C. F. PRESCOTT.

ENGINE VALVE GEAR.

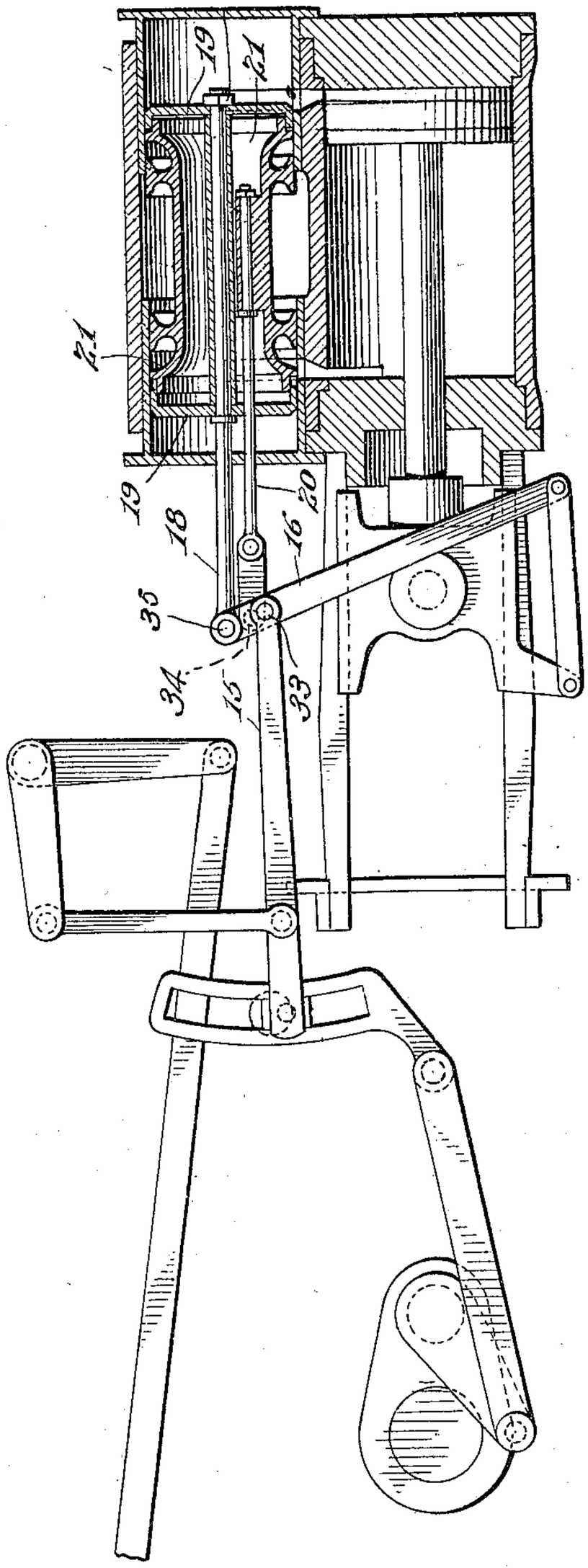
APPLICATION FILED OCT. 20, 1908.

922,036.

Patented May 18, 1909.

2 SHEETS—SHEET 1.

Fig. 1.



Witnesses

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Fig. 2.

