

No. 686,814.

Patented Nov. 19, 1901.

J. D. LIDDELL.
ENGINE GOVERNOR ATTACHMENT.

(Application filed Feb. 28, 1901.)

(No Model.)

Fig. 1.

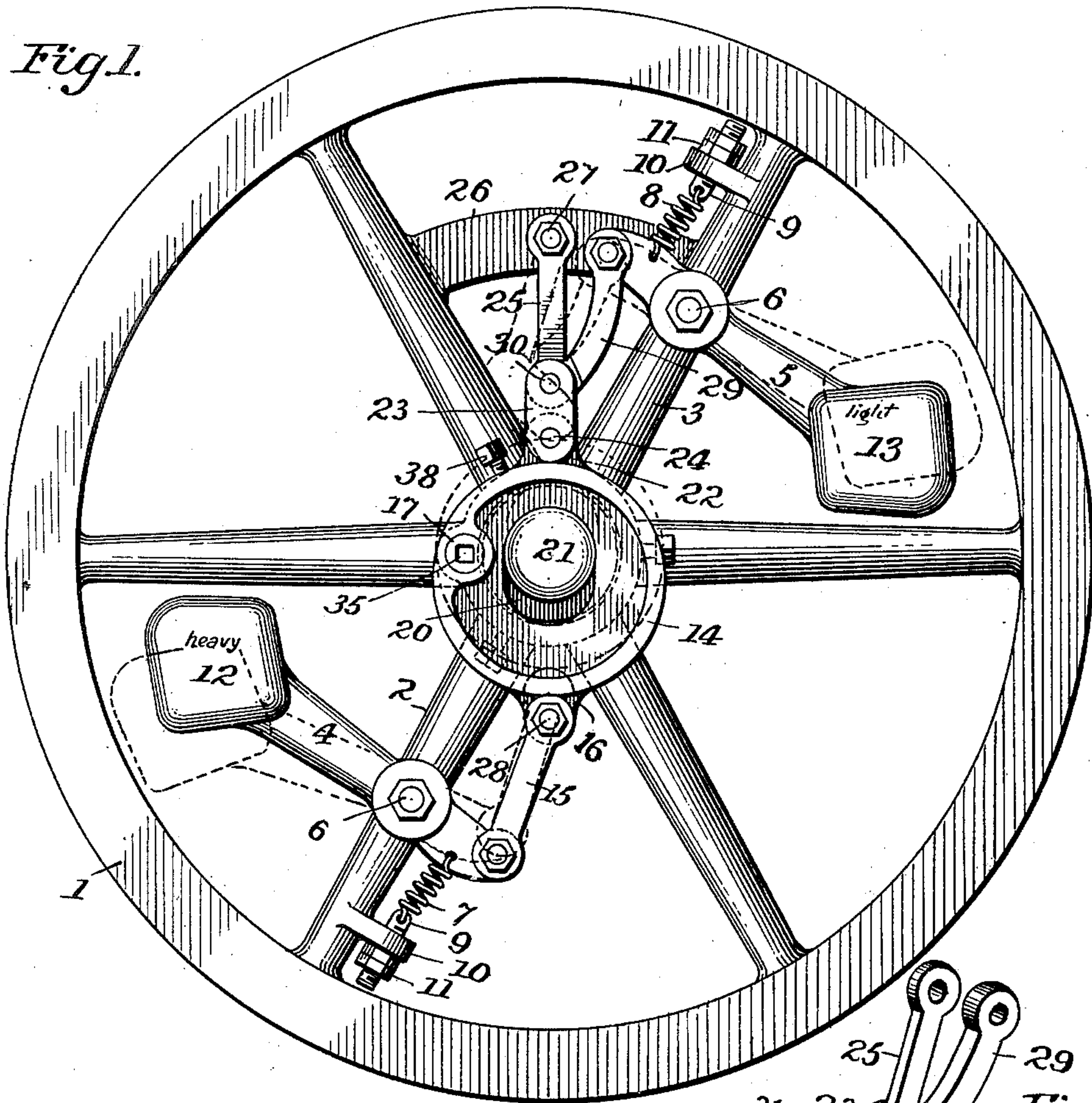


Fig. 2.

