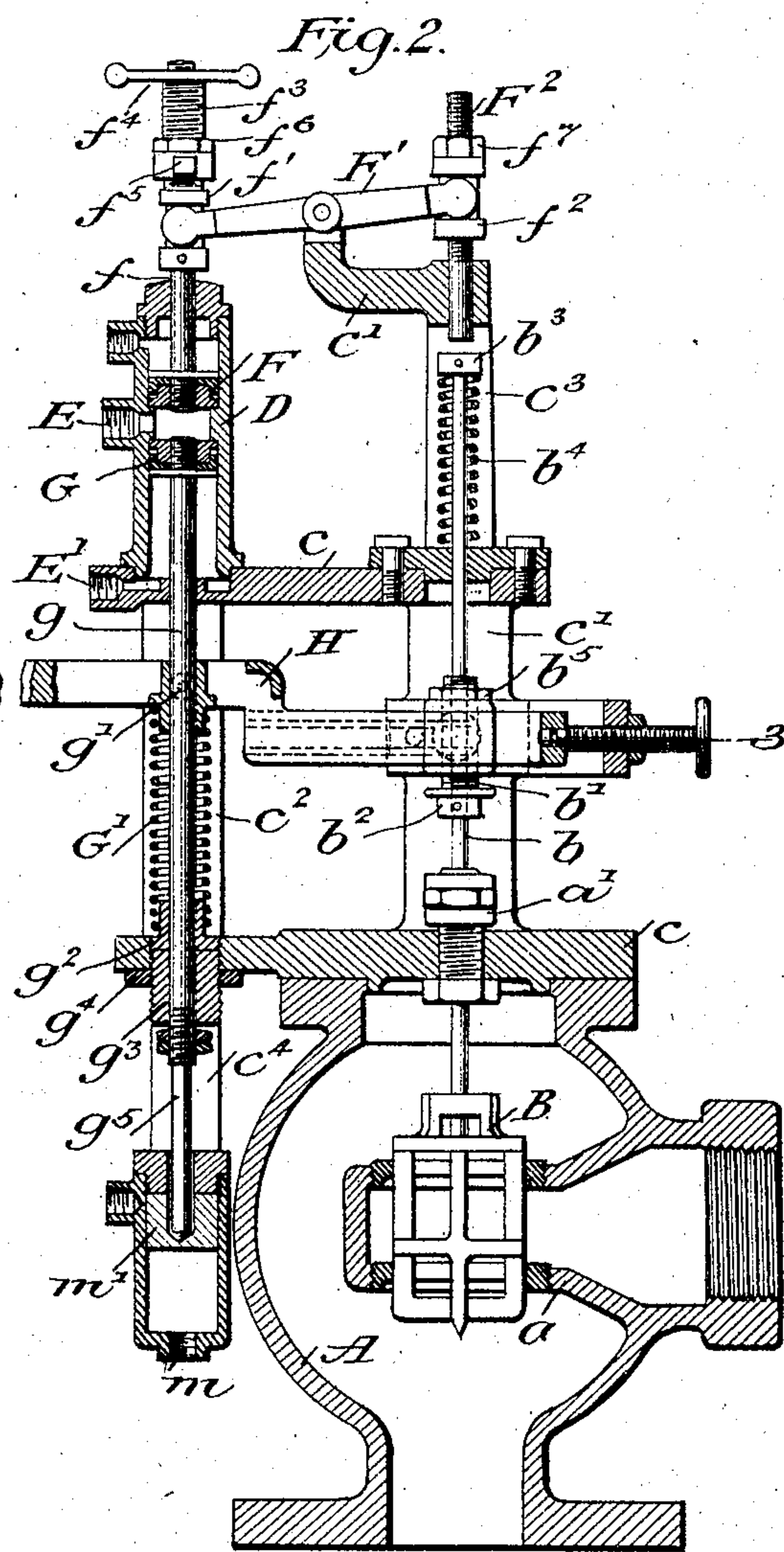
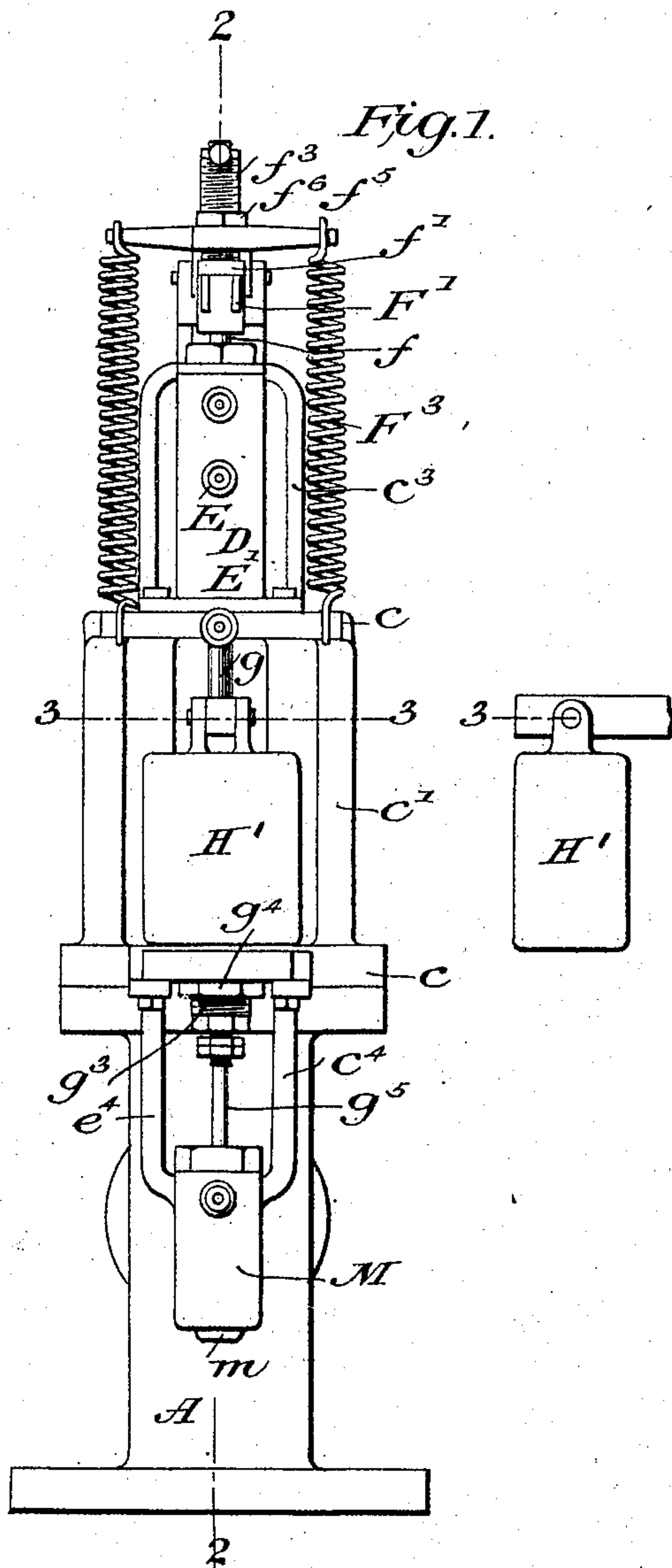


