

No. 637,751.

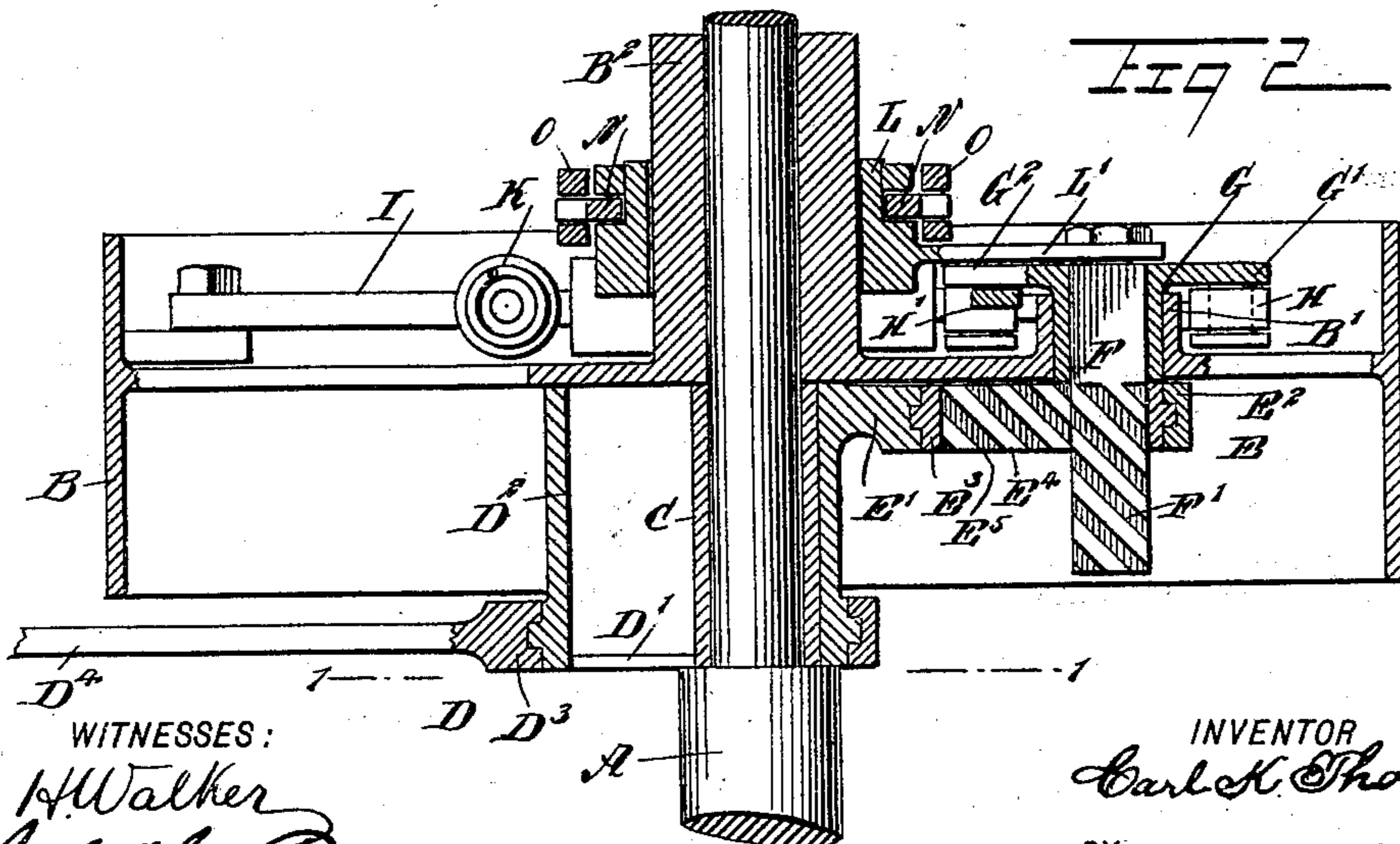
