

H. M. CRAMER.  
GOVERNOR FOR EXPLOSION ENGINES.  
APPLICATION FILED APR. 12, 1907.

924,639.

Patented June 15, 1909.

2 SHEETS—SHEET 1.

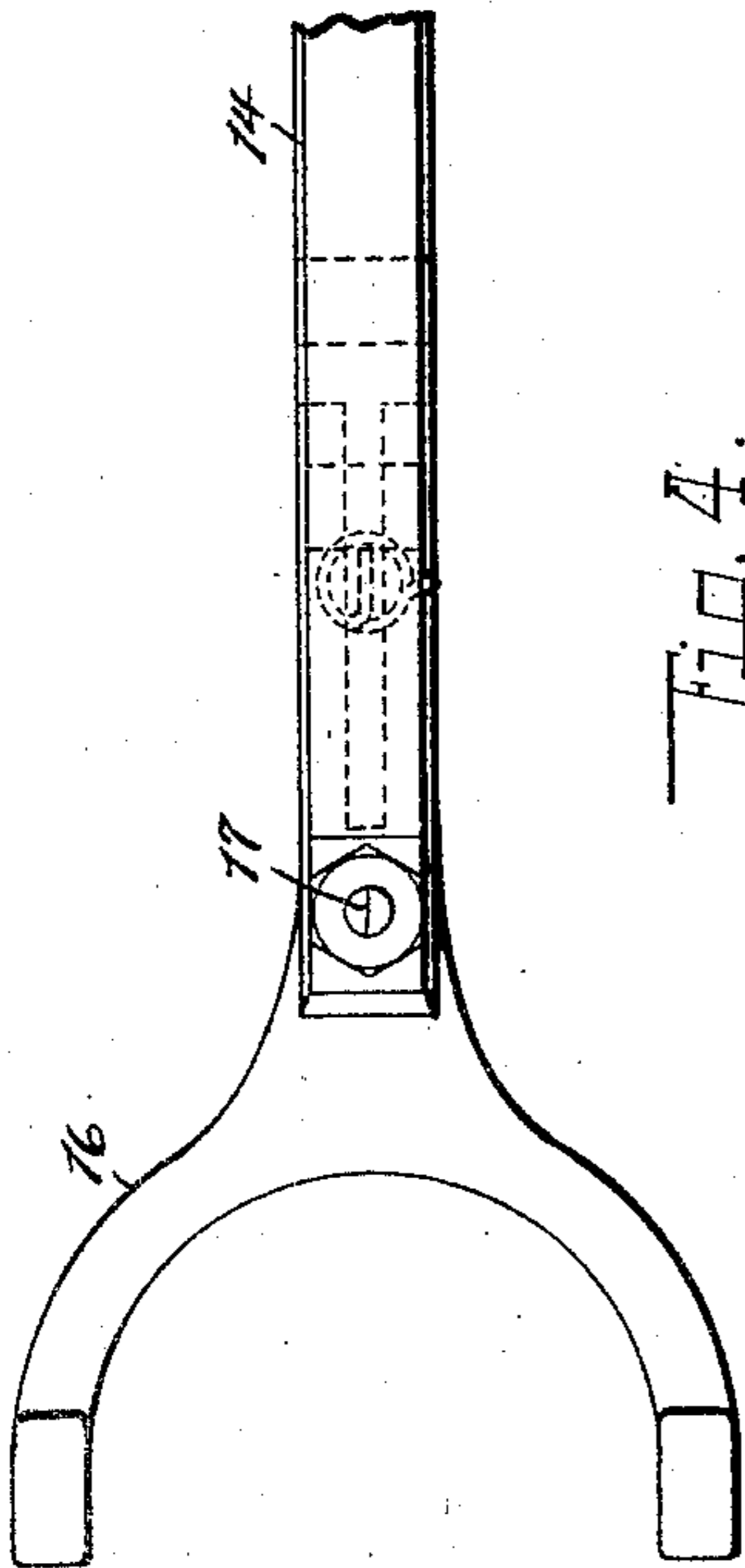


Fig. 4.