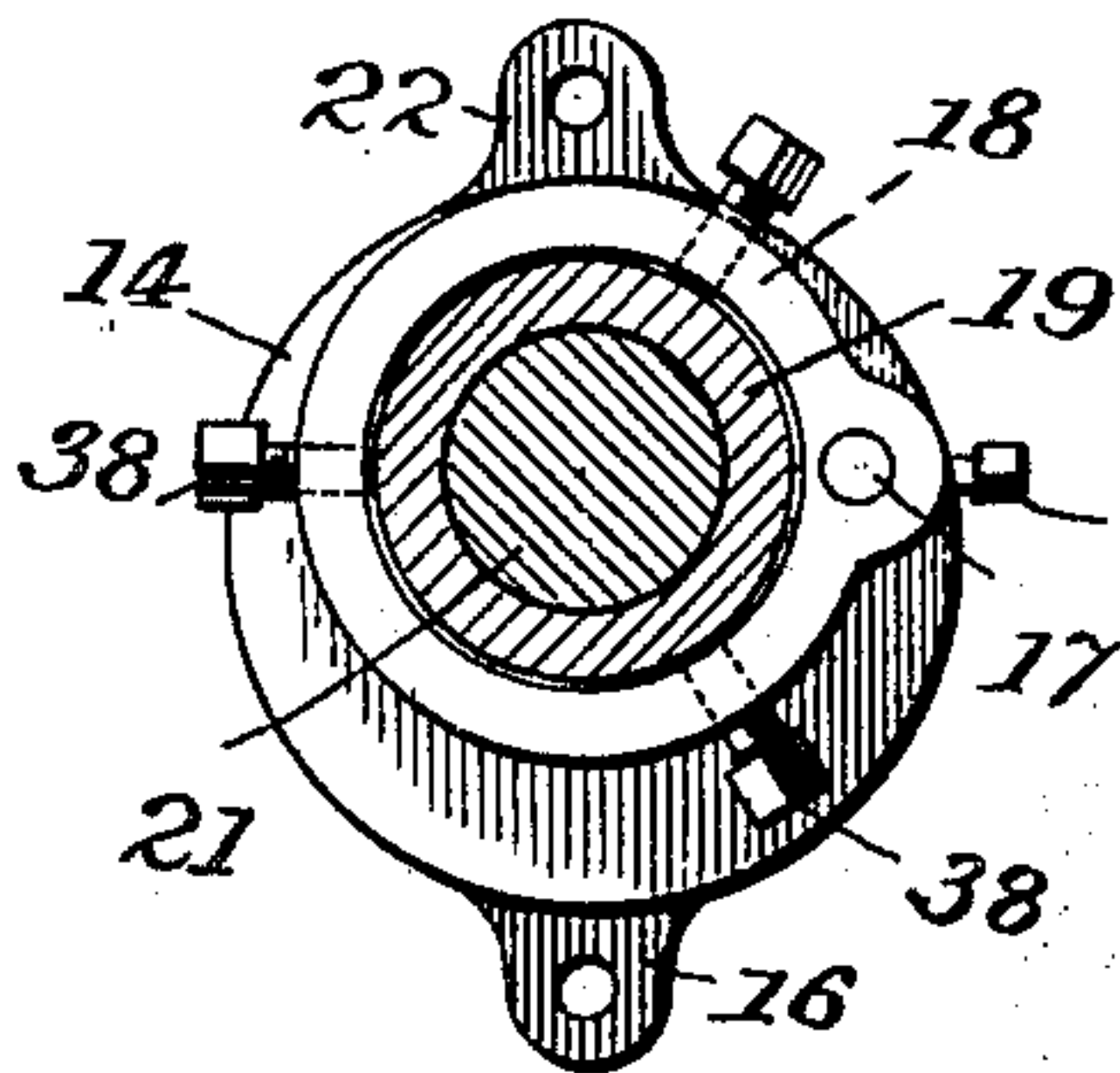
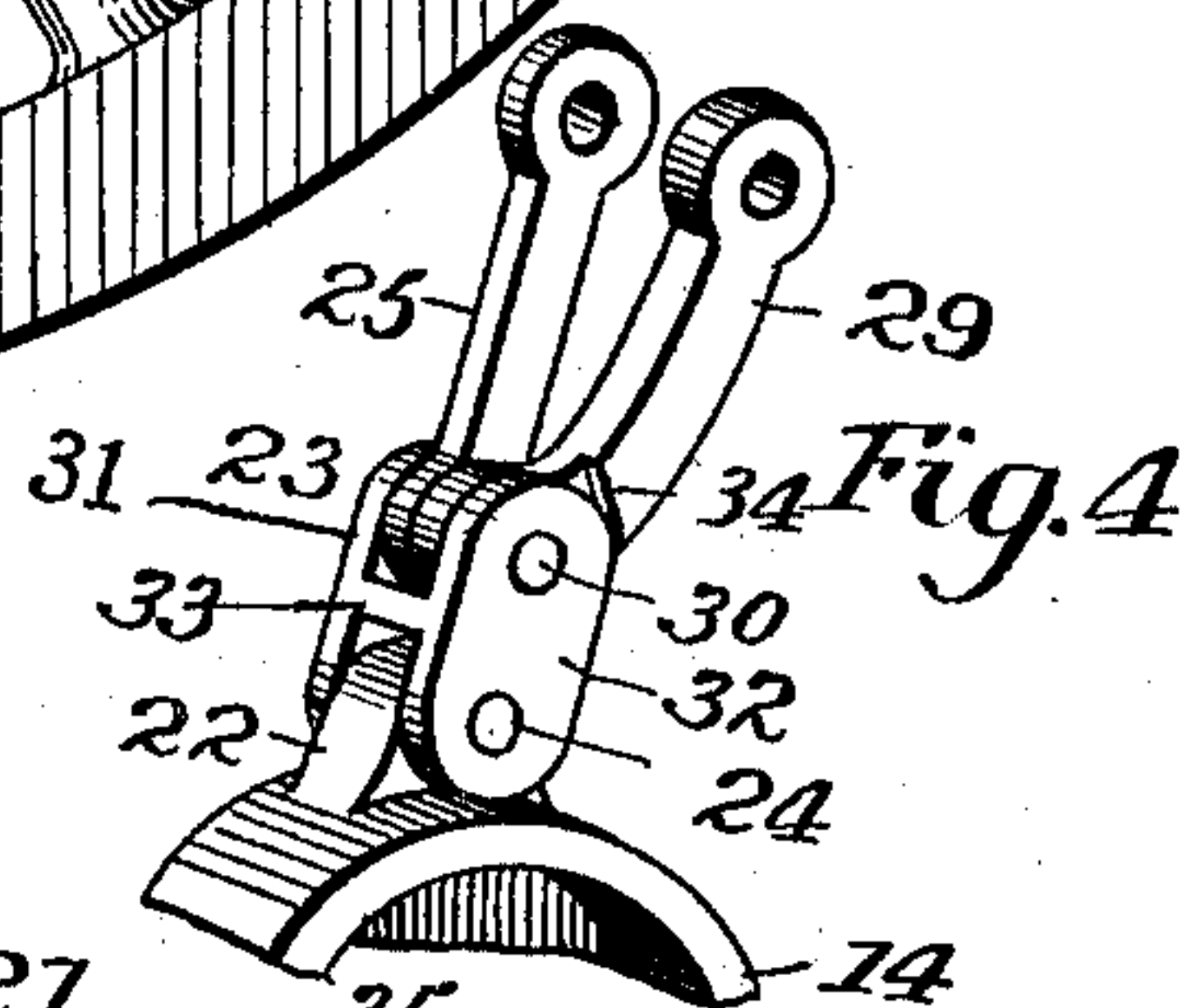