No. 790,187.

PATENTED MAY 16, 1905.

R. CONRADER.
PUMP GOVERNOR.
APPLICATION FILED JUNE 30, 1902.

2 SHEETS—SHEET 1.



Witnesses:

Roy L. Loomis
H. E. Yard.

Inventor:

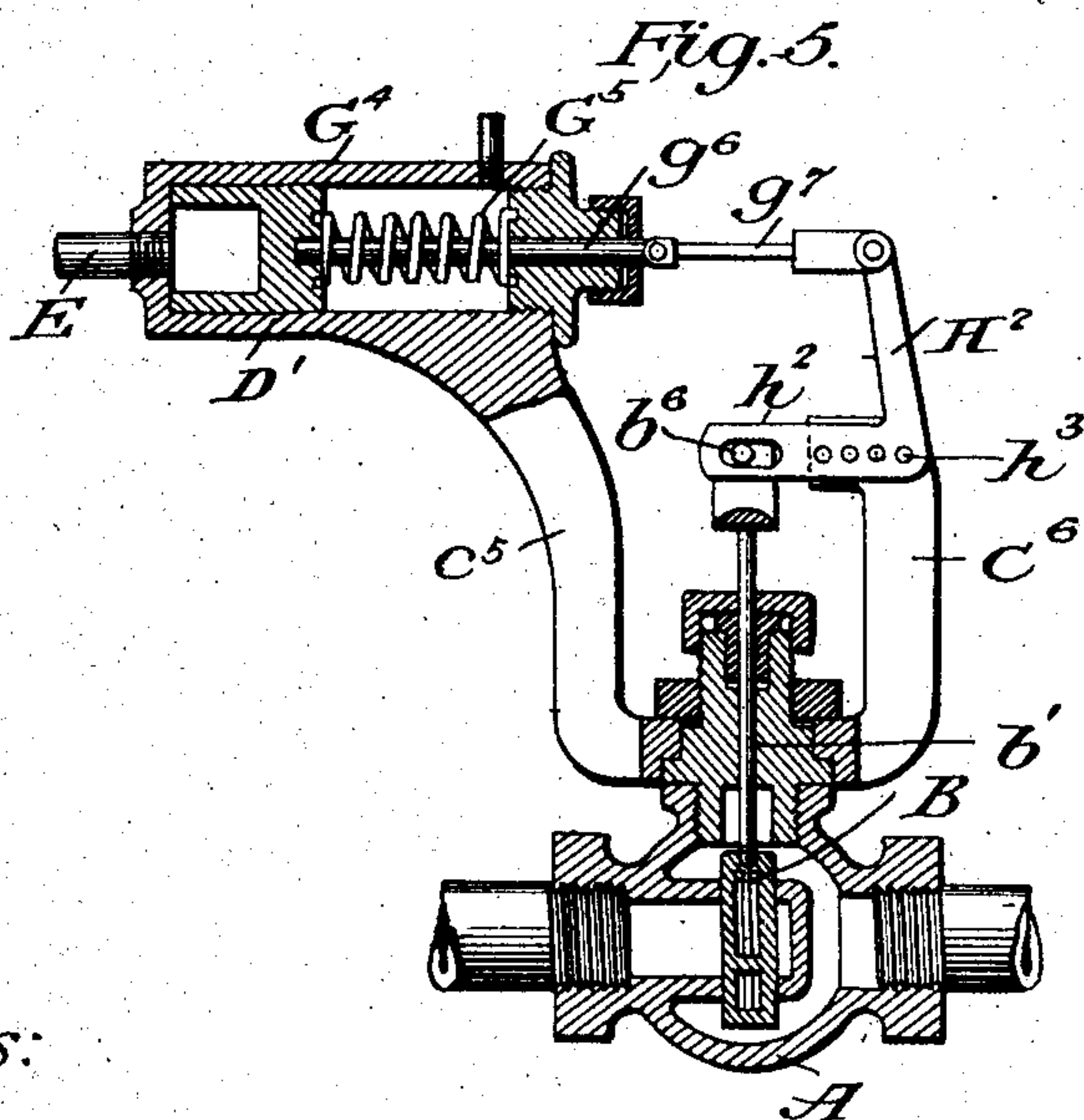
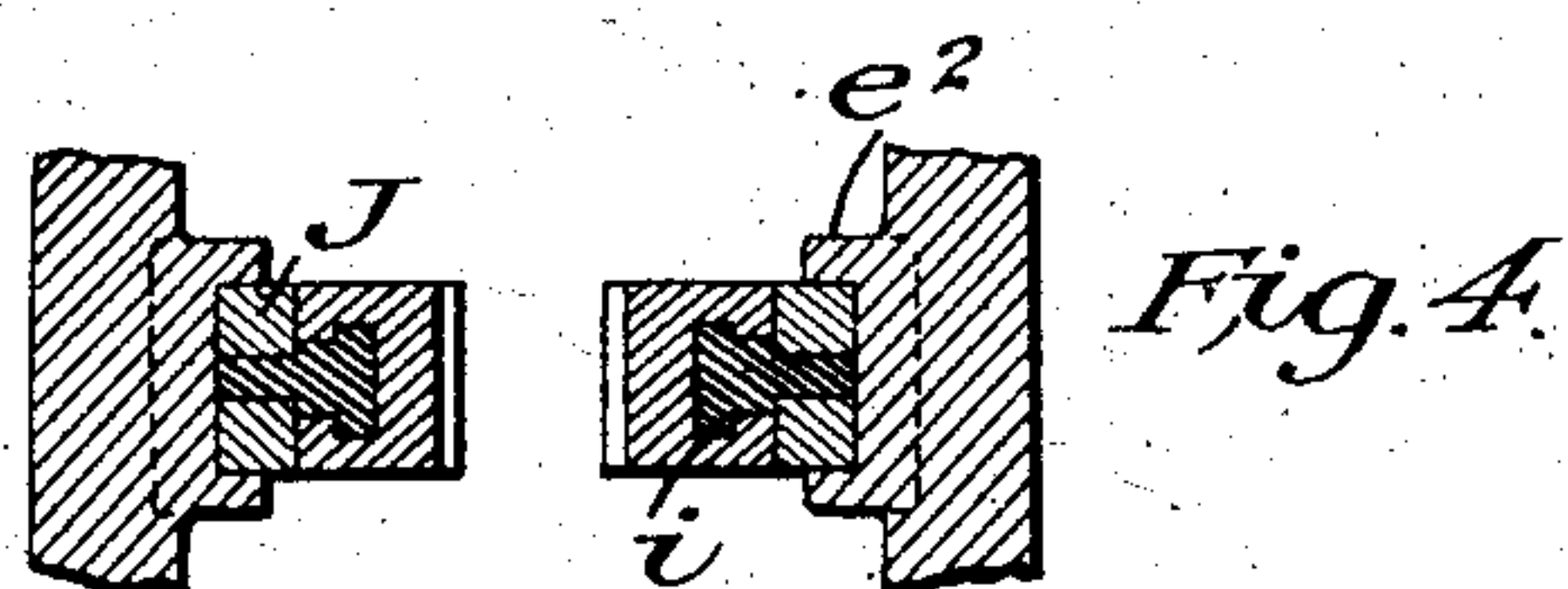
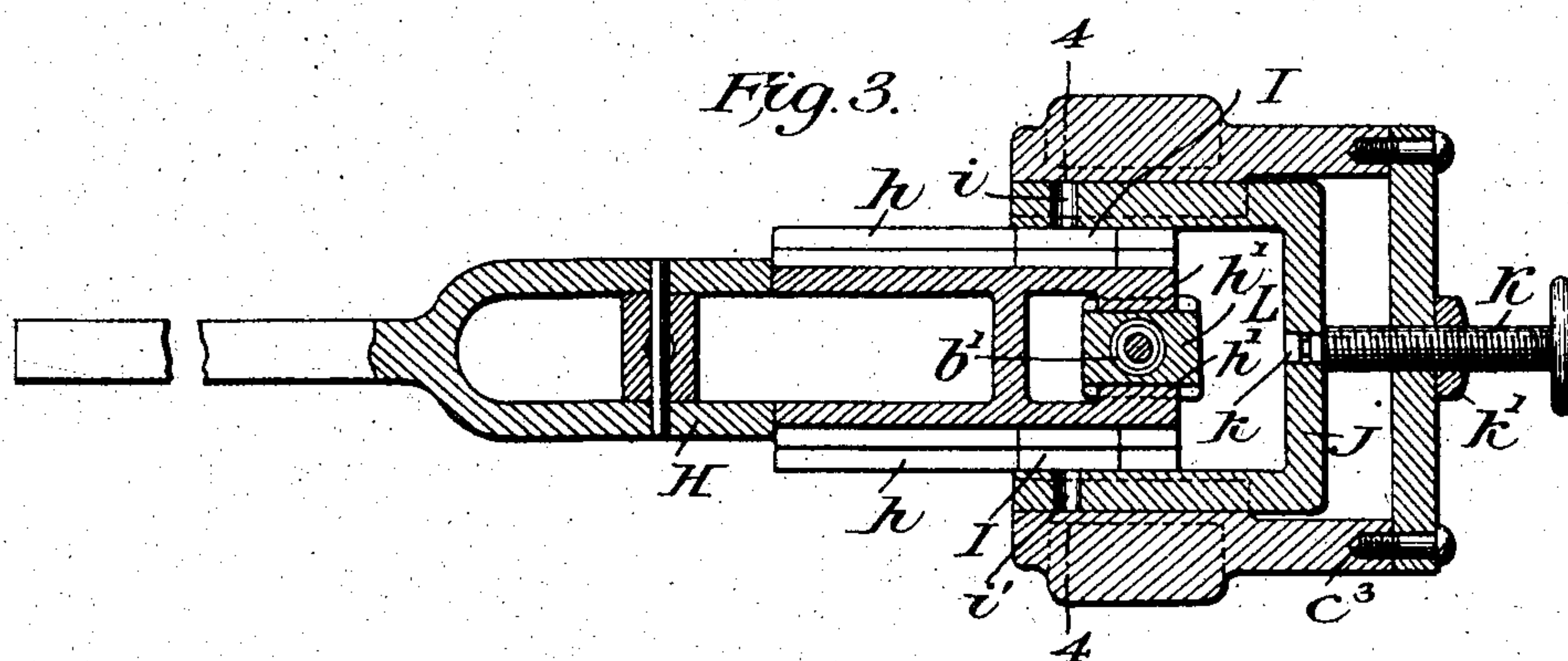
Rudolph Conrader
by N. C. Loomis
his Att.