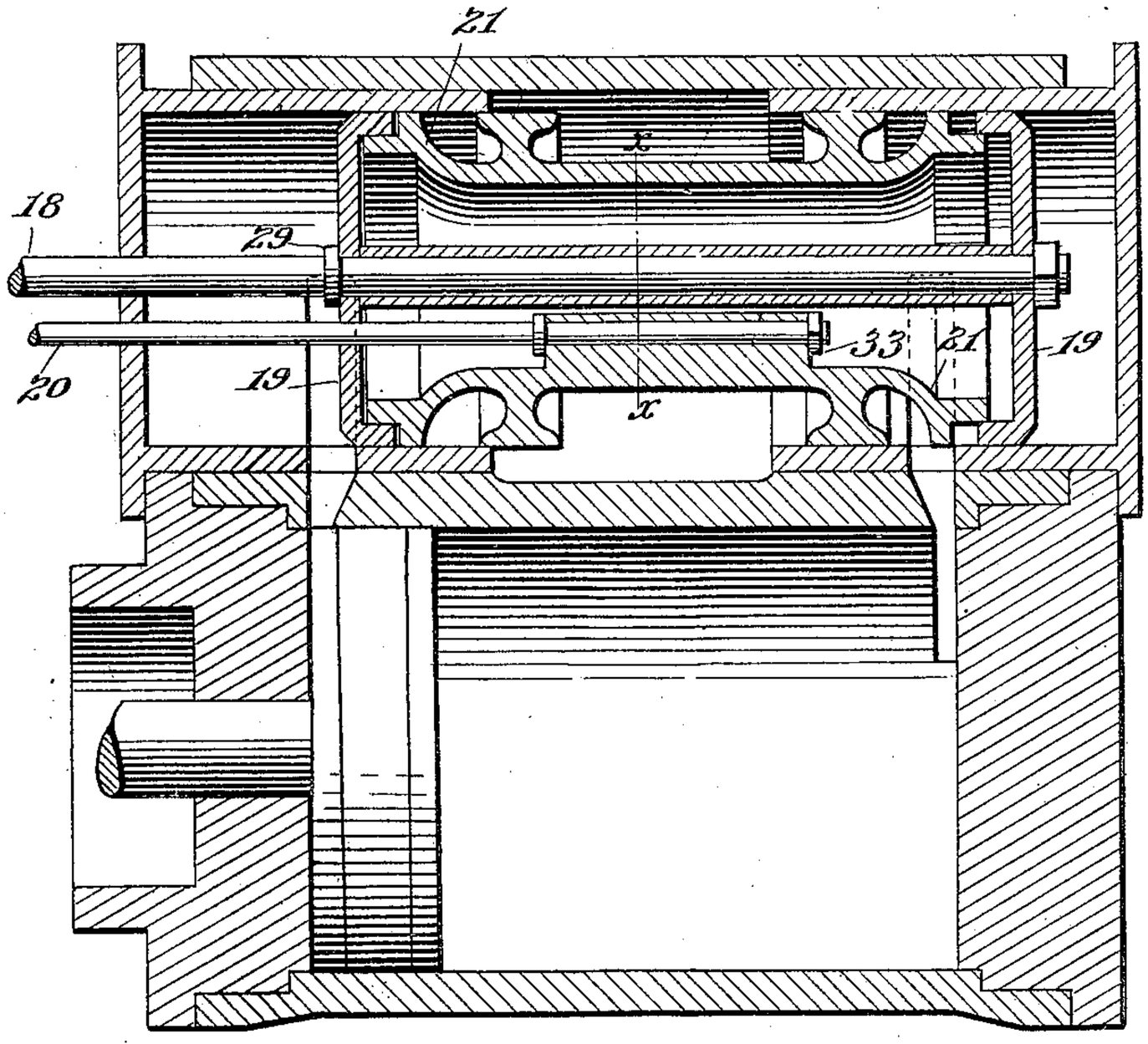


Fig. 3.

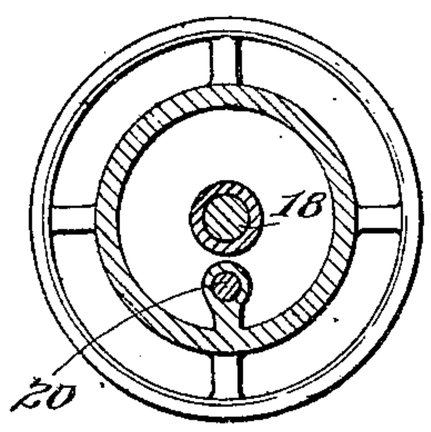
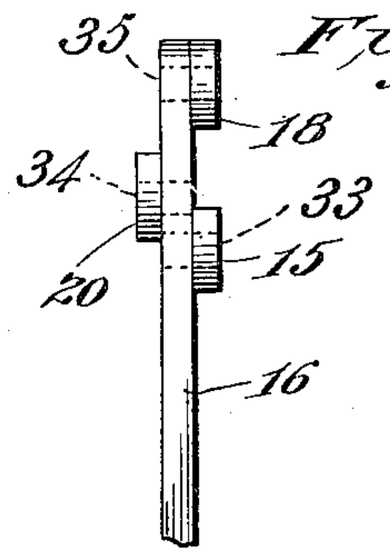


Fig. 4.



