(No Model.) 2 Sheets—Sheet 1.

C. F. LITTLEJOHN.

VALVE GEAR.

No. 490,853. Patented Jan. 31, 1893.

Fig. 1.

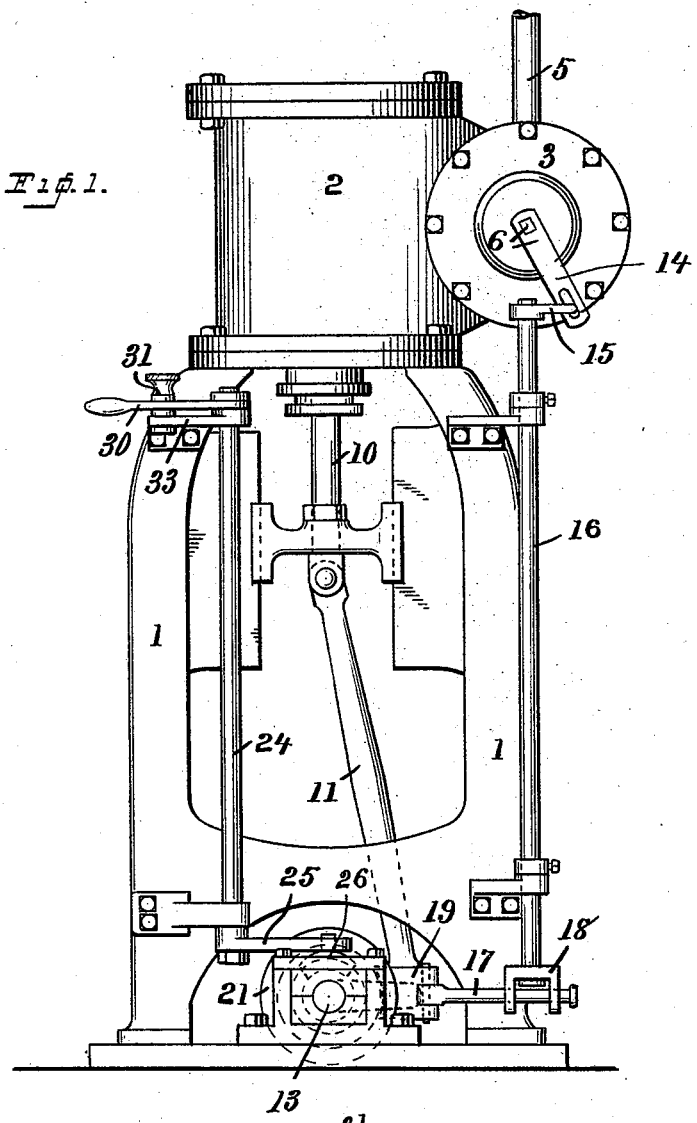
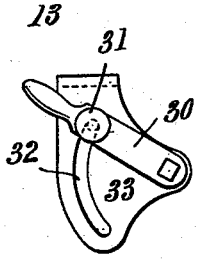


Fig. 5.



WITNESSES:

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A. J. Tanner.

INVENTOR:

Charles F. Littlejohn

BY

J. H. Hubbard,

his attorney

(No Model.) 2 Sheets—Sheet 2.

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Fig. 3.

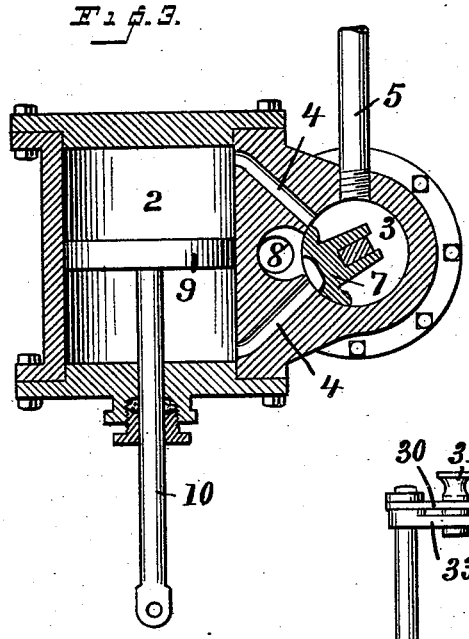


Fig. 2.