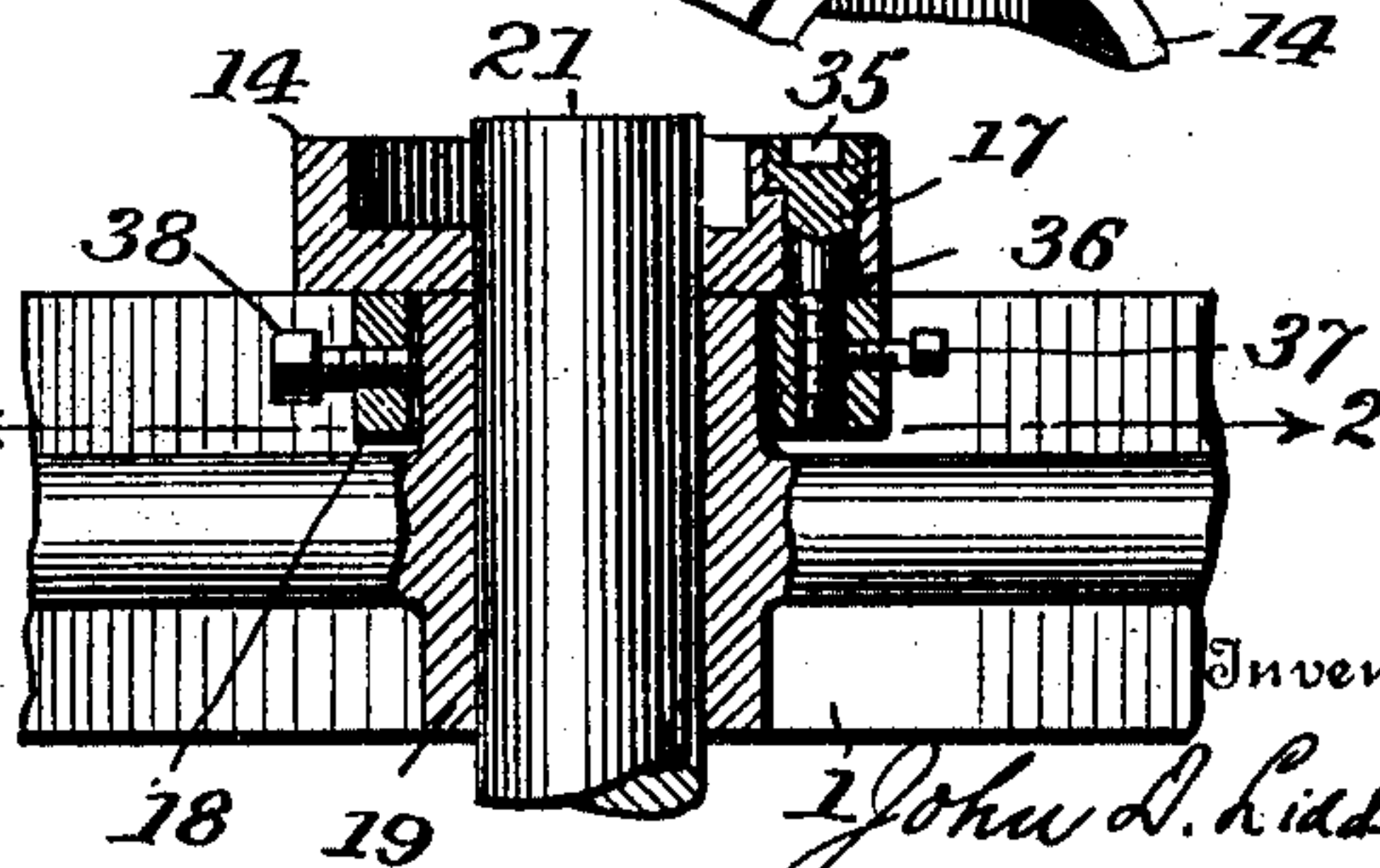