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2 SHEETS--SHEET 2.



Witnesses:

Roy Brown
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his Atty.

UNITED STATES PATENT OFFICE.

RUDOLPH CONRADER, OF ERIE, PENNSYLVANIA.

PUMP-GOVERNOR.

SPECIFICATION forming part of Letters Patent No. 790,187, dated May 16, 1905.

Application filed June 30, 1902. Serial No. 113,853.

To all whom it may concern:

Be it known that I, RUDOLPH CONRADER, a citizen of the United States, residing at Erie, in the county of Erie and State of Pennsylvania, have invented new and useful Improvements in Pump-Governors, of which the following is a specification.

This invention relates to pump-governors; and it consists in certain improvements in the construction thereof, as will be hereinafter fully described, and pointed out in the claims.

The objects of the invention are to provide a pump-governor which may be actuated entirely by the fluids actuating and actuated by the pump.

Some features of the device may be utilized with other governing devices.

The objects of the invention, therefore, include in their broader scope not only those just hereinbefore stated, but also to provide the different features of the mechanism hereinbefore described with functions as expressed in the specification and claims.

The invention is illustrated in the accompanying drawings, as follows:

Figure 1 shows a side elevation of the governor. Fig. 2 shows a section on the line 2 2 in Fig. 1. Fig. 3 shows a section on the line 3 3 in Figs. 1 and 2. Fig. 4 shows a section of the governor-lever mechanism on the line 4 4 in Fig. 3. Fig. 5 shows a view, partly in section, of an alternative construction.

A marks the governor-valve chamber forming part of the connections for the pump-actuating fluid; *a*, the usual diaphragm; B, the usual valve used on throttling-governors. The cap C of the valve-chamber A forms a base for a frame, having the upright C'. The plate *c* connects the upright C', and extending above the uprights C' and C² is a frame C³. Arranged on the plate *c* is a governor-motor cylinder D. This communicates, through the connection E, with the discharge-passage leading from the pump. Arranged within the cylinder D, above the opening of the passage E to the cylinder D, is a piston F, and extending from this piston is a stem *f*. A spool *f'* is secured to this stem *f*. An arm *c'* extends from the frame C³ and forms a pivotal support for a lever F'. The lever F' has a

forked end and is rounded to operate between the shoulders of the spool *f'*. The opposite end of the lever is similarly arranged to operate in the spool *f'*. The spool *f'* is screwed onto a short stem F² and is locked in position thereon by a jam-nut *f'*. A screw-threaded sleeve *f'* is arranged on the stem *f* above the spool *f'*. This sleeve is provided with a hand-wheel *f'*, so that it can be readily manipulated. Screwed onto the thread on the sleeve is a yoke *f'*, and extending from the arms of the yoke are the springs F³. The lower end of the springs are attached to the plate *c*. It will readily be seen that by turning the sleeve *f'* the tension of the springs F³ may be readily adjusted as desired. When adjusted, the yoke may be locked in position by the jam-nut *f'*. The pin F² is of such length that it will contact the upper end of the stem *b* when the piston F is forced upwardly by the pressure exerted by the pump. This part of the mechanism operates in the manner of ordinary regulators. The springs F³ are adjusted so as to exert a counter-pressure in the piston F sufficiently to prevent a movement of the piston F until the pressure exerted by the pumped fluid has reached its desired maximum. When the pressure does reach this point, the piston F is forced upwardly, the pin F² downwardly against the stem *b*, and the valve closed, so as to completely stop the pump. The stem *b* is arranged to have a free downward movement with relation to the other connections of the governor, so as to permit this action of the regulator. The upper end of the stem has the shoulder *b'*, and a spring *b'* is tensioned between the shoulder *b'* and the frame C³, and this immediately opens the valve when the pressure falls below the maximum and allows the lifting of the pin F². The spring *b'* needs to be only of sufficient tension to lift the valve and connecting parts.

Arranged in the cylinder D, beneath the piston F and connection E, is a second piston G. Extending from this piston is a stem *g*, and secured on this stem is a collar *g'*. A pin extends through this collar and the stem and also through a lever H. The lever H has on its edges the guides *h*. The fulcrum-block I is arranged to slide on these guides. Extend-