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UNITED STATES PATENT OFFICE.

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ENGINE VALVE-GEAR.

No. 922,036. Specification of Letters Patent. Patented May 18, 1909.

Application filed October 20, 1908. Serial No. 458,642.

To all whom it may concern:

Be it known that I, CHARLES F. PRESCOTT, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Engine Valve-Gears, of which the following is a specification.

My invention relates to engine valve gears, and more particularly to means for delaying the "events" of opening and closing of the exhaust port.

My invention relates more particularly to modifications of existing valve gears and valves for steam engines by means of which better distribution and economy of motive fluid may be had.

The object is to provide a simple and easily adjustable mechanism, by means of which the length of the faces of slide valves for steam engines can be varied automatically, and without the use of springs, dash pots, toothed gearing or other troublesome parts, in such a manner that later exhaust opening and closing events can be had than with ordinary gears operating slide valves, the faces of which are invariably fixed in length. The results of these late events are: First: The steam is retained longer in the cylinder, thereby increasing the ratio of expansion and getting more work from a given quantity of steam. Second: The exhaust remains open during a greater portion of the return stroke, thereby insuring a lower back pressure and less volume in compression and decreasing negative work. Third: There being a smaller volume in compression, it is not necessary to provide the larger clearance spaces which are usual in steam engine cylinders and it is my intention to so design the cylinder that the clearance spaces will be relatively small and thereby secure an increased ratio of expansion for a given cut off, while with the smaller area of port walls, the radiation of heat and condensation of steam will be relatively less than with usual designs.

In a primitive valve gear, the valve has neither lap or lead, the eccentric is set ninety degrees from the crank, and there is no expansion or compression. This is commonly known as a square setting. In order to obtain expansion, it is necessary to add steam lap to the valve. When steam lap is used, it is necessary in order to admit steam at or near the dead center to advance the valve by approximately the amount of steam lap, from its central position, and to do this, it is necessary to advance the eccentric sufficiently for the purpose. The result of this is that with the exhaust edges of the valve lapless as in the primitive valve, the exhaust is closed quite early in the return stroke, and compression sets in causing a large amount of negative work. This can be overcome by cutting away the exhaust edges of the valve, so as to delay closure of the exhaust, but only at the expense of an early exhaust opening which would result in great loss of power, so as a compromise, the exhaust edges of the valve are usually made line and line with the exhaust edges of the ports. This results in a very early closure of the exhaust and heavy compression at early cut offs, and makes it necessary to provide large clearance spaces which cause great loss of efficiency.

In the accompanying drawings, Figure 1, is a view partly in longitudinal section illustrating my improvements. Fig. 2, is an enlarged view in longitudinal section through the steam chest and valves. Fig. 3, is a view in cross section on the line *x*—*x* of Fig. 2, and Fig. 4, is an edge view of lever 16, showing the location of the several connections at its upper end.

Referring to drawing Fig. 1. For the purpose of illustration, I have chosen the Walschart valve gear in which the primitive movement is derived from a return crank on the crank pin of the engine, while the advance movement of the valve is obtained through the medium of a combining lever, which vibrates in unison with the cross head of the engine, and which gear is quite common in locomotive practice. My improvement is also well adapted to and can be used with other reversing gears, and the automatic gears which are common to high speed stationary engines. I propose to use a divided slide valve provided with riding shoes at either end, one portion 19 of which carries the steam edges, and is operated by rod 18, and the other portion 21

carries the exhaust edges, and is operated by rod 20. The point of connection of rod 18 which operates the steam edges of the valve is at 35. If the point of connection of rod 20 which operates the exhaust edges of the valve were located at 33 which is the fulcrum of the combining lever to the radius rod 15, the exhaust edges will be at the same position as in the primitive gear, and there will be no compression and the release will be at or near the dead center, while with rod 18 connected at point 35, the steam edges will have the large advance necessary for early cut off. However, those familiar with the art, know that it is necessary to have some compression to mechanically cushion the reciprocating parts of the engine. To provide this, it is only necessary to choose some point 34 intermediate between points 33 and 35, which will give the amount of advance necessary to provide sufficient compression to fill the clearance spaces to the pressure deemed necessary.