Fig. 3.



Witnesses

J. G. Hinkel
Arthur L. Bryant

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Inventor
John D. Liddell
Watson & Watson
Attorneys

UNITED STATES PATENT OFFICE.

JOHN D. LIDDELL, OF BALTIMORE, MARYLAND, ASSIGNOR OF ONE-HALF TO
GEORGE DULL, OF BALTIMORE, MARYLAND.

ENGINE-GOVERNOR ATTACHMENT.

SPECIFICATION forming part of Letters Patent No. 686,814, dated November 19, 1901.

Application filed February 28, 1901. Serial No. 49,235. (No model.)

To all whom it may concern:

Be it known that I, JOHN D. LIDDELL, a citizen of the United States, residing at Baltimore, in the State of Maryland, have invented certain new and useful Improvements in Engine-Governor Attachments, of which the following is a specification.

This invention relates to improvements in automatic governors for steam-engines, where-
by the oscillation of the levers when the engine is starting or stopping, and the consequent rattling and pounding of the parts, is prevented.

The invention also includes means for adjusting the eccentric to vary the lead of the valves or to reverse the direction of rotation of the engine.

In the accompanying drawings, which illustrate my invention, Figure 1 is a side view of the governor-wheel of an engine, having my attachment thereon. Fig. 2 is a section on the line 2 2 of Fig. 3, showing a rear view of the eccentric and the adjustable collar by which it is attached to the hub of the wheel. Fig. 3 is a section through the hub of the wheel and through the adjustable collar and eccentric, and Fig. 4 is a detail perspective view showing the arrangement of the levers which lock the eccentric.