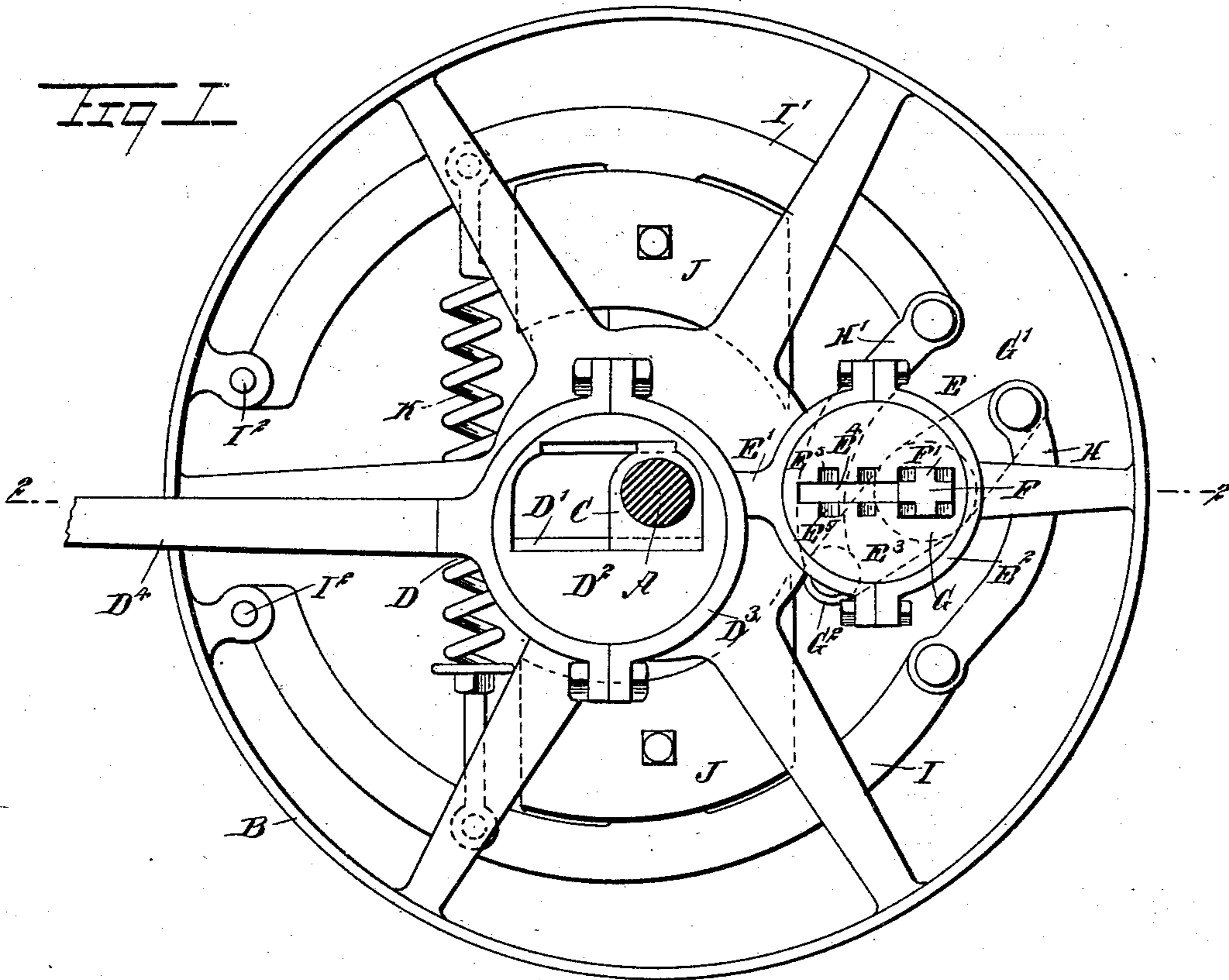
Patented Nov. 21, 1899.