ing from the fulcrum-blocks are the fulcrum-pins i . These pins extend into a yoke J. The yoke J is arranged to slide in the guides c^2 on the frame C'. On the inner end of the lever H are the rounded portions h' , which engage a spool L. An adjusting-nut b' is threaded onto the valve-stem b and screwed into the spool L. Its lower end contacts a shoulder b^2 , fixed on the stem B. This adjusting-nut is locked in place by a jam-nut b^5 . It will readily be seen by following through this mechanism that as the piston G is forced downwardly, carrying with it the stem g , the collar g' and the outer end of the lever H is also forced downwardly. This operating upon the fulcrum formed by the pin i raises the end of the lever at the valve-stem, and this permits the spring b^4 to lift the valve and give to it a wider opening. Beneath the lever H and preferably surrounding the stem g is a spring G' , which forms a counter-pressure mechanism against the motor formed by the piston G and cylinder D. The upper end of this spring rests against the collar g' and the lower end against a collar g^2 . The collar g^2 is mounted on an adjusting-nut g^3 , screwed into the base-plate C. A jam-nut g^4 locks the adjusting-nut g^3 in place. The outer end of the lever H is provided with a weight H'. By shifting this weight the amount of counter-pressure can also be varied. Secured to the yoke J by means of a swivel-joint k is a screw K. This screw K passes through an extension c^3 , arranged on the frame C'. It will readily be observed that the yoke J may be adjusted to any position by the screw K and locked in any position by the jam-nut k' . This adjusting of the yoke J changes the position of the fulcrum i , and consequently changes the movement of the valve relatively to the movement of the motor-piston G. The operation of this feature of the device is as follows: As the pump-pressure operating through the connecting medium increases it actuates the piston G, and this operating through the connecting mechanism, the stem g , and lever H permits the valve B to be lifted by the spring b^4 . When there is no pressure on the pumped fluid, the lever H simply rests on the spring G' . Theoretically the sleeve b' should then be adjusted so as to place the valve B just at the point of opening—that is, there being a zero-load on the pump the valve should be set at zero. In order to start the pump and overcome the friction of the parts, the valve B, with no pressure on the pumped fluid, should be sufficiently open to give to the pump the desired speed. As the pressure on the pumped fluid increases the pump may increase or decrease in speed, depending on whether the valve B is raised in proper proportion to the increase in the load. By turning the screw K, and thus adjusting the yoke J, the movement of the valve relative to the movement of the pressure device incident to the pumped

fluid-pressure may be varied, so that the valve-opening will be proportioned exactly to the load. In adjusting the governor, therefore, it is simply necessary to start with a zero pumped fluid-pressure, set the valve by means of the sleeve b' to give the speed to the pump desired, then allow the pressure on the pumped fluid to run up, and then adjust the yoke so as to give a valve-opening that will bring the pump to the initial speed. It will be found that this adjustment of the yoke will give a proper valve-opening for all intermediate loads, as well as greater loads. Of course the adjustment of the valve, as just hereinbefore described, may be accomplished by adjusting the collar g^2 so as to raise or lower the spring G' ; but this involves the tilting of the lever H, so that it is preferable to make the adjustment by means of the sleeve b' .

It will be noted that by securing the end of the lever H to the stem g the movement of the lever at the point of connection is a straight line, while the movement of the part H' of the lever is arranged with the fulcrum as a center. As the stem g is moved, however, the lever H slides on the block I, so as to vary the length of the lever between the fulcrum and the ends h' . This action of the lever compensates for the varying arm incident to the oscillation of the lever H, so that a given movement of the stem g with the lever H in any position gives to the stem b a proportionately similar movement.

It will of course be understood that the stem b instead of being connected directly to a throttle-valve may be connected to any of the well-known valve mechanisms (not of the throttle-valve type) and will operate in a manner substantially similar to one connected to a throttle-valve.

While a governor-motor connected with the discharge of the pump and subjected to the pumped fluid-pressure forms for many purposes a sufficiently accurate governor, in some relations such a connection does not form a complete governing apparatus.

In pumping liquids the intake-pressure of course is exerted upon the piston and neutralizes the load upon the piston to the extent of the intake-pressure. With gases the intake-pressure increases or decreases the load on the pump, depending upon how closely such intake-pressure approximates the discharge-pressure of the pump. It becomes necessary, therefore, to compensate for this disturbing influence, and in the accompanying drawings I have arranged the mechanism for compensating especially for liquids; but it may be utilized with gases where the intake and discharge pressure approximate each other. The lower end of the cylinder D is closed and a connection E' made with the intake of the pump. As the piston presents practically the same area at both sides, the intake-pressure is exerted against the discharge-pressure in the

governor-motor and effects the governing influence of the discharge-pressure to just the extent that the intake-pressure neutralizes the load on the pump. Thus if the intake-pressure were equal to the discharge-pressure the effect of the discharge-pressure on the piston G would practically be neutralized, as would the work of the pump. Another disturbing influence as to the uniformity of the speed of the pump is the variation in the actuating-fluid pressure, (ordinarily a variation in boiler-pressure.) To compensate for this, I have arranged a mechanism as follows: Extending from the plate C is the arm C⁴, which sustains a cylinder M. The lower end of said cylinder is provided with a connection *m*, leading to some part of the actuating-fluid system. Arranged in this cylinder is the piston *m'*, and resting on this piston is the extension *g*⁵ on the stem *g*. It will be noted that the stem or actuating fluid operating upon the piston *m'* forms a part of the counter-pressure mechanism supporting the spring G', and so that as the actuating-fluid pressure increases the counter-pressure mechanism of the governor increases in force, so that a smaller opening is given to the valve for a given pumped fluid-pressure. The higher actuating-fluid pressure, however, gives to the pump with this smaller valve-opening the same energy that would be given to it by an actuating fluid at less pressure and larger valve-opening.

In Fig. 5 I show an alternative construction comprising the broader features of my invention. In it A marks the valve-chamber, and B the valve. These are substantially similar to the same parts in Fig. 1. Secured to the valve-chamber is an arm C⁵, to which is secured a cylinder D'. Leading to this cylinder is the connection E, which is similar to the connection E in Fig. 1. The piston G⁴ is arranged in said cylinder with a counter-pressure spring G⁵ arranged between the piston and the end of the cylinder. Extending from the piston is a stem *g*⁶. This stem is connected by a link *g*⁷ with a bell-crank lever H². The bell-crank lever is pivoted on an arm C⁶, extending from the chamber A. The valve-stem *b'*, extending from the valve B, is provided with a pin *b*⁶, which operates in a slot *h*² at the end of the bell-crank lever H². The bell-crank lever is provided with a series of holes *h*³, any of which may be made the pivot of the lever H². By this means the length of the arm in which is arranged the slot *h*² may be varied, so as to vary the movement of the valve with a given movement of the governor-motor.

In a former application filed April 24, 1899, Serial No. 714,289, I have shown, but not claimed, the structure shown in Fig. 5.

