

No. 668,646.

Patented Feb. 26, 1901.

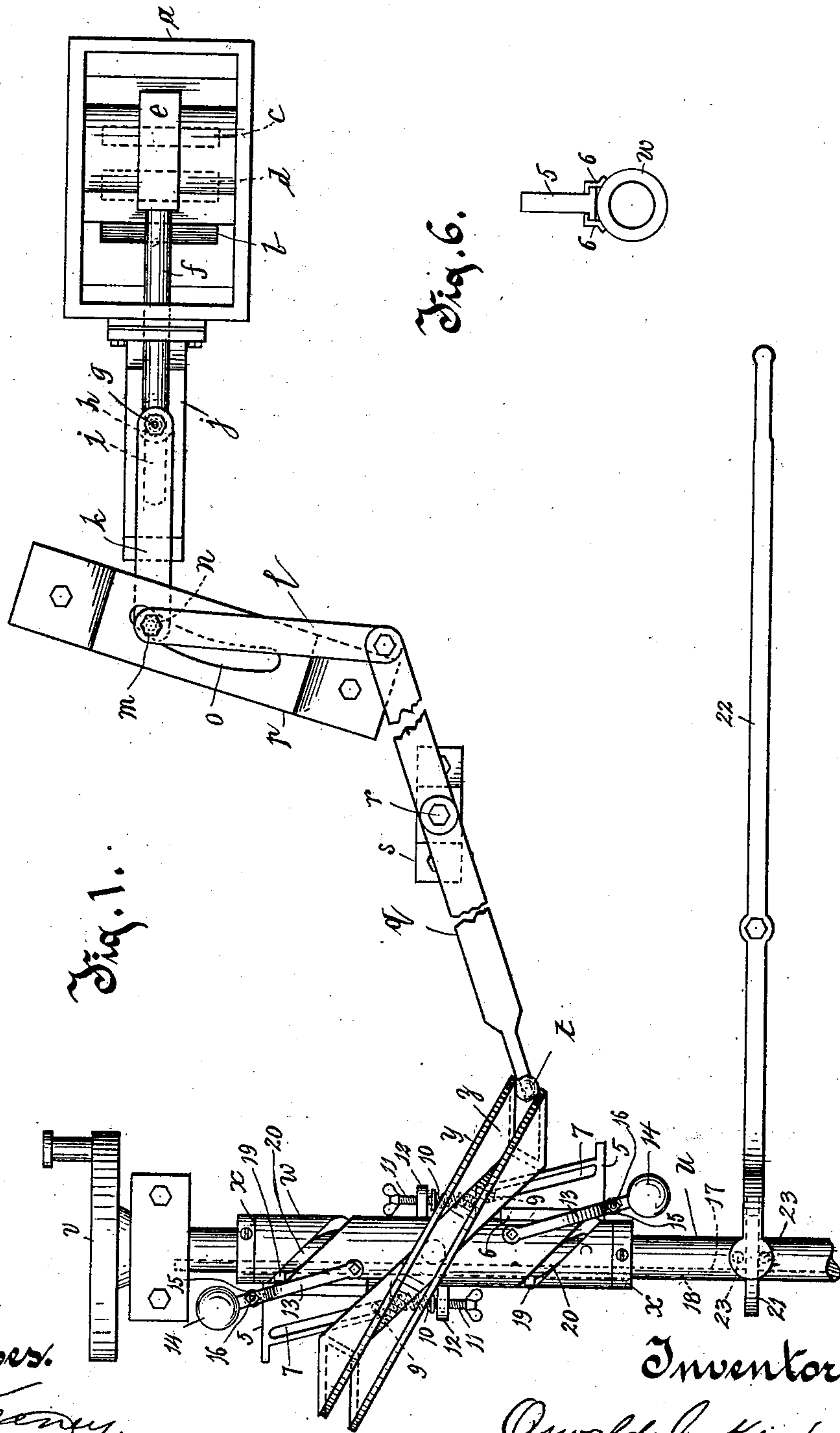
O. JACKSON.

VALVE GEAR FOR STEAM ENGINES.

(Application filed May 19, 1900.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses.