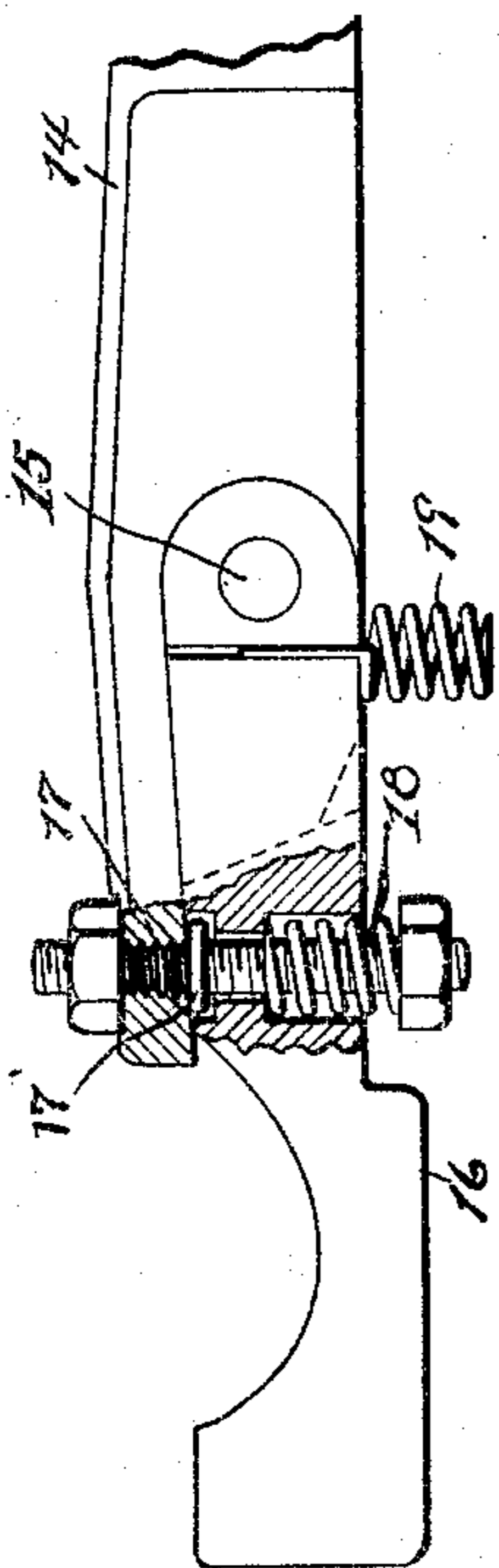


Fig. 3.

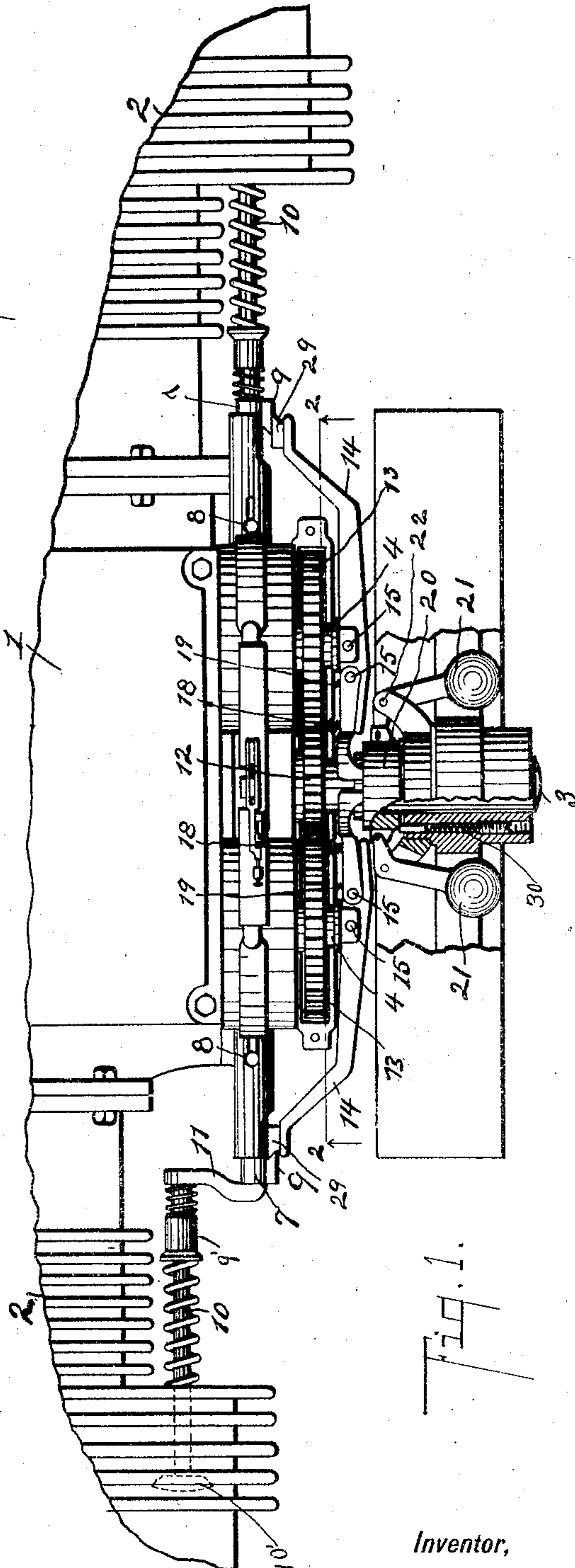


Fig. 1.