Referring to the drawings, 1 indicates a governor-wheel of a steam-engine, upon opposite radial spokes 2 and 3 of which are carried a pair of weighted levers 4 and 5, said levers being fulcrumed upon studs 6. The shorter arms of the levers are normally drawn outward by springs 7 and 8, connected to said arms and to adjusting-screws 9, suitably mounted upon the wheel. As shown, these adjusting-screws extend through lugs 10, formed upon the spokes 2 and 3, and said screws are adjustable by means of nuts 11. The weighted end 12 of the lever 4, as indicated thereon, is made heavier than the end 13 of the lever 5, so that the lever 4 will tend to move outward by centrifugal force at a comparatively low speed, while the lighter weighted lever 5 will not move until a higher speed is attained, the tension of the springs and the lengths of the levers being the same. The same result may be accomplished by making the levers of different lengths or, with

levers of the same length and weight, by making the tension of the spring 8 greater than the tension of the spring 7. The shorter arm of the lever 4 is connected to the eccentric 14 by means of a link 15, pivoted to said arm and to a lug or projection 16 upon the eccentric. The eccentric is secured by a pivot-pin 17 to a collar 18, adjustably secured upon the hub 19 of the wheel, and said eccentric is formed with an oblong opening 20, through which the shafts 21 extend, the arrangement being such that the eccentric may be moved from the eccentric position shown to a position where its perimeter will be concentric with the shaft. Upon the eccentric and diametrically opposite the lug 16 is a smaller lug 22, to which is attached a link 23 by means of a stud 24, and to said link 23 is connected a link 25, the outer end of said latter link being pivoted to a cross-bar 26 between the spokes of the wheel by means of a pivot pin or stud 27, arranged in line with the studs 24 and 28 upon the opposite sides of the eccentric. The shorter arm of the lever 5 is connected by a link 29 to the pivot-pin 30, which joins the links 23 and 25. The links 23, 25, and 29 thus form a toggle-lever, which when the links 23 and 25 are in the same straight line prevents the movement of the eccentric, but which when said links are flexed will permit the eccentric to be moved toward the concentric position. As shown in Fig. 4, the link 23 is made double, the two sides 31 and 32 being joined in the center by a cross-piece 33, and the links 25 and 29 are pivotally mounted between the two sides of said link 23 upon the stud 30. The lower ends of the sides 31 and 32 extend over the lug 22, to which they are secured by the pin 24, and the link 29, as indicated by the reference-figure 34, is cut away, so as not to interfere with the other links of the toggle-lever.

The head of the pivot-pin 17, which unites the eccentric with the collar upon the hub of the wheel, is preferably set in flush with the face of the eccentric and formed with a socket 35, so that it may be made tight with a socket-wrench. This pin has a shoulder 36, which abuts against the collar, and the portion beyond this shoulder is threaded and fits into a threaded opening in the collar. A set-screw

37, inserted through the periphery of the collar, prevents the pivot-pin from turning. The collar is secured to the hub by adjusting-screws 38, and by shifting the collar the eccentric which is connected thereto may be moved to vary the lead of the valves, or by turning the collar through a half-revolution the eccentric may be properly located to operate the engine in the opposite direction without necessitating any changes other than the coupling and uncoupling of the governor-links.

The operation of the governor is as follows: When the engine is stopped, the parts remain in the position shown in full lines in Fig. 1, in which the links 23 and 25 of the toggle-lever are straightened in the line of movement of the eccentric, and the latter is locked thereby against movement. When the eccentric is locked in this position, it will be seen that the lever 4, which is connected to the diametrically opposite side of the eccentric by the link 15, will also be locked against movement. On account of the difference in the weights of the levers the lever 4 tends to fly out under the influence of centrifugal force at a lower speed of the engine-wheel than does the lighter lever 5; but it is prevented from moving until said lever 5 moves and flexes the toggle-levers to which it is connected by the link 29. The weighted lever 5 is proportioned so that it will not move outward sufficiently to flex the toggle-lever until the momentum of the fly-wheel is increased to such an extent that the levers will remain extended and not oscillate as the wheel rotates, so as to cause pounding. As soon as the toggle-lever becomes flexed by the outward movement of the lever 5 the eccentric is moved by the lever 4, which has up to this time been restrained from movement by the toggle-lever. Thereafter and until it is desired to stop the engine the eccentric will be operated by the lever 4, the function of the lever 5 being mainly to operate the toggle-lever so as to lock and unlock the eccentric. The position of the parts when the toggle-lever is flexed and the engine running at high speed is indicated by the dotted lines in Fig. 1. When the engine in stopping slows down, the lighter lever 5 is retracted by its spring and straightens the toggle-lever before the speed has diminished to such an extent as to cause pounding by the oscillation of the parts, and the heavier lever 4 is thus locked against movement while the engine is coming to a stop.