C. K. THOE.  
GOVERNOR FOR TRACTION ENGINES.

(Application filed Mar. 13, 1899.)

(No Model.)

2 Sheets—Sheet 1.



WITNESSES:

H. Walker  
Geo. H. H. H.

INVENTOR

Carl K. Thoe.

BY

M. M. M.  
ATTORNEYS.

**No. 637,751.**

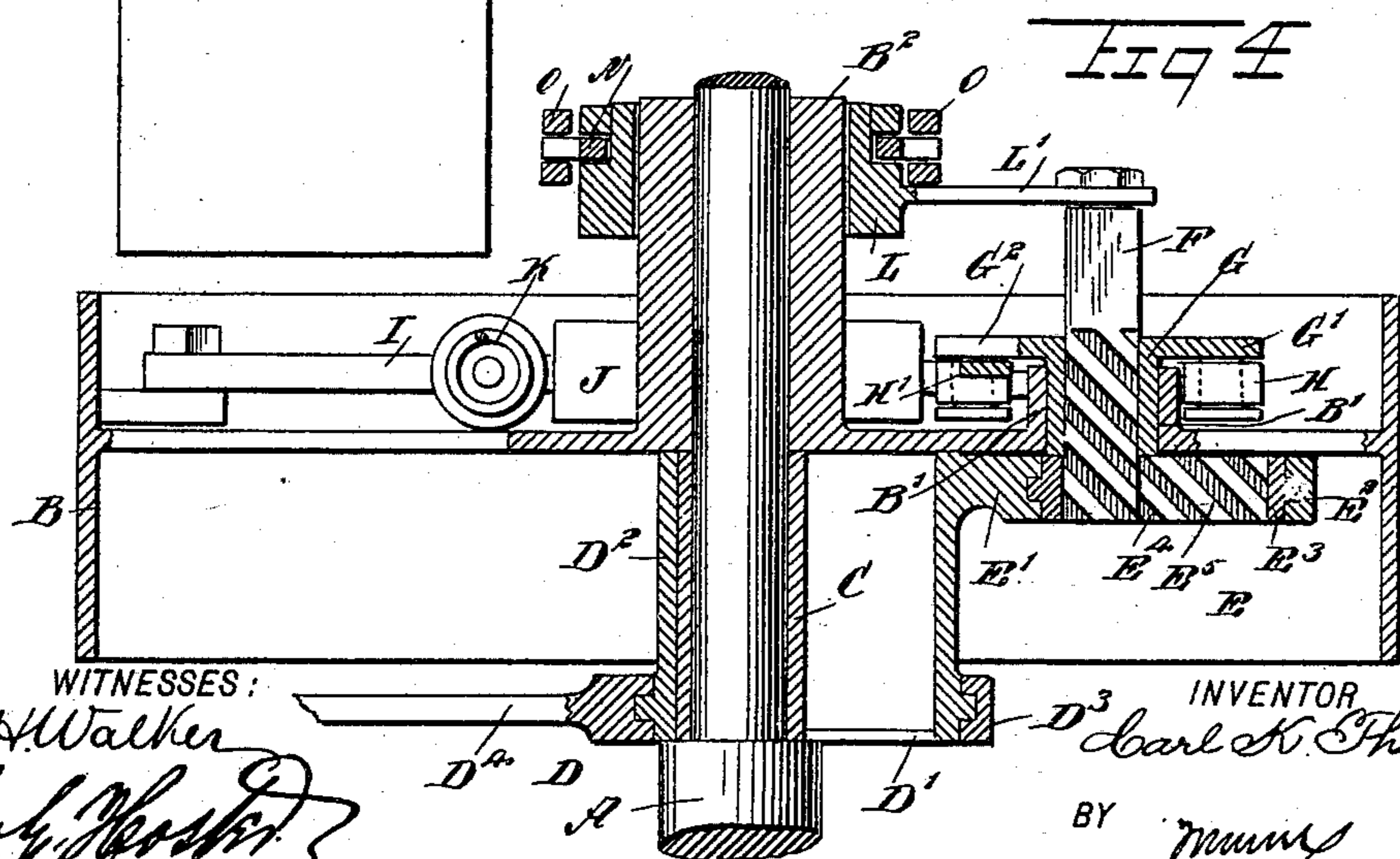
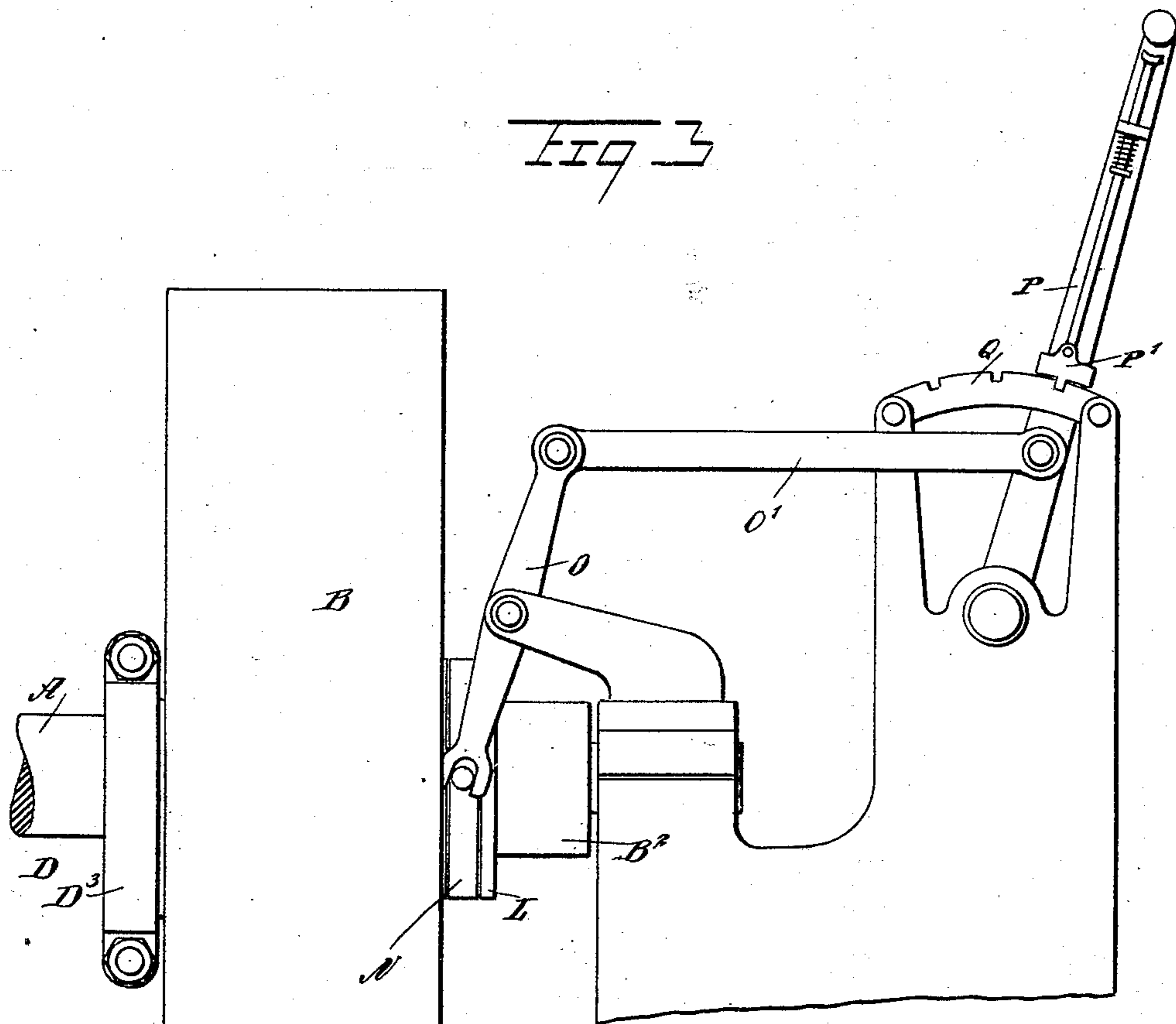
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(No Model.)