Witnesses:

Lulu Greenfield  
Gertrude Tallman

Inventor,

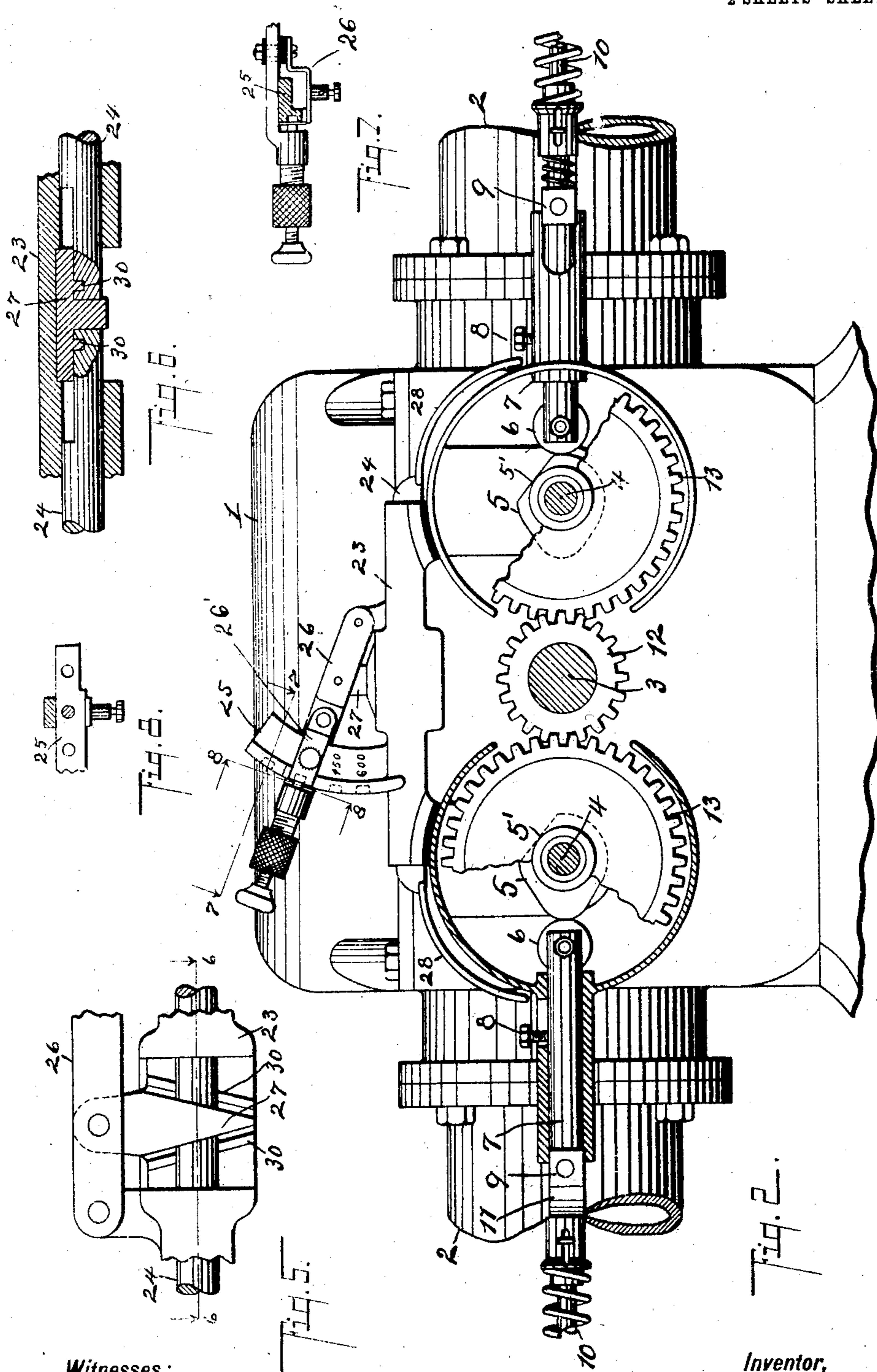
Harry M. Cramer  
By Chappell & Earl  
Att'ys

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2 SHEETS—SHEET 2.



