-valve is operated from a pin placed on the opposite side of the center line of the plate, the arrangement being such that a more rapid movement of the valve is obtained at the time of opening and closing and full-port opening at cut-offs below fifty per cent., as I will presently more fully explain.

Referring now to the diagrammatic view, Fig. 5, wherein is shown the steam-valve movement showing the travel of the valve-rods and wrist-plate when the eccentric is at full throw, A A represent the centers of the valve-stems; B, the center of the wrist-plate; C, the middle position of the pin 16, which is attached to the rod which is actuated by the rocker-arm; D D, the middle positions of the pins 20 21, which actuate the front and back steam-valves, and E E the middle positions of the valve-rod pins 23.

Taking the operation of one valve as an example, we now find that while the pin 16 moves from the point C to the point J the pin 20 (represented at D in the diagram) moves to the point K, a part of the distance being required to overcome the lap of the valve and the remainder to give the port-opening. This movement causes the valve-rod pin 23 (represented in the diagram at E) to reach the point designated H, the proportions of lap and port-opening being, say, one-half-inch port and twenty-five thirty-seconds inch lap. In the meantime the opposite steam-valve has moved from its mid-position "E to F," showing a small "dead" movement "E to F" in proportion to the "active" movement "E to H." The same result obtains from the opposite steam-valve during its active movement.

From this description it will be seen that by reason of the double wrist-plate and the arrangement and disposition of its pins we are enabled to use a very large lap in proportion to port-opening and obtain a positive cut-off before half-stroke, and as the valve must fully open and close between the beginning of the stroke and the point of cut-off I have a rapid valve movement. By the use of double and triple ported valves I obtain ample port areas.

A further advantage of the invention is that the engine cannot take steam later than the

point of maximum cut-off, and it must be operated within an economical range of cut-offs.

In the trip mechanisms ordinarily used a small excess beyond normal load causes the trips to fail to operate, and the engine takes steam to about three-quarters stroke. This will occur first on one end and then on the other, producing heavy uneven strains and a falling off in economy.

With my invention earlier cut-offs than the maximum are obtained by reducing the travel of the eccentric or by alteration in the length of any rod or lever between the eccentric and the pin 16, which will give said pin a shorter travel. I have, therefore, with a shaft-governor a positive valve movement, giving the same range of cut-off as the Corliss trip-gear, but without its complication, and this result is reached, essentially, by the use of the double wrist-plate operating each steam-valve (Corliss type) from a pin placed on the opposite side of the center line of the plate to give a more rapid movement of the valve at the time of opening and closing and full-port opening at cut-offs below fifty per cent.

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

1. In an engine, the combination with a pair of steam-valves of an intermediate wrist-plate including parallel spaced members and connecting-pins whereby the valve at one side of the center of the wrist-plate may be connected to said plate on the opposite side of its center.

2. In an engine, the combination with front and back steam-valves, of a wrist-plate intermediate of the valves, connections from the valves extending in opposite directions across the front and rear faces of said plate to points beyond the center thereof, and means for operating the wrist-plate.

3. In an engine, the combination with front and back valves, of a wrist-plate between the same and having oppositely-extending pins, one located at one side and the other at the opposite side of the center, means connecting each of the valves with the wrist-pin farthest removed from it, and means for operating the wrist-plate.

4. In an engine, the combination with front and rear steam-valves, of a wrist-plate and means connecting with the plate at one side of the center thereof and extending to and connecting with a valve at the opposite side of said center whereby the opening and closing action of the valve is accelerated.

5. In an engine, a wrist-plate including parallel spaced members, a pin projecting outwardly from the front face of the plate, a second pin projecting oppositely to the first-named pin and across the space between said members, said pins being disposed upon opposite sides of the center of said plate and

means whereby the plate may be connected with actuating mechanism.

6. In an engine, a wrist-plate including parallel spaced members and means uniting the same at points between the center and outer edges, a pin projecting from the outer face of one of said members and disposed at one side of the center of said plate, a second pin projecting oppositely to the first-named pin and extending across the space between said members whereby a pin at one side of the center of the plate may be connected with a valve at the opposite side of said center, and means whereby the plate may be connected with actuating mechanism.

7. In an engine, the combination with a rocker-arm and front and rear steam-valves, of a wrist-plate including parallel spaced members, means whereby the rocker-arm may be connected behind the inner member, means whereby the front valve may be connected between the members at a point at one side of the center of the plate, and means

whereby the back valve may be connected to the outer face of the outer member at a point at the opposite side of the center of said plate.

8. In an engine, the combination with front and rear steam-valves, and rods connected therewith, a wrist-plate having oppositely-extending pins one located at each side of the center of the plate and both in the same horizontal plane, said pins so disposed relative to the valves that the valve at one side of the center of the plate connects with the pin on the opposite side of said center, and a rearwardly-extending pin disposed in a plane below the first-named pins and adapted to be connected to the wrist-plate-actuating mechanism.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

SENECA L. BERRY.

Witnesses:

J. B. BRISTOL,
LOUIS HUDGIN.