**2 Sheets—Sheet 2.**



**WITNESSES :**

A. Walker

Rev. J. Koster,

INVENTOR

73 INVENTOR  
Carl K. Thoe

**BY**

*Munn*  
ATTORNEYS

**ATTORNEYS.**

# UNITED STATES PATENT OFFICE.

CARL K. THOE, OF OSLO, MINNESOTA.

## GOVERNOR FOR TRACTION-ENGINES.

SPECIFICATION forming part of Letters Patent No. 637,751, dated November 21, 1899.

Application filed March 13, 1899. Serial No. 708,880. (No model.)

*To all whom it may concern:*

Be it known that I, CARL K. THOE, of Oslo, in the county of Dodge and State of Minnesota, have invented a new and Improved Governor for Traction-Engines, of which the following is a full, clear, and exact description.

The invention relates to governors in which an eccentric is shifted across the driving-shaft by centrifugal force; and the object of the invention is to provide a new and improved governor more especially designed for use on traction-engines, but also applicable to other machines, the governor being simple and durable in construction, very effective in operation, and arranged to insure a correct distribution of steam under the varying conditions under which the traction-engine operates, especially when reversing the engine, to keep the initial cylinder-pressure equal to the boiler-pressure and to cut off the steam in exact variation of the load and pressure to permit of utilizing the motive agent to the fullest advantage.

The invention consists of novel features and parts and combinations of the same, as will be fully described hereinafter and then pointed out in the claims.

A practical embodiment of my invention is represented in the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a side elevation with the driving-shaft in section on the line 1 1 in Fig. 2. Fig. 2 is a sectional plan view of the same on the line 2 2 in Fig. 1. Fig. 3 is an end elevation of the improvement with the reversing-gear attached, and Fig. 4 is a sectional plan view of the improvement with parts in a different position from that shown in Fig. 2.

The governor is arranged on a driven element of the traction-engine, such as the main driving-shaft A and the pulley B secured to the shaft. On the shaft A is secured a bearing C engaged by guideways D' formed in the disk D<sup>2</sup> of a valve-eccentric D, so that said disk can slide across the shaft on the bearing C to change the position of the valve accordingly, said valve-eccentric being provided with the usual strap D<sup>3</sup> and the eccentric-rod D<sup>4</sup>, connected with the cylinder-valve.

The disk D<sup>2</sup> is rigidly connected with an eccentric-rod E' of a second eccentric E, the strap E<sup>2</sup> of which is arranged on a disk E<sup>3</sup>, having a diametrical slot E<sup>4</sup>, in which is mounted to slide transversely a bar F, formed on the top and bottom with diagonal ridges F', engaging correspondingly-shaped grooves E<sup>5</sup>, formed in the top and bottom walls of the slot E<sup>4</sup>. When the bar F is turned, the disk E<sup>3</sup> is likewise turned, and consequently the eccentric-rod E' pulls on the disk D<sup>2</sup>, so as to draw the latter across the shaft A a corresponding distance to change the position of the valve correspondingly. When the bar F is moved transversely from the position shown in Fig. 2 to that shown in Fig. 4, the ridges F', by engaging the diagonal grooves E<sup>5</sup>, shift the disk E<sup>3</sup> to cause the eccentric-rod E' to draw the disk D<sup>2</sup> of the valve-eccentric D across the bearing C on the shaft A to change the position of the valve. When the bar F is moved to its extreme transverse position, as shown in Fig. 4, complete reversal of the eccentrics, and consequently the position of the valve, is had to reverse the engine. The turning movement of the bar F is controlled by centrifugal action, and the transverse sliding movement of the bar is under the control of the engineer by means of a reversing mechanism for reversing the engine, as above mentioned.

