

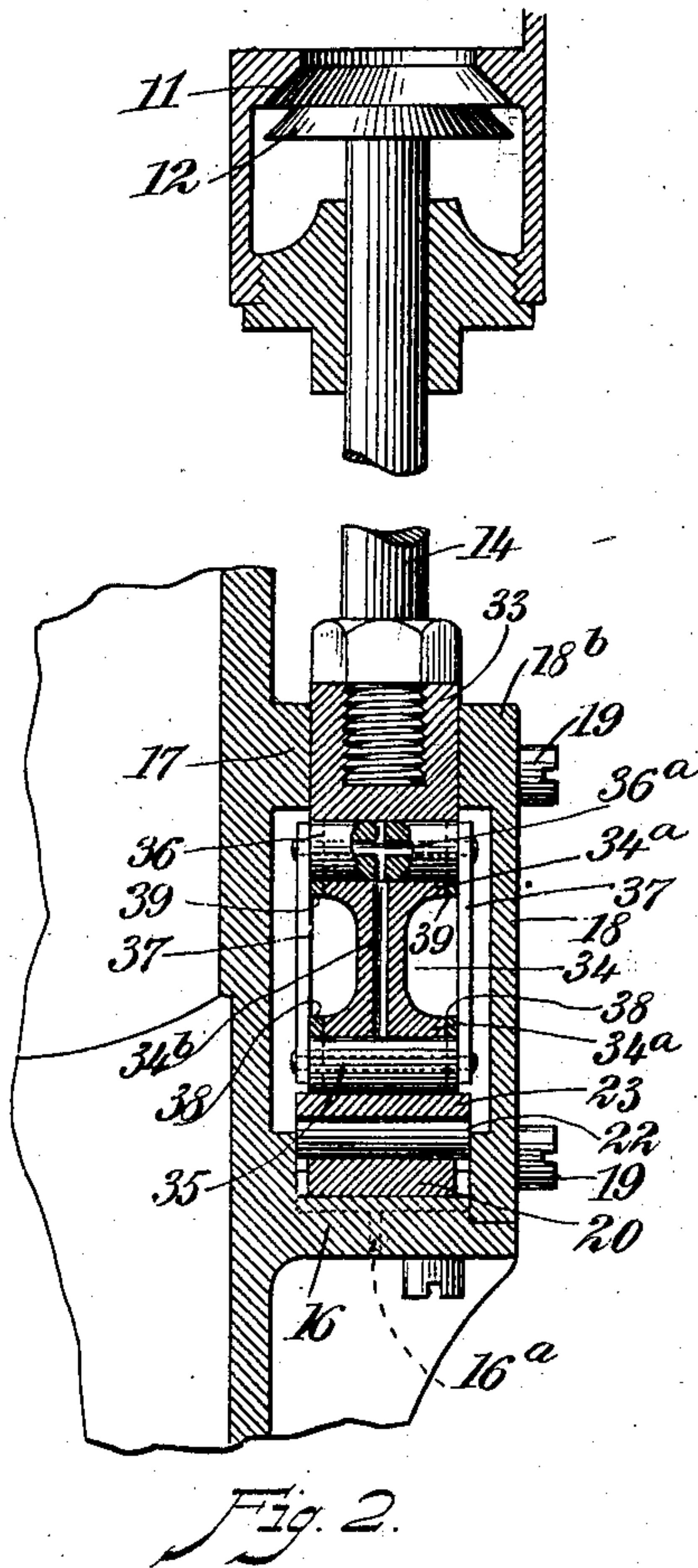
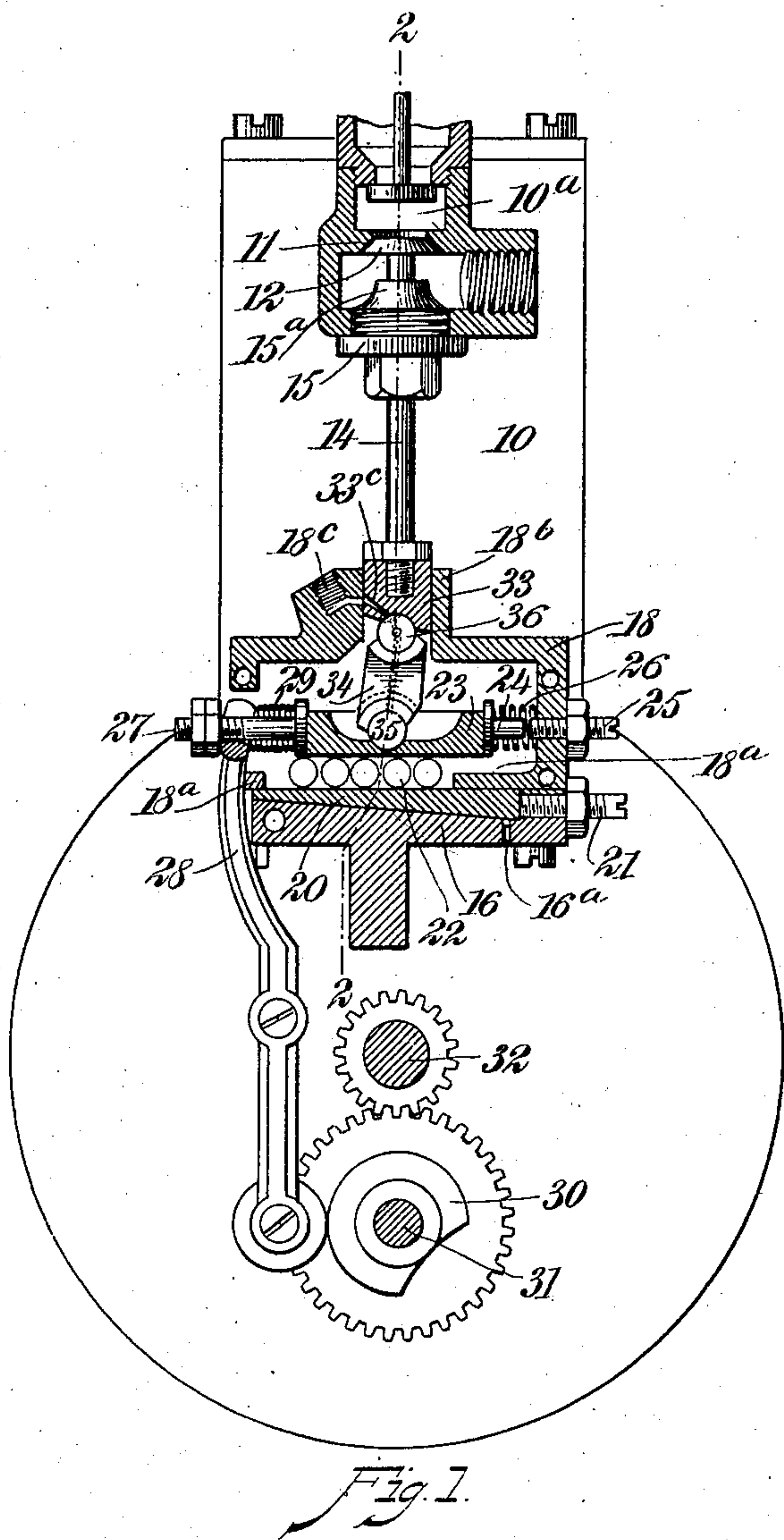
No. 751,293.