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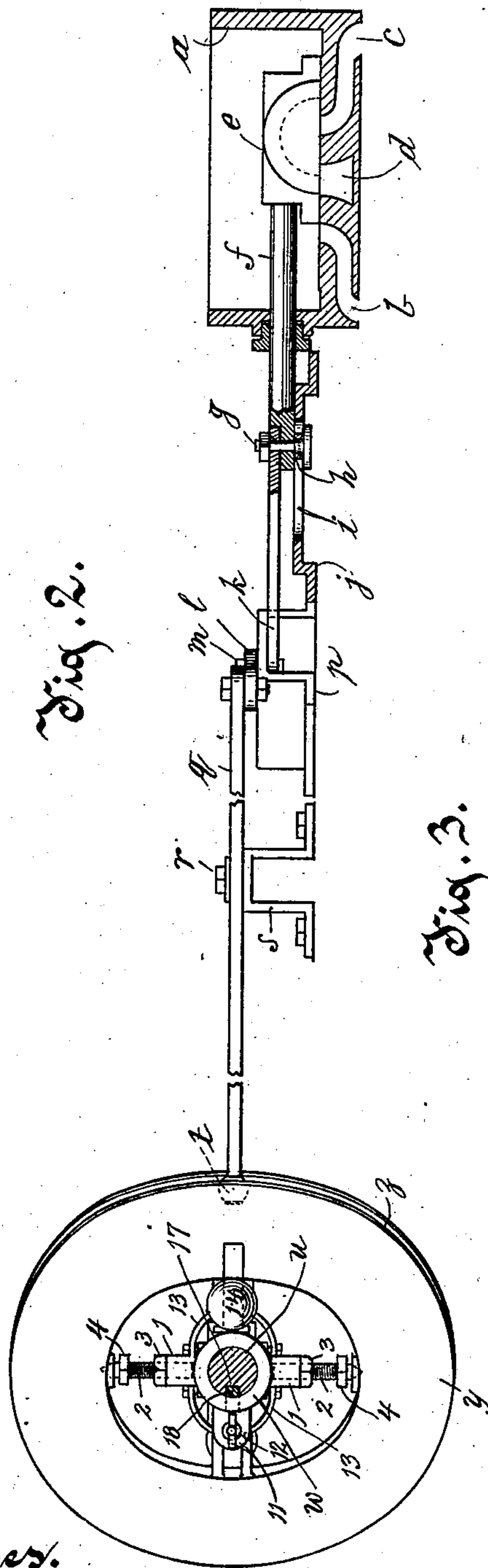


Fig. 4.

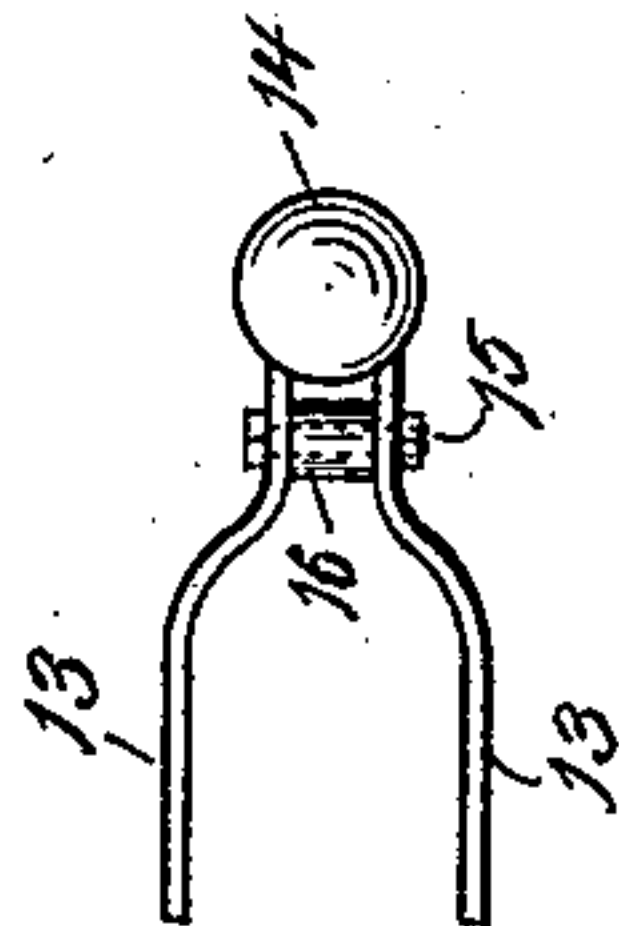


Fig. 5.