What I claim as new is—

1. In a pump-governor, the combination of a connection for conveying fluid to a pump-motor; a valve mechanism for controlling the

flow of actuating fluid to said motor; a connection for conveying fluid from the pump; a governor - actuating mechanism comprising a motor arranged to be actuated by the pumped fluid; a connecting mechanism for conveying the action of the governor-actuating motor to the valve mechanism, said governor-motor mechanism and valve mechanism being arranged to give to the pump-motor an increased supply of actuating fluid with an increase of the pressure on the governor-motor; a counter-pressure device for operating against said governor-motor; and means for varying the initial position of the valve mechanism relatively to the counter-pressure mechanism.

2. In a pump-governor, the combination of a connection for conveying fluid to a pump-motor; a valve mechanism for controlling the flow of said actuating fluid to said motor; a connection for conveying fluid to the pump; a governor-actuating mechanism comprising a motor arranged to be actuated by the pumped fluid; a connecting mechanism for conveying the action of the governor-actuating motor to the valve mechanism, said governor-motor and valve mechanism being arranged to give to the pump-motor a greater supply of actuating fluid with an increase of the pressure on the governor-actuating motor; and means for adjusting the connecting mechanism to vary the action of the valve mechanism with a given movement of the governor-actuating motor.

3. In a pump-governor the combination of a connection for conveying fluid to a pump-motor; a valve mechanism for controlling the flow of said actuating fluid to said motor; a connection for conveying fluid from the pump; a governor-actuating mechanism comprising a motor arranged to be actuated by the pumped fluid, and a counter-pressure device operating against said motor; a connecting mechanism for conveying the action of the governor-actuating motor to the valve mechanism, said governor-actuating motor and valve mechanism being arranged to give to the pump-motor a greater supply of actuating fluid with an increase of pressure on the governor-actuating motor; means for adjusting the connecting mechanism to vary the action of the valve mechanism with a given movement of the governor-actuating motor; and means for adjusting the initial position of the valve relative to the counter-pressure mechanism.

4. In a pump-governor, the combination of a connection for conveying actuating fluid to a pump-motor; a valve mechanism for controlling the flow of actuating fluid to said motor; a connection for conveying fluid from the pump; a governor-actuating mechanism comprising a motor arranged to be actuated by the pumped fluid; a lever for conveying the movement of the governor-actuating motor to the valve mechanism; and means for varying the arm of said lever to vary the movement of

the valve mechanism relatively to the movement of the governor-motor.

5. In a pump-governor, the combination of a connection for conveying an actuating fluid to a pump-motor; a valve mechanism for controlling the flow of actuating fluid to said motor; a connection for conveying fluid from the pump; a governor-actuating mechanism comprising a motor arranged to be actuated by the pumped fluid; a lever for conveying the movement of the governor-actuating motor to the valve mechanism; and a movable fulcrum for said lever whereby the movement of the valve mechanism relatively to the movement of the governor-motor may be varied.

6. In a pump-governor, the combination of a connection for conveying fluid to the pump-motor; a valve mechanism for controlling the flow of actuating fluid to said motor; a connection for conveying fluid from the pump; a governor-actuating mechanism comprising a motor arranged to be actuated by the pumped fluid; a stem extending from said motor; a stem extending from said valve mechanism; a lever secured to one of said stems and arranged to actuate the other of said stems.

7. In a pump-governor, the combination of a connection for conveying actuating fluid to the pump-motor; a valve mechanism for controlling the flow of actuating fluid to said motor; a connection for conveying fluid from the pump; a governor-actuating mechanism comprising a motor arranged to be actuated by the pumped fluid; a stem extending from said motor; a stem extending from said valve mechanism; a lever secured to one of said stems and arranged to actuate the other of said stems; and means for changing the fulcrum of the lever to vary the relative movement of the valve to the movement of the governor-actuating motor.

8. In a pump-governor the combination of a connection for conveying an actuating fluid to the pump-motor; a valve mechanism for controlling the flow of actuating fluid to said motor; a connection for conveying fluid from the pump; a governor-actuating mechanism comprising a motor arranged to be actuated by the pumped fluid; means for exerting a counter-pressure upon said motor; means for varying the initial position of the valve mechanism relatively to the counter-pressure mechanism; a lever for conveying the action of the governor-actuating motor of the valve mechanism; and means for varying the arm of the lever to vary the relative movement of the valve mechanism to the movement of the governor-motor.

9. In a pump-governor, the combination of a connection for conveying an actuating fluid to a pump-motor; a valve mechanism for controlling the flow of actuating fluid to said motor; a connection for conveying fluid from the pump; a governor-actuating mechanism comprising a motor arranged to be actuated by

the pumped fluid; a lever for conveying the movement of the governor-actuating motor to the valve mechanism; a sliding fulcrum for said lever whereby the movement of the valve mechanism relatively to the movement of the governor-actuating motor may be varied; a screw for moving said fulcrum; and means for locking said screw.

10. In a pump-governor, the combination of a connection for conveying an actuating fluid to the pump-motor; a valve mechanism for conveying fluid from the pump; a governor-actuating mechanism comprising a motor arranged to be actuated by the pumped fluid; a lever for conveying the movement of the governor-motor to the valve mechanism, said lever having the guides *h*, thereon, and end *h'*; the fulcrum-block I, arranged to slide on said guides and having the fulcrum-pin *i*, thereon; a sliding block J; and a screw for moving said block.

11. In a pump-governor, the combination with the cylinder, D; the connection E, leading to the discharge of the pump; the piston G; the stem *g*; spring G', tensioned to oppose the fluid-pressure upon the piston G; the lever H, secured to the stem *g*; a sliding fulcrum for said lever; a screw for adjusting said fulcrum; a valve mechanism arranged to be actuated by said lever.