PATENTED FEB. 2, 1904.

J. M. JOHANSON.
VALVE GEAR FOR EXPLOSIVE ENGINES.

APPLICATION FILED MAY 8, 1903.

NO MODEL.



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VALVE-GEAR FOR EXPLOSIVE-ENGINES.

SPECIFICATION forming part of Letters Patent No. 751,293, dated February 2, 1904.

Application filed May 8, 1903. Serial No. 156,176. (No model.)

To all whom it may concern:

Be it known that I, JOHAN M. JOHANSON, a subject of the King of Sweden and Norway, and a resident of Cambridge, in the county of Suffolk and State of Massachusetts, have invented a new and Improved Valve-Gear for Explosive-Engines, of which the following is a full, clear, and exact description.

This invention relates to a gear intended especially for operating the exhaust-valves of internal-combustion engines.

The principal object of the invention is to provide means by which the valve may be allowed to open outward as contradistinguished from inward against the cylinder-pressure and which means, while permitting this outward opening movement, will nevertheless hold the valve seated with absolute firmness during the expansive period of the cycle.

A further object of the invention is to avoid backlash on the gearing of the cam-shaft and to prevent the operation of the valve from materially loading said shaft and the connected parts.

These ends I attain, briefly stated, by providing a slide between which and the valve-stem bears a link having rolling connection with the slide and valve-stem, said slide moving across the longitudinal axis of the valve-stem, so that the latter will be operated to seat the valve, the extent of the valve movement depending upon the degree of movement of the link from alinement with the valve-stem to an inclination to the stem. Said slide is operated by a rocker arm or lever from a cam driven from the engine-shaft, this cam acting to hold the slide immovable during all periods of the cycle excepting the exhaust period, whereupon the valve is allowed to open by reason of the cylinder-pressure, assisted, if necessary, by a spring applied to start the opening movement of the slide.

This specification is an exact description of one example of the invention, while the claims define the actual scope thereof.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in both views.

Figure 1 is a sectional elevation of the inven-

tion, and Fig. 2 is an enlarged section on the line 2 2 of Fig. 1.

10 indicates the engine-cylinder, and 10^a the combustion-chamber thereof.