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# UNITED STATES PATENT OFFICE.

HARRY M. CRAMER, OF LANSING, MICHIGAN, ASSIGNOR TO "NEW WAY" MOTOR COMPANY,  
OF LANSING, MICHIGAN.

## GOVERNOR FOR EXPLOSION-ENGINES.

No. 924,639.

Specification of Letters Patent.

Patented June 15, 1909.

Application filed April 12, 1907. Serial No. 367,843.

*To all whom it may concern:*

Be it known that I, HARRY M. CRAMER, citizen of the United States, residing at Lansing, county of Ingham, State of Michigan, have invented certain new and useful Improvements in Governors for Explosion-Engines, of which the following is a specification.

This invention relates to improvements in governors for explosion engines.

The objects of this invention are, first, to provide an improved governor mechanism for explosion engines having a plurality of cylinders by which, when the speed of the engine exceeds a predetermined rate, the charging of the engine is automatically prevented, thereby preventing an explosion and thereby controlling the speed. Second, to provide an improved governor mechanism for explosion engines in which the sparking is properly timed and one in which the electrical connections for the igniter mechanism are disconnected when the speed of the engine exceeds a predetermined rate.

Further objects, and objects relating to details of construction, will definitely appear from the detailed description to follow.

I accomplish the objects of my invention by the devices and means described in the following specification.

The invention is clearly defined and pointed out in the claims.

A structure embodying the features of my invention is clearly illustrated in the accompanying drawing, forming a part of this specification, in which,

Figure 1 is a detail plan of a structure embodying the features of my invention, proportions being broken away to better show the relation of the parts. Fig. 2 is a detail enlarged vertical section, taken on a line corresponding to line 2—2 of Fig. 1. Fig. 3 is an enlarged detail plan of the inner end of one of the levers 14, parts being broken away to better show the arrangement of the parts. Fig. 4 is a detail side elevation thereof. Fig. 5 is an enlarged detail side elevation of the support and adjusting means for the contact members 28. Fig. 6 is a detail view, partially in longitudinal section, taken on a line corresponding to line 6—6 of Fig. 5. Fig. 7 is a detail section taken on a line corresponding to line 7—7 of Fig. 2, showing details of construction. Fig. 8 is a detail

section taken on a line corresponding to line 8—8 of Fig. 2.

In the drawing, the sectional views are taken looking in the direction of the little arrows at the ends of the section lines, and similar numerals of reference refer to similar parts throughout the several views.

Referring to the drawing, 1 represents the engine base and the crank shaft casing thereof; 2 the engine cylinders; and 3 the crank shaft. Arranged, one at each side of the crank shaft, is a pair of cam shafts 4, having valve-actuating cams 5 thereon, the cams being provided with drops or depressions 5' on each side thereof, the object of which will definitely appear later. Exhaust valves, as 10', are arranged to be actuated by the push rods or plungers, 7, which are arranged to engage the valve stems 10. The plungers 7 are provided with rollers 6, adapted to travel on the cams 5. The plungers are provided at their outer ends with laterally projecting arms 11 on which the valve stems 10 rest.

The cam shafts 4 are connected, to the crank shaft by gears 12 and 13, the gears 13 being arranged on the cam shafts and the gear 12 on the crank shaft. These gears are preferably proportioned two to one so that the cam shafts are driven at half the speed of the crank shaft.

A pair of levers 14, having inner yielding sections 16, is provided. The levers 14 are pivoted at 15' and are provided with latch blocks 29 at their outer ends, adapted to engage the catches 9 on the valve-actuating plungers 7. The yielding sections are secured to the pivoted sections by pivots 15. The bolts 17 are adjustably secured to the inner end of the pivoted sections and are loosely arranged through the lever sections 16.

The coiled springs 18, arranged on the bolts 17, hold the section 16 yieldingly in position. The inner ends of the levers are held normally outward by the springs 19.