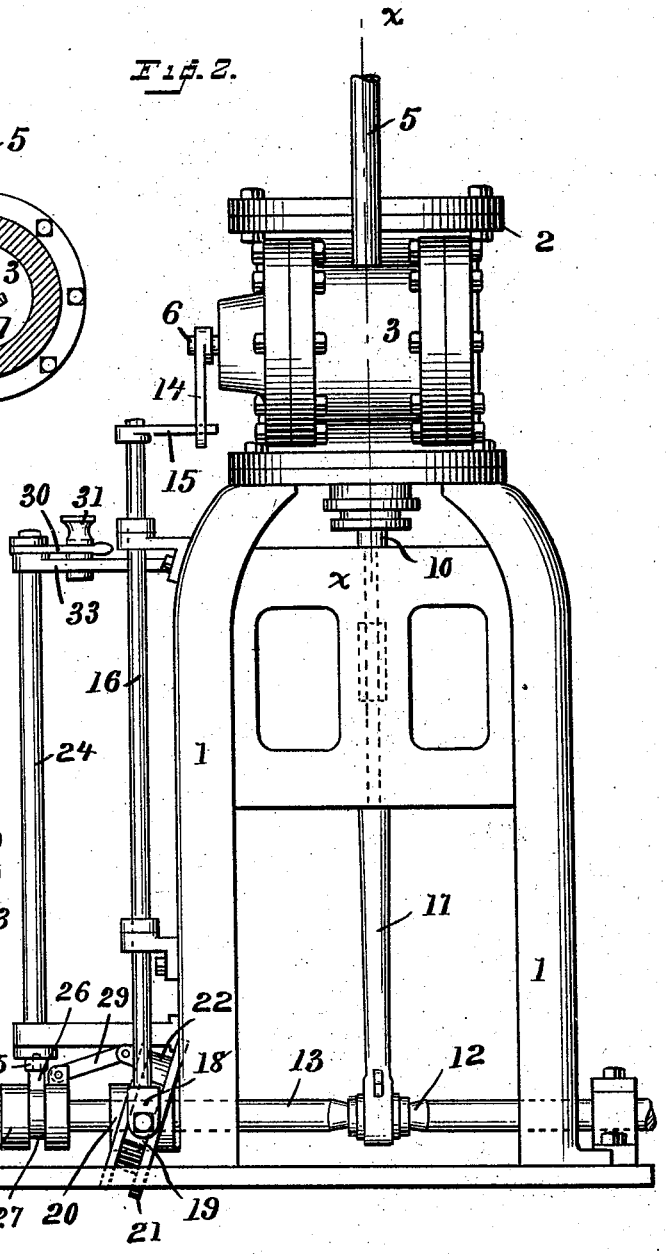
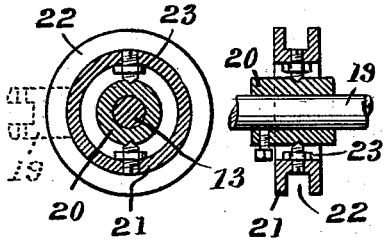


Fig. 4.



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UNITED STATES PATENT OFFICE.

CHARLES F. LITTLEJOHN, OF BRIDGEPORT, CONNECTICUT.

VALVE-GEAR.

SPECIFICATION forming part of Letters Patent No. 490,853, dated January 31, 1893.

Application filed March 21, 1892. Serial No. 425,740. (No model.)

To all whom it may concern:

Be it known that I, CHARLES F. LITTLEJOHN, a citizen of the United States, residing at Bridgeport, in the county of Fairfield and State of Connecticut, have invented certain new and useful Improvements in Valve-Gear; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to certain novel and useful improvements in valve gears for steam engines, but more especially it is intended for marine engines, although applicable to engines of other kinds, and the object thereof is to provide a simple and positive means for varying the cut-off according as the engine is performing light or heavy duty. With this end in view my invention consists and resides in the construction and combination of elements hereinafter fully explained and then recited in the claims, and particularly in the employment of the adjustable cam whereby the throw of the valve is determined through suitable connections.

In order that those skilled in the art to which my invention appertains may fully understand its construction and method of operation I will describe the same in detail, reference being had to the accompanying drawings which form a part of this specification, and in which

Figure 1, is an end elevation of a vertical engine containing my improvement, Fig. 2, is a side elevation, Fig. 3, a vertical section on the line *x*—*x* of Fig. 2, Fig. 4, comprises two small sections of the adjustable cam ring, the one at the left transverse to the shaft, and the right longitudinal of the shaft. Fig. 5, is a detail plan view of the hand lever.