The bar F is mounted to slide in a sleeve G, journaled in a bearing B' on the web of the pulley B, and the rear end of the sleeve is provided with arms G' G<sup>2</sup>, extending in opposite directions and pivotally connected by links H H', respectively, with levers I I', respectively fulcrumed at I<sup>2</sup> to brackets on the rim of the pulley B. (See Fig. 1.) Each of the levers I I' carries an adjustable weight J, and the two levers are connected with each other by a spring K, which serves to bring the levers back to a normal position after the levers have swung outward by centrifugal force when the engine is working and the pulley B on the shaft A is rotated. It is evident that when the engine is running the levers I I' swing outward and, by the links H H', pull on the arms G' G<sup>2</sup> to turn the sleeve G and cause the bar F to turn the disk E<sup>3</sup> to change the position of the valve-eccentric E and that

of the valve accordingly in proportion to the outward-swinging movement of the levers II'.

The rear end of the bar F is engaged by an arm L', projecting from a sleeve L, mounted to slide on and turn with the hub B<sup>2</sup> of the pulley B, and the said sleeve is engaged by a shifting ring N, receiving lateral movement by a shifting fork O, connected by a link O' with a reversing-lever P, having the usual locking-pawl P' engaging one of a series of notches on a segment Q.

When the several parts are in the position shown in Figs. 1, 2, and 3, the bar F stands in position for running the engine forward; but when the operator shifts the reversing-lever P to the opposite side then the link O' imparts a swinging motion to the shifting lever O to move the ring N, and with it the sleeve L, to the position shown in Fig. 4, so that the arm L' draws the bar F to an outermost position and slides the disk E<sup>3</sup> of the eccentric E into an opposite position, as is plainly indicated in Fig. 4. The movement of the eccentric E causes a shifting of the eccentric D to a reverse position, and consequently the valve of the engine is reversed. While the bar F is in this position it is acted on by centrifugal force in the same manner as described to control the valve-eccentric D and the valve for the cylinder in the same manner as if the engine were running forward. By the arrangement described the engine may be run at a high rate of speed and still have its valve closely governed, so that the desired power can readily be obtained from a short-stroke engine.

As a close regulation of the valve is obtained from the governor described, it is evident that a steady motion, which is very valuable in a threshing-engine, is obtained, as any variation in the motion will cause the operation of the threshing-engine to waste grain.

It will further be seen that by the invention described a more perfect distribution of steam is had than by other valve-gear now in use, especially as the lead of the valve is varied according to the speed and the cut-off and compression and in exact variation of the load. Furthermore, there is no lead when the engine is started, and consequently no backlash is produced to retard the power of the engine, especially when starting. A further advantage in having no lead when starting is that a later cut off and release and less compression are had to insure a strong and steady start.

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

1. A governor, provided with a driving element, a valve-eccentric shiftable across the shaft of said element, a second eccentric carried by said driving element, and having its eccentric-rod rigidly connected with the disk of said valve-eccentric, means, substantially as described, for shifting the disk of said

second eccentric while the engine is running, said means comprising a bar engaging the disk of said second eccentric, for turning said disk, an armed sleeve on said bar, and weighted levers fulcrumed on the driving element, and connected with the arms of said sleeve, substantially as shown and described.

2. A governor, provided with a driving element, a valve-eccentric shiftable across the shaft of said element, a second eccentric carried by said driving element, and having its eccentric-rod rigidly connected with the disk of said valve-eccentric, means, substantially as described, for shifting the disk of said second eccentric while the engine is running, said means comprising a bar engaging the disk of said second eccentric and operated by centrifugal action for turning said disk, a sleeve mounted to turn with and to slide on the driving element, and having an arm connected with the bar, and reversing-gear connected with said sleeve, for sliding said bar transversely and shifting the eccentric-disk of the second eccentric across the bar, as set forth.