On the crank shaft is a collar 20, which is adapted to be controlled by the governor weights 21, the governor weights being pivoted at 22 on suitable arms provided therefor on the fly-wheel hub. When the speed of the engine exceeds a predetermined rate, the collar 20 is drawn outwardly, thereby releasing the levers so that their outer ends

are thrown inwardly by the springs 19, so that the latch blocks 29 engage under the catches 9 provided therefor on the valve-actuating plungers. When in this position, the levers prevent the closing of the exhaust valves, although they are reciprocated through a part of their normal stroke. When the speed of the engine falls, the collar 20 travels inwardly against the yielding portions of the levers 14, and as soon as the valve-actuating plungers are shifted to release the latch blocks 9, the levers 14 are thrown out of their engaging position. The levers 14 are adjusted so that the catch blocks 29 may be engaged with the blocks 9 at the same time. The adjustment of the levers 14 is secured by means of the bolt 17 which is held in its adjusted position by suitable lock nuts, the collars 17' coacting therewith. This adjustment is of advantage, as, for instance, if the inner end of one of the levers should be worn more than the other by the governor collar 20, the other lever would be adjusted to compensate for the wear.

It is evident that as the plungers are actuated alternately both the levers are not freed at the same time. The yielding portion of the levers, however, permits their being released successively. Were it not for this yielding feature of the lever, both would be forced out of engagement with the valve-actuating plungers at the same time, thereby releasing one or the other of them prematurely.

In order to properly time the sparking, I provide the valve-actuating plungers with contact members 8, which are adapted to engage the relatively fixed spring contact members 28 as the plungers reciprocate. The contact members 28 are carried by the blocks 24 slidably mounted in suitable ways provided therefor in the bracket 23.

At the inner ends of the blocks 24 is a slide 27, having a V-shaped portion arranged between the ends of the blocks and having converging ribs 30 arranged in suitable grooves provided therefor in the ends of the blocks. By adjusting this slide the blocks are drawn in or pushed out, thereby changing the position of the spring contact members 28, so that they are engaged earlier or later in the stroke of the plunger, as desired. This arrangement enables the exact timing of the sparking, the sparking mechanism being of the jump-spark class, which is well understood and not here illustrated.

The slide 27 is operated by the lever 26, which is provided with a suitable segment 25. When the lever is raised to its highest point so as to draw the contact members 28 inwardly, they are engaged by the contact members on the valve-actuating plungers very late in the stroke, thus causing a very late sparking, so that there is practically no

chance for a "kick back". When the engine is started, the lever is forced downwardly, thereby moving out the contact members 28 to the desired point. When the lever 26 is in its outer position, the switch member 26' carried thereby is thrown out of contact with the segment 25 thereby breaking the electrical connections and as a consequence stopping the engine. The structure by which this is accomplished is clearly illustrated in Figs. 2, 7 and 8.

It will be apparent that, when the exhaust valves are locked or held open, the charging of the engine is prevented, so that no charge is taken into the engine when running above a predetermined rate. This, of course, prevents waste of fuel. Another advantage is that, as the engine runs when the valve is held open, the cool air passing into and out of the cylinders cools the same, and also effectively cools the valve. By adjusting the tension springs 30, in the governor, the speed of the engine can be nicely regulated.

It is apparent that when the valve-actuating plungers are not operated the igniter mechanism is not operated, so that the electrical supply is not needlessly exhausted.

I have illustrated and described my improved governor mechanism for explosion engines in detail in the form preferred by me on account of structural simplicity and effectiveness in use. I am, however, aware that it is capable of considerable variation in structural detail without departing from my invention, and I desire to be understood as claiming the same specifically, as illustrated, as well as broadly.

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

1. The combination with a pair of explosion engines, of a shaft therefor; a collar slidably arranged on said shaft; governor weights arranged to control said collar; tension springs for said governor weights arranged to hold said collar normally inward; means for adjusting the tension of said springs; exhaust valves for said engines; exhaust valve-actuating plungers; means for actuating said plungers; levers made up of sections, the outer-sections of said levers being pivotally mounted and the inner sections thereof being arranged to be engaged by said governor collar; connecting pivots for said lever sections; bolts secured to one of the lever sections and loosely arranged through the others; springs arranged on said bolts for yieldingly holding said lever sections in position; latch blocks on said levers; catches on said plungers adapted to be engaged by said latch blocks; and springs for holding said levers in their engaging position.

2. The combination with a pair of explosion engines, of a shaft therefor; a collar slidably arranged on said shaft; a governor

arranged to control said collar; exhaust valves for said engines; exhaust valve-actuating plungers; means for actuating said plungers; levers made up of sections, the outer sections of said levers being pivotally mounted and the inner sections thereof being arranged to be engaged by said governor collar; connecting pivots for said lever sections; bolts secured to one of the lever sections and loosely arranged through the other; springs arranged on said bolts for yieldingly holding said lever sections in position; latch blocks on said levers; catches on said plungers adapted to be engaged by said latch blocks; and springs for holding said levers in their engaging position.