In the engine shown in the drawings 1 denotes a suitable frame upon which the cylinder 2 is supported. The steam chest 3 is mounted alongside the cylinder and is connected therewith by means of steam ports 4, see Fig. 3. Steam is admitted to the chest through a steam pipe 5. A shaft 6 is journaled longitudinally in the steam chest, which latter, as shown at Fig. 3, is circular in cross section, and upon this shaft is borne a rocker valve 7 which is adapted alternately to cover and thereby connect the steam ports 4 with the exhaust port 8 which, as shown at Fig. 3, lies between the steam ports. As this is a common and well known form of valve it needs no further description in this place. The piston 9 having piston rod 10 is connected through a pitman 11 with a driving crank 12 upon the main shaft 13, which, in a marine engine, carries the propeller wheel. To the end of the shaft 6, which projects outside the steam chest, is affixed the crank 14 which has a slotted engagement with another crank 15, which latter is borne upon a rock shaft 16 mounted in vertical bearings. The lower end of this shaft is furnished with a laterally projecting rod or bar 17, said bar being hung in bearings 18 on the lower end of the rod. The outer end of the rod 17 has hinged thereto a shoe 19. Upon the main shaft 13 is secured a hub 20, and around this hub is placed a ring 21 having in its periphery a groove 22. This ring is connected to the hub 20 by means of gimbals 23. upon which it may have a rocking movement. The shoe 19 just referred to enters the groove in this ring, as shown at Fig. 1. Hung in bearings on the frame is a vertical rock shaft 24 similar in constuction to the rock shaft 16, and on its lower end it carries an outwardly projecting crank 25, as appears at Fig. 1. The end of this crank carries a shoe 26, see Fig. 2, and this shoe runs in a groove 27 in a hub 28, which latter part is splined to the shaft 13. Through a connecting link 29 the hub 28 is connected with the ring 21 in such manner that a sliding movement of the hub along the shaft will rock the ring upon its gimbal joints for the purpose of changing its plane of rotation. The upper end of the shaft 24 is provided with a lever 30 having a screw stud or fastening 31 which runs in a slot 32 in a plate 33, and this lever is provided with a handle whereby it may be operated.

The operation of my invention is as follows. If the ring 21 stood in a plane at right angles to the plane of the shaft 13 no movement would be imparted to the valve 7, but in direct proportion as the ring is swung upon its gimbal joints so as to stand oblique to the shaft 13 it operates upon the shoe 19 after the manner of cams, and through said shoe imparts an oscillatory movement to the shaft 16 and thence through the parts 15, 14 and 6 to the

valve itself. The throw of the valve is varied by means of the lever 30 which, by moving the hub 28, determines the angle at which the ring 21 stands to the shaft, and this forms an exceedingly simple and positive device for this purpose.

I have shown simply the hand lever for actuating the ring and determining the throw of the valve, but I do not confine myself to this specific means, since if required a governor may be used in place of the lever in such manner as to cause the throw of the valve to automatically adjust itself for any duty either light or heavy which may devolve upon the engine. I have shown the ring as borne upon the main shaft, and this I deem to be preferable, but it will readily be understood that it may be secured upon any other element of the machine which has a rotative movement properly timed to the stroke of the engine.

The gear shown may also, as will be readily apparent to any one skilled in the art, be applied to or combined with valves other than the rocker valve shown in the drawings.

I claim,

1. In a machine of the character described, the shaft 13 provided with a hub, in combination with the ring 21 having a groove 22 in its periphery, a gimbal connection between said ring and the hub, the rock shaft 16, a pivoted shoe 19 projecting outward from the lower end of said rock shaft and entering the groove in the ring, and a connection between said rock shaft and the valve, the whole arranged and adapted to operate substantially as and for the purpose set forth.

2. In a machine of the character described, the shaft 13 provided with a hub, in combination with the ring 21 having a groove 22 in its periphery, a gimbal connection between said ring and the hub, the rock shaft 16, a pivoted shoe 19 projecting outward from the lower end of said rock shaft and entering the groove in the ring, a connection between said rock shaft and the valve, the grooved hub 28 splined upon the shaft, the shoe 26 running in said groove, and the rock shaft and lever whereby movement is imparted to said shoe and the hub 28, the whole being arranged and adapted to operate substantially as specified.

In testimony whereof I affix my signature in presence of two witnesses.

CHARLES F. LITTLEJOHN.

Witnesses:
S. H. HUBBARD,
A. J. TANNER.