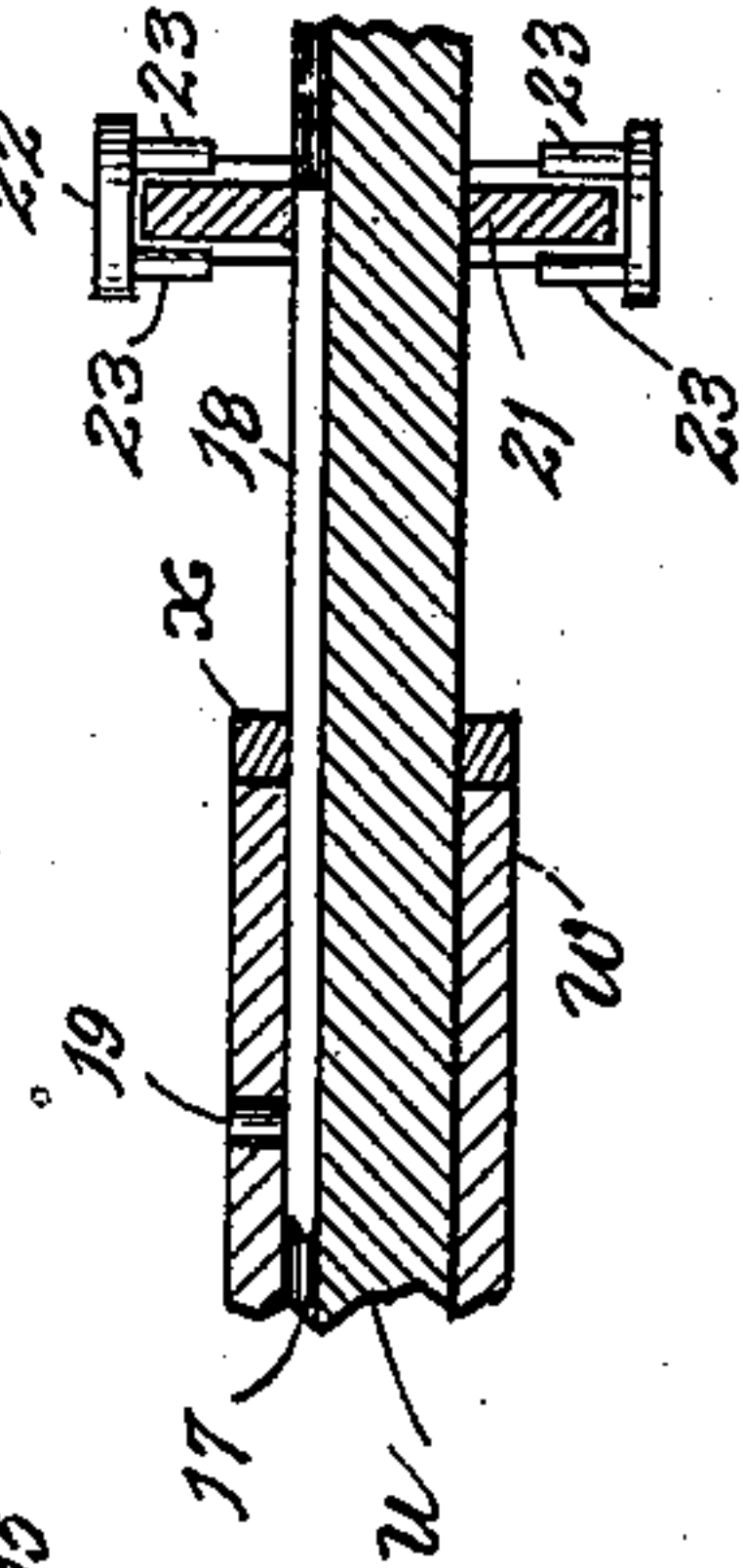