11 is the exhaust-port, and 12 the exhaust-valve, this valve seating in the port and opening outward, as shown. The stem 14 of the valve is fitted in a bushing or cap 15, which is fastened in the exhaust-chamber and provided with an inward extension 15^a, serving to limit the opening movement of the valve 12.

Formed, preferably, integral with the engine-frame is a shelf 16, which projects out horizontally and is formed, as best shown in Fig. 1, with an inclined upper face. Above this shelf 16 is formed a shoulder 17, and to the parts 16 and 17 a face-plate 18 is fastened by means of bolts 19 or the like, these bolts permitting a slight vertical adjustment of the plate 18 and said parts 16, 17, and 18 forming a case or inclosure for the principal parts of the valve-operating gear. The face-plate 18 is provided with inward extensions 18^a, and between said extensions and the sloping upper face of the shelf 16 is arranged a bed-plate 20, said plate having an inclined bottom face corresponding to the upper face of the shelf 16. The upper face of the bed-plate 20 is horizontal. Screwing in the end wall of the face-plate 18 is an adjusting-screw 21, by which the bed 20 may be moved on the shelf 16, and by this means the elevation of the bed-plate may be regulated at will. To effect this regulation, it is necessary to loosen the fastenings 19, so as to permit the face-plate to rise correspondingly.

Mounted on the bed-plate 20 between the extensions 18^a of the face-plate 18 are a series of rollers or other antifriction devices 22, such rollers carrying a slide 23. This slide is located in the before-mentioned case formed by the parts 16, 17, and 18, and its inward movement may be regulated by a stop 24 and adjusting-screw 25, as shown.

26 indicates a spring which is coiled around the stop 24 and which may be employed to start the outward or opening movement of the slide, if necessary. At its opposite or outer end the slide 23 has a stem 27, with which is engaged the forked upper end of the

lever 28. Between said lever and the slide a spring 29 bears, this spring being tightly coiled and encircling the stem 27. The lever 28 extends downward and is actuated by the
5 cam 30 on the cam-shaft 31, suitably geared with the engine-shaft 32.

The lower end of the valve-stem is fastened to a block 33, which slides in a vertically-extending guideway 18^b in the case 18, and between this block 33 and the slide 23 is located
10 the before-mentioned link. This link comprises a web or body portion 34, having transversely-extended concave ends 34^a. In said concave ends are arranged the roller-like bearings 35 and 36, said bearings being connected
15 by straps 37, so as to hold them firmly engaged with the link. The rollers 35 and 36 are held engaged with the slide 23 and block 33 by means of straps 38 and 39, formed on
20 or fastened to the respective elements 23 and 33. By this means the elements 23 and 33 are connected by the link in such a manner as to insure the operation of the three parts with the least possible friction, but at the same
25 time providing for entire strength and certainty of action.

18^c indicates a socket for an oil-cup or other lubricant, and this socket communicates with a passage 33^c in the block 33, this communication being periodical upon the reciprocation
30 of said block. The roller-bearing 36 has passages 36^a formed therein, as shown, these passages communicating with the passage 33^c and with a passage 34^b in the web 34, said passage leading downward to the bearing 35.
35 This provides for the thorough lubrication of the parts 33, 36, and 35, the roller 35 being seated in a cavity in the top of the slide 23, as best shown in Fig. 1. To enable the surplus oil to escape from the locality of the
40 rollers 22, I provide an orifice 16^a in the bottom of the shelf 16, by which the surplus oil may be drained off.

In the operation of the invention as the circular part of the cam 30 engages the lever 28 the
45 force of the said lever is first communicated to the spring 29 and the slide 23 is moved inward until arrested by the parts 25 and 26, this spring 29 being of greater strength than the
50 spring 24. The parts 25 and 26 should be so adjusted as to allow the slide to move sufficiently to bring the link into near proximity to alinement with the valve-stem; but actual alinement should not be permitted. The movement of the slide 23 having been arrested and
55 the movement of the lever 28 continuing, said lever will close up the spring 29 and exert a positive pressure on the slide. The valve 12 will have been seated at the end of the movement of the slide, and then when the spring
60 29 is closed and the positive pressure of the lever is applied to the slide the valve is held seated by a pressure which is unyielding. At the same time there is no perceptible load on
65 the cam-shaft, since the circular part of the