12. In a pump-governor, the combination with the cylinder D; the connection E, leading to the discharge of the pump; the piston G; stem *g*; spring G', tensioned to oppose the fluid-pressure upon the piston G; the lever H, secured to the stem *g*; a sliding fulcrum for said lever; a screw for adjusting said fulcrum; a spool L, on which said lever operates; an adjusting-nut in said spool; a valve-actuating stem *b*; a shoulder on said stem, which is connected by said screw; and a valve mechanism controlled by said stem.

13. In a pump-governor, the combination of a connection for conveying an actuating fluid to a pump-motor; a valve mechanism for controlling the flow of actuating fluid; a connection for conveying fluid from the pump-intake; a governor-actuating mechanism comprising a motor arranged to be actuated by the fluid-pressure at the intake; and a connecting mechanism for conveying the action of the governor-actuating motor to the valve mechanism.

14. In a pump-governor, the combination of a connection for conveying an actuating fluid to a pump-motor; a valve mechanism for controlling the flow of actuating fluid; a connection for conveying fluid from the pump-intake; a governor-actuating mechanism comprising a motor arranged to be actuated by the fluid-pressure at the intake; a connecting mechanism for conveying the action of the governor-actuating motor to the valve mechanism, said governor-actuating motor mechanism and valve mechanism being arranged

to give to the pump-motor a supply of actuating fluid varying with variations in the work of the pump incident to a variation in the intake pressure.

5 15. In a pump-governor, the combination of a connection for conveying an actuating fluid to a pump-motor; a valve mechanism for controlling the flow of actuating fluid to said motor; a connection for conveying fluid from the pump-outlet; a connection for conveying fluid from a pump-intake; a governor-actuating mechanism comprising a motor arranged to be actuated by fluids from the discharge and intake of a pump; and a connecting mechanism for conveying the governor-actuating motor mechanism to the valve mechanism.

15 16. In a pump-governor, the combination of a connection for conveying an actuating fluid to a pump-motor; a valve mechanism for controlling the flow of actuating fluid to said motor; a connection for conveying fluid from the discharge of the pump; a connection for conveying fluid from a pump-intake; a governor comprising a motor arranged to be actuated by fluids from the discharge and intake of a pump; and a connecting mechanism for connecting the governor-actuating motor mechanism to the valve mechanism.

25 17. In a pump-governor, the combination of a connection for conveying an actuating fluid to a pump-motor; a valve mechanism for controlling the flow of actuating fluid to said motor; a connection for conveying fluid from the discharge of a pump; a connection for conveying fluid from a pump-intake; a governor-actuating mechanism comprising a motor subject to the opposing pressure of the discharge and intake of a pump; and a connecting mechanism for conveying the action of the governor-actuating motor to the valve mechanism.

40 18. In a pump-governor, the combination of a cylinder, D, having the connection E, to the discharge of a pump; the connection E', arranged to lead to the intake of a pump; the piston G, subject to the opposing pressures; a valve mechanism for controlling the flow of actuating fluid of a pump-motor; a connection between the piston and said valve mechanism for conveying the movement of the piston to the valve mechanism.

50 19. In a pump-governor, the combination of a cylinder D, having the connection E, to the discharge of a pump; the connection E', arranged to lead to the intake of a pump; the piston G, subject to the opposing pressures; a valve mechanism for controlling the flow of actuating fluid to a pump-motor; a connection between the piston and said valve mechanism for conveying the movement of the piston to the valve mechanism; the areas of piston exposed to the discharge and intake pressures being proportioned to compensate for variations in load incident to change in either intake pressure or discharge pressure.

20. In a pump-governor, the combination of a connection for conveying fluid to a pump-motor; a valve mechanism for controlling the flow of actuating fluid to said motor; a connection for conveying fluid from the pump; an actuating governor mechanism comprising a motor arranged to be actuated by the pumped fluid; and a regulator arranged to be actuated when the pumped fluid reaches a maximum pressure and to operate upon the valve mechanism when so actuated.

21. In a pump-governor, the combination of a connection for conveying fluid to a pump-motor; a valve mechanism for controlling the flow of actuating fluid to said motor; a connection for conveying fluid from the pump; a governor-actuating mechanism comprising a motor arranged to be actuated by the pumped fluid; and a regulator arranged to be actuated when the pumped fluid reaches a maximum pressure and to operate upon the valve mechanism to entirely close the valve when so actuated.

22. In a pump-governor, the combination of a connection for conveying fluid to a pump-motor; a valve mechanism for controlling the flow of actuating fluid to said motor; a connection for conveying fluid from the pump; a governor-actuating mechanism comprising a motor arranged to be actuated by the pumped fluid; connecting mechanisms for conveying the action of the governor-actuating motor to the valve mechanism; and a regulator arranged to be operated from the same connection to the pumped fluid and to operate when the pumped fluid reaches a maximum pressure and to actuate when operated the valve mechanism.

23. In a pump-governor, the combination of a connection for conveying fluid to a pump-motor; a valve mechanism for controlling the flow of actuating fluid to said motor; a connection for conveying fluid from the discharge of the pump; a connection for conveying fluid from the pump-intake; a governor-actuating mechanism comprising a motor arranged to be actuated by fluid-pressures from the discharge and intake; a connecting mechanism for conveying the action of the governor-actuating motor to the valve mechanism; and a regulator arranged to be actuated by the pumped fluid and to operate when actuated the valve mechanism.

24. In a pump-governor, the combination of a connection for conveying fluid to a pump-motor; a valve mechanism for controlling the flow of actuating fluid to said motor; a connection for conveying fluid from the pump; a governor-actuating mechanism comprising a motor arranged to be actuated by the pumped fluid and by the actuating fluid; a connecting mechanism for conveying the action of the governor-actuating motor to the valve mechanism.