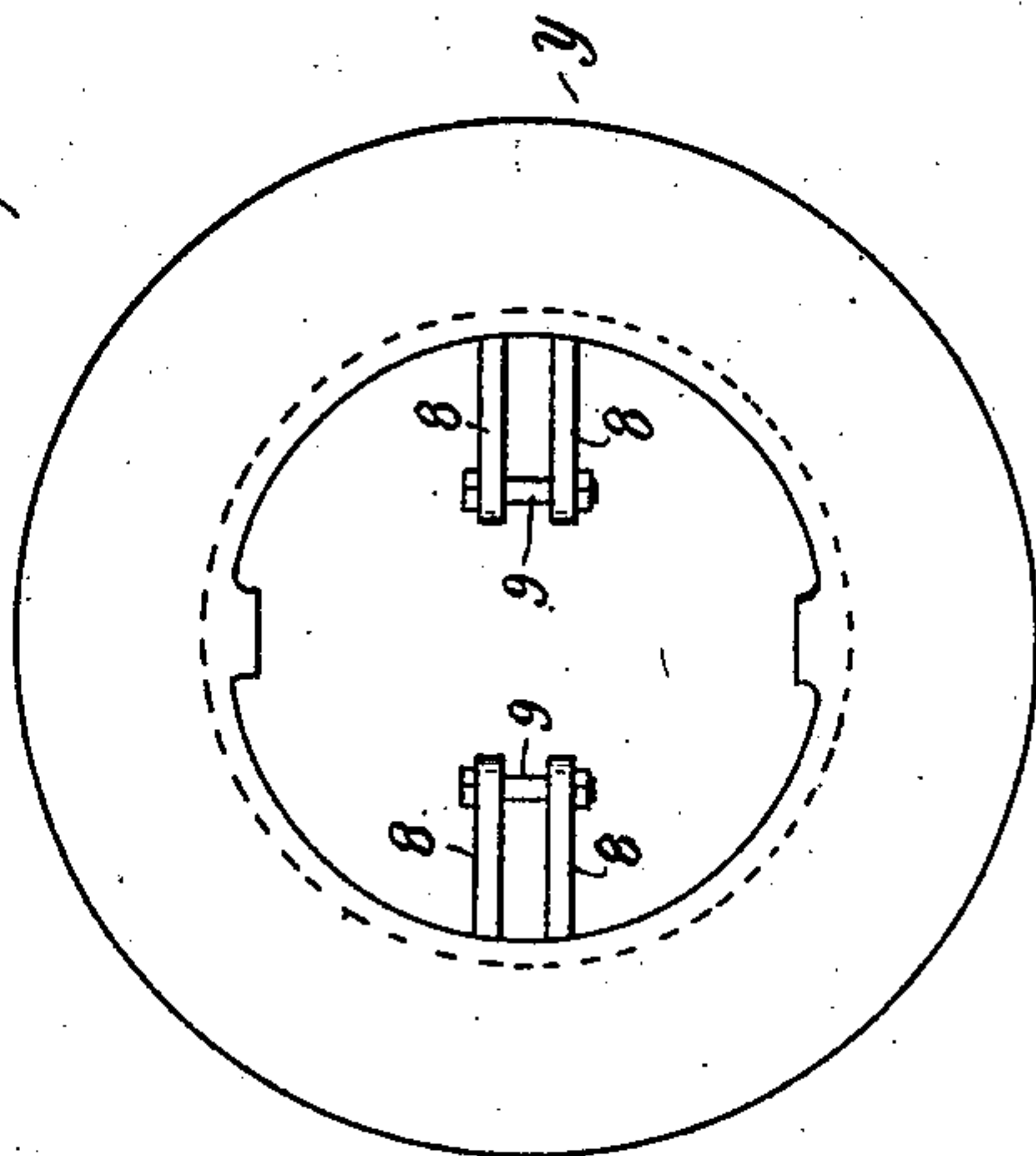