Instead of weighting the levers differently it will be evident that the same result may be accomplished with levers of the same weight and proportions by making the tension of the spring 8 upon the locking-lever 5 greater than the tension of the spring 7, which is connected to the lever 4, which operates the eccentric, or the parts may be otherwise proportioned and arranged to lock the eccentric and the governing-lever.

The invention may be applied to any form

of engine-wheel and to various forms of governors. It will be understood also that the governing devices and the locking device may be carried by the shaft upon supports other than the spokes or web of a fly-wheel or driving-wheel; but I have herein shown the devices attached to an engine-wheel, that being the preferred and customary way of mounting engine-governors. I do not therefore wish to limit myself to the arrangement illustrated in the drawings.

Having thus described my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

1. The combination with an engine-shaft and a centrifugally-operated governing-lever carried by said shaft, of a locking device arranged to prevent oscillation of said lever when the engine is running at a speed below the normal.

2. The combination with an engine-shaft and a centrifugally-operated governing-lever carried by said shaft, of an automatically-operated locking device adapted to prevent oscillation of said lever when the engine is running at a speed below the normal.

3. The combination with an engine-shaft and a centrifugally-operated governing-lever carried by said shaft, of a centrifugally-operated locking device arranged to prevent the oscillation of said lever when the engine is running at a speed below the normal.

4. The combination with an engine-shaft and a centrifugally-operated governing-lever carried by said shaft, of a toggle-lever adapted when straightened to prevent oscillation of said governing-lever, and a centrifugally-operated locking-lever arranged to flex and straighten said toggle-lever.

5. The combination with an engine-shaft and an eccentric, of a centrifugally-operated governor arranged to move said eccentric, and locking means for preventing the movement of said governor relatively to the shaft when the engine is running at a low speed.

6. The combination with an engine-shaft and an eccentric, of a centrifugally-operated governor arranged to shift said eccentric, and a centrifugally-operated locking device arranged to prevent the operation of the governor when the engine is running at a comparatively low speed and to permit said governor to operate when the engine speed is increased.

7. The combination with an engine-shaft and an eccentric, of a governing-lever connected to the eccentric and a centrifugally-operated locking device arranged to prevent the movement of said lever relatively to the shaft when the engine is running at a comparatively low speed, and to release said lever when the speed of the engine is increased.

8. The combination with an engine-shaft and an eccentric of a governing-lever pivotally carried by said shaft and arranged to shift said eccentric, a toggle-lever arranged, when straightened, to prevent movement of

said eccentric by the governing-lever, and a centrifugally-operated device adapted to flex said toggle-lever.

5 9. The combination with an engine-shaft and an eccentric, of a governing-lever pivotally carried by said shaft and connected to the eccentric, a toggle-lever arranged, when
10 straightened, to prevent the movement of said eccentric by the governing-lever, and a centrifugally-operated locking-lever arranged to flex said toggle-lever.

10. The combination with an engine-wheel and an eccentric, of a governing-lever pivoted to said wheel and connected to the eccentric, a toggle-lever connected to the
15 opposite side of said eccentric, and a centrifugally-operated device arranged to flex and straighten said toggle-lever.

11. The combination with an engine-wheel
20 and an eccentric, of a governing-lever piv-

oted to said wheel and connected to the eccentric, a toggle-lever connected to the opposite side of said eccentric, and a centrifugally-operated locking-lever pivoted to the wheel and arranged to flex and straighten
25 said toggle-lever.

12. In a steam-engine governor the combination with a wheel, a centrifugally-operated governor arranged thereon, and an eccentric connected to said governor, of a collar
30 concentric with the shaft to which said eccentric is pivoted, said collar being adjustably mounted on the hub of the wheel.

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

JOHN D. LIDDELL.

Witnesses:

CHARLES H. MILLIKIN,
HOWARD C. BROWN.