25. In a pump-governor, the combination of

a connection for conveying fluid to a pump-motor; a valve mechanism for controlling the flow of actuating fluid to said motor; a connection for conveying fluid from the pump; 5 a governor-actuating mechanism comprising a motor arranged to be actuated by the pumped fluid and by the actuating fluid; a connecting mechanism for conveying the action of the governor-actuating motor to the valve mechanism. 10

26. In a pump-governor, the combination of a connection for conveying fluid to a pump-motor; a valve mechanism for controlling the flow of actuating fluid to said motor; a connection for conveying fluid from the pump; a governor-actuating mechanism comprising a motor arranged to be actuated by the pumped fluid and by the actuating fluid; a connecting mechanism for conveying the action of the 15 governor-actuating motor to the valve mechanism. 20

27. In a governor-motor, the combination of a connection for conveying an actuating fluid to a pump-motor; a valve mechanism for controlling the flow of actuating fluid to said motor; a connection for conveying fluid from the pump-intake; a governor-actuating mechanism comprising a motor arranged to be actuated by fluid-pressure from the intake and the actuating fluid; and a connecting mechanism for conveying the action of the governor-actuating motor to the valve mechanism. 25 30

28. In a pump-governor, the combination of a connection for conveying an actuating fluid to a pump-motor; a valve mechanism for controlling the flow of said fluid; a connection for conveying fluid from the pump-intake; a governor-actuating mechanism comprising a motor arranged to be actuated by fluid-pressure from the intake and the actuating fluid; and a connecting mechanism for conveying the action of the governor-actuating motor to the valve mechanism. 35 40

29. In a pump-governor, the combination of a connection for conveying fluid to a pump-motor; a valve mechanism for controlling the flow of actuating fluid; a connection for conveying fluid from the pump-intake; a governor-actuating mechanism comprising a motor arranged to be actuated by fluid-pressure from the intake and the actuating fluid; a connecting mechanism for conveying the action of the governor-actuating motor to the valve mechanism. 45 50

30. In a pump-governor, the combination of a connection for conveying an actuating fluid to a pump-motor; a valve mechanism for controlling the flow of said fluid to said motor; a connection for conveying fluid from the discharge of the pump; a connection for conveying fluid from the pump-intake; a governor-actuating mechanism comprising a motor arranged to be actuated by the pressure of the intake, discharge and actuating fluids; and a 55 60 65 connecting mechanism for conveying the ac-

tion of the governor-actuating motor to the valve mechanism.

31. In a pump-governor, the combination of a connection for conveying an actuating fluid to a pump-motor; a valve mechanism for controlling the flow of actuating fluid to said motor; a governor-actuating mechanism comprising a motor arranged to be actuated by said actuating fluid; a connecting mechanism for conveying the action of the governor-actuating motor to the valve mechanism; a connection leading from the pump; and a regulator arranged to be actuated by a maximum pressure of the pumped fluid and to operate when actuated the valve mechanism. 70 75 80

32. In a pump-governor, the combination of a connection conveying actuating fluid to a pump-motor; a valve mechanism for conveying fluid from the pump; a governor-actuating mechanism comprising a motor arranged to be actuated by the pressure of a pumped fluid and the actuating fluid; a connecting mechanism for conveying the action of the governor-actuating motor to the valve mechanism; and a regulator arranged to be actuated by the pumped fluid and to operate when actuated said valve mechanism. 85 90

33. In a pump-governor, the combination of a connection for conveying actuating fluid to a pump-motor; a valve mechanism for controlling the flow of actuating fluid to said motor; a connection for conveying fluid from the discharge of the pump; a connection for conveying fluid from a pump-intake; a governor-actuating mechanism comprising a motor arranged to be actuated by the pressure of the intake, discharge and actuating fluid; a connecting mechanism for conveying the action of the valve-motor to the valve mechanism; and a regulator arranged to be actuated by the pumped fluid and to operate when actuated the valve mechanism. 95 100 105

34. In a pump-governor, the combination with the valve mechanism; of a regulator comprising the cylinder D; connection E; the piston F, arranged in the cylinder D; the stem f , extending from the piston; the spool f'' , on said stem; the screw-threaded sleeve f^3 , on said stem; the yoke f^5 , on said sleeve; the springs f^3 , tensioned on said yoke; the lever F' ; and the pin F^2 , operated by said lever, said pin F^2 , being arranged to operate upon the valve mechanism. 110 115

35. In a pump-governor, the combination of the chamber A, having the diaphragm a , therein; the valve B, arranged to operate in said diaphragm; the frame having the base-plate C, uprights C' , C^2 , C^3 ; the arms C^4 and c' , and the plate c ; the cylinder D, arranged on the plate c ; the cylinder M, carried by the arm C^4 ; the stem b , extending from the valve B, and having the shoulder b^2 , thereon; the screw-threaded sleeve b' ; the spool L, on said sleeve; the shoulder b^3 , on said stem; the spring b^4 , arranged against said shoulder and the frame 120 125 130

and tensioned to operate the valve; the lever H, having the guide h , thereon and the end h' ; the fulcrum-block I, arranged on the guides, said block being provided with the
5 fulcrum-pin i ; the yoke J, arranged to slide in the frame, said yoke carrying the fulcrum-pin i ; a screw for operating said yoke; the piston G; the stem g ; means for securing the lever H, to the stem g ; the collar g' ; the spring
10 G' , tensioned against said collar and an adjustable collar g^2 ; the collar g^2 ; the extension g^5 , to the stem g ; the piston m' , arranged in the cylinder M; the connection m , with the actuating fluid; the connection E' , to the in-
15 take of a pump; the connection E, to the dis-

charge of a pump; the piston F, arranged in the cylinder D; the stem f , extending from said piston; the lever F' , pivoted on the arm c' , and arranged to be actuated by the stem f ; and the pin F^2 , arranged to be actuated by the
20 lever F' , and to contact the end of the stem b , when operated.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

RUDOLPH CONRADER.

Witnesses:

JUSTIN P. SLOCUM,
H. E. YARD.