Fig. 3.



Witnesses.

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UNITED STATES PATENT OFFICE.

OSWALD JACKSON, OF CARROLLTON, ILLINOIS.

VALVE-GEAR FOR STEAM-ENGINES.

SPECIFICATION forming part of Letters Patent No. 668,646, dated February 26, 1901.

Application filed May 19, 1900. Serial No. 17,217. (No model.)

To all whom it may concern:

Be it known that I, OSWALD JACKSON, of Carrollton, in the county of Greene and State of Illinois, have invented a new and useful Improvement in Valve-Gear for Steam-Engines, of which the following is a description, reference being had to the accompanying drawings, which are a part of this specification.

My invention has relation to improvements in valve-gear for steam-engines, being adaptable to any common slide-valve of a stationary, traction, or locomotive engine.

The primary object of the invention is to provide an improved construction whereby steam may be automatically cut off from the cylinder as the load on the engine may vary.

With the above primary object and other incidental objects in view the invention consists of the devices and parts or their equivalents, as hereinafter more fully set forth.

In the accompanying drawings, Figure 1 is a plan view of the complete mechanism. Fig. 2 is a side elevation with parts in section and parts broken away. Fig. 3 is a detail view of the cam-ring. Fig. 4 is a detail view of one of the governor-balls and its arms. Fig. 5 is a longitudinal section of the crank-shaft and its hub or sleeve, and Fig. 6 is a detail view showing the connection of the wedge-plate to the hub or sleeve.

Referring to the drawings, the letter *a* indicates a valve-casing of an ordinary engine mechanism, into which steam is admitted either from the top or side, as desired. This valve-casing is provided in its bottom with the usual channels *b* and *c*, respectively, which lead to the cylinder below, (not shown,) and with an exhaust-channel *d*. Within the valve-casing is the usual valve *e*, which is adapted to connect either of the channels leading to the cylinder with the exhaust-channel. Extending from the valve and through one end of the valve-casing is the valve-rod *f*. Passing through the outer end of this valve-rod is a bolt *g*, said bolt carrying an antifriction-roller *h*, which rides in a slot *i* in a plate *j* for the purpose of keeping the valve-rod in a central position. The bolt *g* also passes loosely through a rod *k*. The outer end of the rod *k* is loosely connected to a link *l* by means of a bolt *m*, said bolt also carrying an antifriction-

roller *n*, which rides in an elongated slot *o*, formed in a saddle-plate *p*, said slot being preferably curved. The opposite end of the link *l* articulates with one end of a medially-pivoted lever *q*, said lever being pivoted on a bolt *r* to a plate *s*. The free end of the lever *q* carries an antifriction-roller *t*.

The letter *u* indicates the ordinary crank-shaft of an engine mechanism, said shaft having mounted on one end thereof the usual crank-disk *v*, which is connected to the piston-rod (not shown) of the cylinder by means of the usual pitman. (Not shown.) As is well understood in this class of mechanism, the reciprocation of the piston in the cylinder causes the rotation of the crank-shaft.

Mounted loosely on the crank-shaft is a long hub or sleeve *w*, which is held against longitudinal movement on the shaft by means of collars *x x*. Surrounding the hub or sleeve centrally is a ring *y*, said ring provided with a peripheral groove *z*, in which the antifriction-roller *t* of the lever *q* fits. Extending from diametrically opposite points of the hub or sleeve are bosses *1 1*, and into these bosses are fitted pins *2 2*, the outer ends of said pins being pointed or conical to engage conical recesses at diametrically opposite points of the inner circumference of the ring. By thus mounting the ring upon the hub or sleeve said ring may be readily turned upon the pivot-pins *2* to a more or less oblique plane. The pins are preferably threaded, and jam-nuts *3 3* are turned thereon against the outer ends of the bosses *1*. Other nuts *4 4* also engage the threads and are adapted to adjust the pins so as to take up any wear at the conical ends thereof.

Upon opposite sides and near opposite ends of the hub or sleeve are arranged plates *5 5*, which are slidingly fitted to said hub. This sliding engagement is preferably secured by providing the inner edges of the plates with T-heads, as most clearly shown in Fig. 6, said heads engaging grooveways in the hub, the said grooveways being advisably formed by securing to the hub the angle-plates *6 6*. Each plate *5* is also formed with an oblique elongated slot *7*.

Projecting from diametrically opposite points of the inner circumference of the ring *y* are lugs *8 8* and *8 8*. Each set of lugs is

intersected by a bolt 9. These bolts respectively pass through the oblique slots 7. Bearing against the inner end of each plate 5 is a coiled spring 10. The tension of the springs
 5 may be adjusted by means of screws 11 11, engaging threaded openings in lugs 12 12, projecting from the hub or sleeve. The ends of these screws are provided with heads or enlargements which take the bearing of the
 10 ends of the springs. By turning these screws in the proper direction it is evident that the tension of the springs may be readily regulated.

Pivoted to diametrically opposite points of
 15 the hub or sleeve and near opposite ends thereof are governor-arms 13 13 and 13 13, said arms carrying at their outer ends the governor-balls 14 14. Near their outer ends the governor-arms are intersected by pins 15
 20 15, upon which are mounted rollers 16 16, said rollers adapted to bear against the outer ends of the plates 5 5.