cam will be turning against the lever. As the rotation of the cam continues and the exhaust period is reached the cam-pressure on the lever 28 will cease and the cylinder-pressure, acting on the valve 12 and assisted by the spring 29,
70 will throw downward the sliding block 33. Owing to the inclined position of the link and the antifriction-mountings of the slide, the latter will be moved outward, and the inclination of the link to the valve-stem will be gradually
75 increased until the valve movement is arrested by the extension 15^a of the cap or bushing 15. Upon the continued rotation of the cam 30 the closing movement will begin and the above-described operations will be repeated.
80 Owing to the fact that the link is always at an inclination to the valve-stem and the slide is mounted to move with the least possible friction, the instant the pressure of the lever 28 is relaxed the slide will move outward under
85 the action of the cylinder-pressure. Consequently the spring 26 is not strictly necessary. I prefer, however, to provide it as a precaution. The adjustable bed 20 enables me to take up all wear on the parts, so as to
90 insure their effective operation. This wear may also be partly accounted for by adjusting the stop 24. By means of this construction it will be seen that the objects of my invention are fully attained. The valve is not
95 opened against the cylinder-pressure, as is usually the case in prior structures, and the opening movement of the valve exerts on the lever 28 and then on the cam 30 a pressure which is in the direction of the cam-shaft, and
100 consequently rather than retarding the cam-shaft in its operation my improved gear tends to assist the movements thereof. When the valve is closed and the link is nearly in alinement with the valve-stem, the greater part of
105 the pressure on the valve is borne by the slide 23, but a decidedly minor portion being communicated to the lever 28. Consequently, owing to this fact and to the fact that when
110 the valve is closed the circular part of the cam 30 is running on the lever 28, the work of holding the exhaust-valve closed involves no perceptible load on the engine.

Various changes in the form, proportions, and minor details of my invention may be resorted to at will without departing from the spirit and scope thereof. Hence I consider myself entitled to all such variations as may lie within the intent of my claims.

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

1. In a valve-gear, the combination with the valve, of a slide movable across the line of movement of the valve, a connection between the valve and slide, said connection including
125 a link pivoted at its ends, and means for actuating the slide.

2. In a valve-gear, the combination with the valve, of a slide movable across the line of movement of the valve, a valve-stem, a link
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pivotally connected to the slide and valve-stem, and means for operating the slide.

3. In a valve-gear, the combination with the valve, of a slide movable across the line of movement of the valve, a connection between the valve and slide, said connection including a link pivoted at its ends, and means for actuating the slide, said means for operating the slide including an expansive spring bearing between the slide and the operating member.

4. In a valve-gear, the combination with the valve, of a slide movable across the line of movement of the valve, a valve-stem, a link pivotally connected to the slide and valve-stem, and means for operating the slide, said means for operating the slide comprising an expansive spring bearing between the slide and the operating member.

5. In a valve-gear, the combination with the valve, of a slide movable across the line of movement of the valve, a connection between the valve and slide, said connection including a pivoted link, means for mounting the slide, such means including rolling antifriction bearing members, and means for operating the slide.

6. In a valve-gear, the combination with the valve, of a slide movable across the line of movement of the valve, a connection between the valve and slide, said connection including a pivoted link, means for mounting the slide, such means including rolling antifriction bearing members, and means for operating the slide, said means including an expansive spring acting between the slide and operating member.

7. In a valve-gear, the combination with the valve, of a slide movable across the line of movement of the valve, a connection between the slide and valve, said connection including a pivoted link, a spring pressing the slide in one direction, and means for operating the slide in the other direction.

8. In a valve-gear, the combination with the valve, of a slide movable across the line of movement of the valve, a connection between the slide and valve, said connection including a pivoted link, a spring pressing the slide in one direction, and means for operating the slide in the other direction, the means for operating the slide including an expansive spring actuated between the slide and the operating member.

9. In a valve-gear, the combination with the valve, of a slide movable across the line of movement of the valve, a connection between the valve and slide, such connection including a pivoted member, means for mounting the slide, such means including antifriction roller bearing devices, and means for operating the slide.

10. In a valve-gear, the combination with the valve, of a support, a bed adjustable thereon for the purpose specified, a slide mounted on the bed, a connection between the slide and valve, such connection including a pivoted member, and means for operating the slide.

11. In a valve-gear for internal-combustion engines the combination with the outwardly-opening exhaust-valve, of a pivoted link having connection with the valve, and means for varying the inclination of the link with respect to the line of movement of the valve, whereby to operate the valve.

12. In a valve-gear for internal-combustion engines, the combination with the outwardly-opening exhaust-valve, of a pivoted link connected therewith, a slide also having connection with the link and movable across the line of movement of the valve, and means for operating the slide.

13. In a valve-gear, the combination with the valve, of a pivoted link having connection therewith, and means for varying the inclination of the link with respect to the line of movement of the valve, said link comprising a web or portion having concave ends, bearing-rollers placed in said ends, and means for holding said rollers in operative position.

14. In a valve-gear, the combination with the valve, of a slide, means for mounting and operating the slide, and a connection between the slide and valve, said connection including a link which comprises a web having concave ends, bearing-rollers placed in said ends, means for holding the rollers engaged with the link, and means for holding one roller engaged with the slide and the other roller with the valve connection.

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

JOHAN M. JOHANSON.

Witnesses:

CHARLES E. ANDERSON,
OLAF MYHRER.