In designing the valve, it is necessary to provide an annular space between the steam and exhaust edges at either end of the valve, the longitudinal dimension of which is slightly greater than one-half the difference between the maximum movement of the steam and exhaust edges, which is due to and derived from the crosshead of the engine. This is necessary to avoid damage due to the difference in travel and linear advance of the two portions of the valve, one of which 21 partakes more of the primitive movement of the gear than the other 19.

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

1. In a valve gear for steam engines, the combination with an engine cylinder, a valve chamber and ports connecting the chamber and cylinder, of inlet and exhaust valves in said chamber, said exhaust valves being connected by a tubular barrel having circular flanges at its ends mounted to slide within the cylindrical inlet valves, rings around the barrel connected thereto and providing riding shoes in the valve chamber, and mechanism for transmitting varying speed and linear advance to the inlet and exhaust valves with relation to each other.

2. In a valve gear for steam engines, the combination with an engine cylinder, a valve chamber and ports connecting the chamber and cylinder, of inlet and exhaust valves in said chamber, said exhaust valves connected by a tubular barrel, a longitudinal web in said barrel, an operating rod projecting through one of said inlet valves and secured to said web, an operating rod secured to both of said inlet valves; and mechanism for transmitting varying speed and linear advance to the inlet and exhaust valves with relation to each other.

3. In a valve gear for steam engines, the combination with an engine cylinder, a valve chamber and ports connecting the chamber and cylinder, of inlet and exhaust valves in said chamber, said exhaust valves connected by a tubular barrel, said inlet valves having alined openings, an operating rod extending through said openings, a shoulder on said rod against one inlet valve, a nut screwed onto the end of said rod and against the other inlet valve, a spacing sleeve around said rod between said inlet valves, an operating rod secured to said barrel, and mechanism for transmitting varying speed and linear advance to the inlet and exhaust valves with relation to each other.

4. In a valve gear for steam engines, the combination with an engine cylinder, a valve chamber and ports connecting the chamber and cylinder, of inlet and exhaust valves in said chamber, said exhaust valves connected by a tubular barrel, a longitudinal web in said barrel, an operating rod projecting through one of said inlet valves and secured to said web, said inlet valves having alined openings, an operating rod extending through said openings, a shoulder on said rod against one inlet valve, a nut screwed onto the end of said rod and against the other inlet valve, a spacing sleeve around said rod between said inlet valves, an operating rod secured to said barrel, and mechanism for transmitting varying speed and linear advance to the inlet and exhaust valves with relation to each other.

5. In a valve gear for steam engines, the combination with an engine cylinder, a valve chamber and ports connecting the chamber and cylinder, of inlet and exhaust valves, a tubular barrel integral with said exhaust valves, and reduced in diameter throughout, rings around said barrel, connected thereto and constituting riding shoes in the valve chamber, a longitudinal web in said barrel, an operating rod projecting through one of said inlet valves and secured to said web, an operating rod secured to both of said inlet valves, and mechanism for transmitting varying speed and linear advance to the inlet and exhaust valves with relation to each other.

6. In a valve gear for steam engines, the combination with an engine cylinder, a valve chamber and ports connecting the chamber and cylinder, of inlet and exhaust valves, a tubular barrel integral with said exhaust valves, and reduced in diameter throughout, rings around said barrel, connected thereto and constituting riding shoes in the valve chamber, said inlet valves having alined openings, an operating rod extending

through said openings, a shoulder on said rod against one inlet valve, a nut screwed onto the end of said rod and against the other inlet valve, a spacing sleeve around said rod between said inlet valves, and mechanism for transmitting varying speed and linear advance to the inlet and exhaust valves with relation to each other.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CHARLES F. PRESCOTT.

Witnesses:
R. H. KRENKEL,
J. A. L. MULHALL.