I also provide mechanism for reversing the travel of the valve *e* on its seat, and thereby
 25 correspondingly reverse the travel of the engine. This consists in providing the crank-shaft with a long groove or recess 17, in which is slidably fitted a bar 18, said bar being seated in the recess so that its face is flush
 30 with the circumference of the shaft. Extending from two different points of this bar are pins 19 19, which pins engage oblique grooves 20 20, disposed in the hub or sleeve and extending half-way around said hub and at the
 35 required angle to admit of the ring *y* being reversed half around the shaft. The groove or recess 17, it will be understood, is long enough to admit of the bar 18 being moved the required distance to reverse the cam.
 40 Fitted to the shaft *u* and also connected to the bar 18 is a collar 21. The numeral 22 indicates a medially-pivoted forked lever. The arms of the fork straddle the collar 21, and said fork-arms are provided with inwardly-
 45 extending pins 23 23, which engage upon opposite sides of the collar. (See Fig. 5.) By this arrangement the collar is permitted to revolve freely with the shaft, and yet at the same time when the lever is moved the pins
 50 23 are caused to engage the collar, and hence move the bar longitudinally. In the operation of this reversing mechanism when the lever 22 is moved to the right or left the collar 21 and the bar 18 attached thereto are
 55 correspondingly moved to the right or left, and as the pins 19 of the bar are engaged with the oblique grooves 20 of the hub the said movement of the lever will necessarily cause the hub, and consequently the ring *y*,
 60 carried thereby, to be reversed on the shaft *u*, and this of course will reverse the travel of the valve *e* on its seat, and therefore correspondingly reverse the travel of the engine.

While I have herein shown and described
 65 the specific form of reversing mechanism above set forth, yet I do not wish to be understood as restricting myself thereto, inas-

much as any other desirable form of reversing mechanism in order to suit different makes of engines may be employed in connection
 70 with the other features of my invention.

In explanation of the operation of the invention it is to be stated that when the shaft *u* is revolved the ring *y* is revolved therewith, and this causes the medially-pivoted
 75 lever *q* to move from right to left, and as this lever is connected to the connecting-rod *k* by the link *l*, and connecting-rod *k* in turn is connected to the valve-rod *f*, the antifriction-roller *n* is forced to travel in the slot *o*. When
 80 the ring *y* is at a certain obliquity, the valve will travel its full stroke—*i. e.*, will open the ports to their full width. If now the speed of the engine becomes too great, the governor-balls 14 will fly outwardly, and by rea-
 85 son of the rollers 16 bearing against the ends of the plates 5 said plates will be forced toward the lugs 12 against the tension of the springs 10, and as the bolts 9 extend through the oblique slots 7 the ring *y* is necessarily
 90 moved to a more upright position, and consequently the throw of the lever *q*, the link *l*, the connecting-rod *k*, the valve-rod *f*, and in turn the valve *e* decreases, and consequently the speed of the engine is thus decreased.
 95 After the speed is decreased to a certain extent the governor-balls move inwardly and the springs 10 force the plates 5 back toward their normal position, and the ring *y* is thereby carried back to a more oblique position,
 100 thus again increasing the throw.

It will be understood that the arrangement of the ring *y* at an obliquity on the hub *w* virtually constitutes said ring a cam. While I prefer that the lever *q* should be operated
 105 by a cam of the specific construction herein shown—*viz.*, a ring arranged obliquely on the hub—yet I do not wish to be understood as restricting myself specifically thereto. I furthermore do not wish to be understood as re-
 110 stricting myself to the specific form of governor herein shown and described, inasmuch as modifications and variations in the construction thereof may be made without departing from the spirit and scope of my inven-
 115 tion. I may also in some instances, in order to economize room, dispense entirely with the link *l*. In such case the hub or sleeve is moved on shaft *u* so that the pins 2 2 are in line with the center of the elongated slot *o*.
 120

What I claim as my invention is—

1. In a valve-gear, the combination of a valve-casing, a valve therein for regulating the ports leading to and from the cylinder, a valve-rod extending from the valve, a con-
 125 necting-rod pivoted to the valve-rod, a plate provided with an elongated slot in which the end of the connecting-rod works, a crank-shaft, a lever actuated by the crank-shaft, a connection between the lever and the con-
 130 necting-rod, and governor mechanism actuated by the crank-shaft and connected with the valve-operating mechanism, and adapted to regulate the throw of the valve.

2. In a valve-gear, the combination of a valve-casing, a valve therein for regulating the ports leading to and from the cylinder, a valve-rod extending from the valve, a connecting-rod pivoted at one end to the valve-rod, and carrying at its opposite end an anti-friction-roller, a plate provided with an elongated slot in which the anti-friction-roller works, a crank-shaft, a lever actuated by the crank-shaft, a connection between the lever and the connecting-rod, and governor mechanism actuated by the crank-shaft and connected with a valve-operating mechanism, and adapted to regulate the throw of the valve.