3. The combination with a pair of explosion engines, of a shaft therefor; a collar slidably arranged on said shaft; governor weights arranged to control said collar; tension springs for said governor weights arranged to hold said collar normally inward; means for adjusting the tension of said springs; exhaust valves for said engines; means for actuating said exhaust valves; levers made up of sections, the outer sections of said levers being pivotally mounted and the inner sections thereof being arranged to be engaged by said governor collar, said levers being adapted to hold the exhaust valves open; connecting pivots for said lever sections; bolts secured to one of the lever sections and loosely arranged through the other; and springs arranged on said bolts for yieldingly holding said lever sections together.

4. The combination with a pair of explosion engines, of a shaft therefor; a collar slidably arranged on said shaft; a governor arranged to control said collar; exhaust valves for said engines; means for actuating said exhaust valves; levers made up of sections, the outer sections of said levers being pivotally mounted and the inner sections thereof being arranged to be engaged by said governor collar, said levers being adapted to hold the exhaust valves open; connecting pivots for said lever sections; bolts secured to one of the lever sections and loosely arranged through the other; and springs arranged on said bolts for yieldingly holding said lever sections together.

5. The combination with a pair of explosion engines, of a shaft therefor; a collar slidably arranged on said shaft; governor weights arranged to control said collar; tension springs for said governor weights arranged to hold said collar normally inward; means for adjusting the tension of said springs; exhaust valves for said engines; means for actuating said exhaust valves; levers made up of sections, the outer sections of said levers being pivotally mounted and the inner sections thereof being arranged to be engaged by said governor col-

lar, said levers being adapted to hold the exhaust valves open; connecting pivots for said lever sections; bolts secured to one of the lever sections and loosely arranged through the other; and springs arranged on said bolts.

6. The combination with a pair of explosion engines, of a shaft therefor; a collar slidably arranged on said shaft; a governor arranged to control said collar; exhaust valves for said engines; means for actuating said exhaust valves; levers made up of sections, the outer sections of said levers being pivotally mounted and the inner sections thereof being arranged to be engaged by said governor collar, said levers being adapted to hold the exhaust valves open; connecting pivots for said sections; bolts secured to one of the lever sections and loosely arranged through the other; and springs arranged on said bolts.

7. The combination with an explosion engine of a governor; an exhaust valve for said engine; means for reciprocating said exhaust valve; and a catch lever adapted to hold said valve open, said catch lever being provided with a yielding portion on which said governor acts there being a spring in the connection for said yielding portion to the other portion of said catch lever, for the purpose specified.

8. The combination with a pair of explosion engines, of a shaft therefor; a collar slidably arranged on said shaft; governor weights arranged to control said collar; tension springs for said governor weights arranged to hold said collar normally inward; means for adjusting the tension of said springs; exhaust valves for said engines; means for successively actuating said exhaust valves; and catch levers made up of yieldingly connected sections, the outer sections being pivotally mounted on the inner sections, and being adapted to engage said exhaust valves and hold them open, the inner sections being arranged to be engaged by said governor collar, there being springs in the connections for said outer sections to the inner sections of said levers, thereby permitting the successive disengaging of the catch levers from said exhaust valves upon the actuation thereof when the levers are engaged by said governor collar.

9. The combination with a pair of explosion engines, of a governor therefor; exhaust valves for said engines; exhaust valve actuating plungers; catch levers for said valve actuating plungers, said catch levers being formed of yieldingly connected sections; means for successively actuating said plungers; springs arranged to throw said catch levers into their engaging position with said plungers when they are released by said governor; and springs arranged in said yielding connection for said lever sections

adapted to swing the plunger engaging sections thereof out of their engaging position when their respective plungers are actuated to release the same.

- 5 10. The combination with a pair of explosion engines, of a governor therefor; exhaust valves for said engines; exhaust valve actuating plungers; catch levers for said valve actuating plungers, said catch levers  
10 being formed of yieldingly connected sections; means for successively actuating said plungers; and springs arranged in said

yielding connection for said lever sections adapted to swing the plunger engaging sections thereof out of their engaging position 15 when their respective plungers are actuated to release the same.

In witness whereof, I have hereunto set my hand and seal in the presence of two witnesses.

HARRY M. CRAMER. [L. s.]

Witnesses:

E. W. GOODNOW,  
SCHUYLER B. SPALDING.