3. A governor, provided with a driving element, a valve-eccentric shiftable across the shaft of said element, a second eccentric carried by said driving element, and having its eccentric-rod rigidly connected with the disk of said valve-eccentric, means, substantially as described, for shifting the disk of said second eccentric while the engine is running, a sleeve mounted to turn with and to slide on the driving element, and having an arm connected with the bar, and a reversing-gear connected with said sleeve, for sliding said bar transversely and shifting the eccentric-disk of the second eccentric across the bar, the latter being for this purpose provided with diagonal ridges engaging corresponding grooves in the walls of a slot in said disk, as set forth.

4. In a governor, the combination with the driving-shaft, a pulley secured to the shaft, and an eccentric mounted to slide across the said shaft, of a second eccentric carried by the pulley and rigidly connected with the first eccentric, said second eccentric having diagonal grooves in the walls of its opening, a slidable and rotatable bar mounted in the opening of the second eccentric and having diagonal ridges engaging the grooves in the opening thereof, means for imparting rotary movement to the bar by centrifugal action, and means under the control of the operator for sliding said bar, substantially as described.

5. In a governor the combination with a driving-shaft, a pulley secured to the shaft, and an eccentric mounted to slide across the said shaft, of a second eccentric carried by the pulley and having its strap rigidly connected with the first eccentric, a bar mounted to turn and projecting into the opening of the second eccentric, said bar and eccentric having a ridge-and-groove connection, and means

for imparting a turning movement to said bar by centrifugal action, substantially as described.

6. In a governor, the combination with a  
5 driving-shaft, a pulley secured to the shaft, and an eccentric mounted to slide across said shaft, of a second eccentric carried by the pulley and having its rod rigidly connected with the first eccentric, said second eccentric hav-  
10 ing diagonal grooves in the walls of its opening, a bar mounted in the opening of the second eccentric and having diagonal ridges engaging the grooves in the opening thereof, an armed sleeve mounted to turn and in which  
15 the bar is mounted to turn therewith, weighted levers mounted on the pulley, and links connecting the levers with the arms of the sleeve, substantially as described.

7. In a governor, the combination with a  
20 driving-shaft, a pulley secured to the shaft, and an eccentric mounted to slide across the shaft, of a second eccentric carried by the pulley and having its eccentric-rod rigidly connected with the first eccentric, the said  
25 eccentric having diagonal grooves in the walls of its opening, a bar mounted in the opening of said eccentric and having diagonal ridges engaging the grooves thereof, an armed sleeve mounted to turn and in which the bar  
30 is mounted to slide but to turn therewith, weighted levers on the pulley, links connect-

ing the levers with the arms of the sleeve, means for sliding the bar in the sleeve, substantially as described.

8. In a governor, the combination with a 35 pulley, and a valve-eccentric shiftable across the pulley, of a second eccentric carried by the pulley and having its eccentric-rod rigidly connected with the disk of the valve-eccentric, a slidable bar mounted in the open- 40 ing of the second eccentric and engaging the same to shift it when said bar is moved endwise, and means under the control of the operator for moving said bar, substantially as described.

9. In a governor, the combination with a 45 pulley, and a valve-eccentric shiftable across the pulley, of a second eccentric carried by the pulley and having its eccentric-rod rigidly connected with the disk of the valve-eccentric, a slidable and rotatable bar mounted 50 in the opening of the second eccentric, said bar and eccentric having a ridge-and-groove connection, means for sliding the bar, weighted levers carried by the pulley, and means 55 for turning the said bar from the levers, substantially as described.

CARL K. THOE.

Witnesses:

GEORGE P. HAGEN,  
L. A. COUSER.