3. In a valve-gear, the combination, of a valve-casing, a valve therein for regulating the ports leading to and from the cylinder, a valve-rod extending from the valve, a connecting-rod pivoted to the valve-rod, a plate provided with an elongated slot in which the end of the connecting-rod works, a crank-shaft, a lever actuated by the crank-shaft, a link connecting said lever with the connecting-rod, and governor mechanism actuated by the crank-shaft and connected with the valve-operating mechanism, and adapted to regulate the throw of the valve.

4. In a valve-gear, the combination of a valve-casing, a valve therein for regulating the ports leading to and from the cylinder, a crank-shaft, a hub mounted on the crank-shaft so as to revolve therewith, a cam pivotally mounted on the hub so as to rotate therewith but adapted to be thrown on its pivots to a more or less oblique position, a lever having one end engaging the cam, connections between the lever and the valve and governor mechanism acting on the cam so as to throw the same at a more or less oblique plane depending upon the speed of the engine, and thereby regulating the speed of said engine.

5. In a valve-gear, the combination of a valve-casing, a valve therein for regulating the ports leading to and from the cylinder, a crank-shaft, a hub mounted on the crank-shaft so as to revolve therewith, a cam pivotally mounted on the hub so as to rotate therewith but adapted to be thrown on its pivot to a more or less oblique position, said cam having sets of lugs extending from opposite points thereof, wedge-plates slidingly mounted on the hub, bolts passing through the sets of lugs and engaging the wedge-plates, a lever having one end engaging the cam, connections between the opposite end of said lever and the valve, governor mechanism adapted, when the speed of the engine becomes too great, to actuate the wedge-plates in a direction to turn the cam to a more upright position, and means, when the speed of the engine becomes reduced, for turning the cam back toward its former position, and at the same time returning the wedge-plates to their normal position.

6. In a valve-gear, the combination of a valve-casing, a valve therein for regulating

the ports leading to and from the cylinder, a crank-shaft, a hub mounted on the crank-shaft so as to revolve therewith, a cam pivotally mounted on the hub so as to rotate therewith but adapted to be thrown on its pivots to a more or less oblique position, said cam having sets of lugs extending from opposite points thereof, plates slidingly mounted on the hub, said plates provided with oblique slots, bolts passing through the sets of lugs and through the oblique slots, a lever having one end engaging the cam, connections between the opposite end of said lever and the valve, governor mechanism adapted, when the speed of the engine becomes too great, to actuate the wedge-plates in a direction to turn the cam to a more upright position, and means, when the speed of the engine becomes reduced, for turning the cam back toward its former position, and at the same time returning the wedge-plates to their normal position.

7. In a valve-gear, the combination of a valve-casing, a valve therein for regulating the ports leading to and from the cylinder, a crank-shaft, a hub mounted on the crank-shaft so as to revolve therewith, a cam pivotally mounted on the hub so as to rotate therewith but adapted to be thrown on its pivots to a more or less oblique position, said cam having sets of lugs extending from opposite points thereof, plates slidingly mounted on the hub, bolts passing through the sets of lugs and engaging the wedge-plates, a lever having one end engaging the cam, connections between the opposite end of said lever and the valve, governor mechanism consisting of sets of arms pivoted to the hub, each set of arms carrying at its outer end a governor-ball, and each set of arms also having an anti-friction-roller mounted therebetween, the said rollers adapted, when the speed of the engine becomes too great, to act against the wedge-plates and force said plates in a direction to turn the cam to a more upright position, and means, when the speed of the engine becomes reduced, for turning the cam back toward its former position, and at the same time returning the wedge-plates to their normal position.

8. In a valve-gear, the combination of a valve-casing, a valve therein for regulating the ports leading to and from the cylinder, a crank-shaft having a longitudinal recess therein, a bar fitting in said recess, said bar provided with a projecting pin or pins, a hub mounted on the shaft so as to rotate therewith, said hub provided with an oblique slot or slots which the pin or pins engages or engage, a cam mounted on the crank-shaft, a lever having one end engaging the cam, connections between said lever and the valve, and means for moving the rod longitudinally.

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

OSWALD JACKSON.

Witnesses:

C. D. BRADLEY,

H. H. MONTGOMERY.