

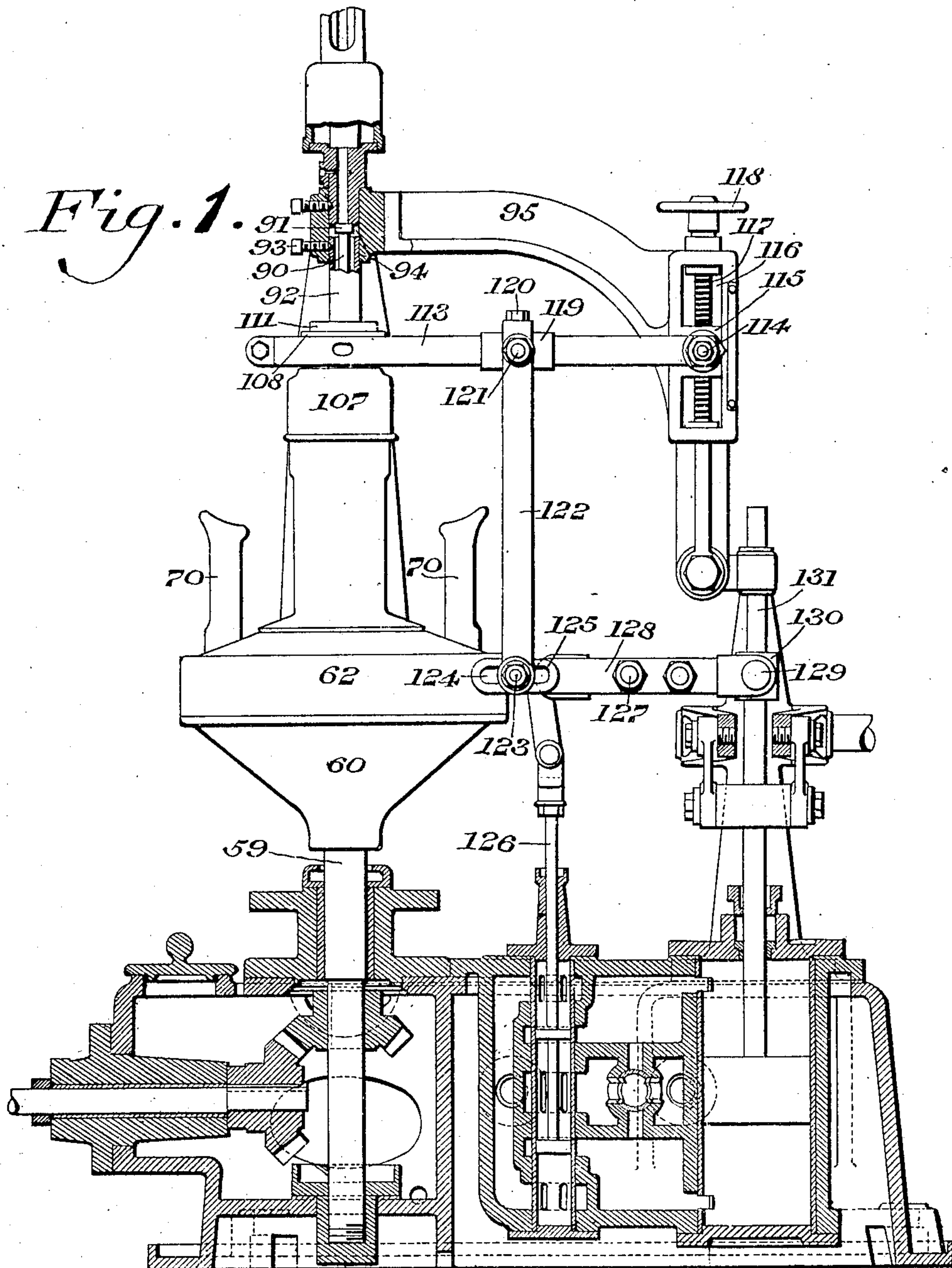
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FATENTED FEB. 4, 1908.

W. H. GLOCKER & W. M. WHITE.
GOVERNOR.

APPLICATION FILED JUNE 1, 1906.

3 SHEETS—SHEET 1.



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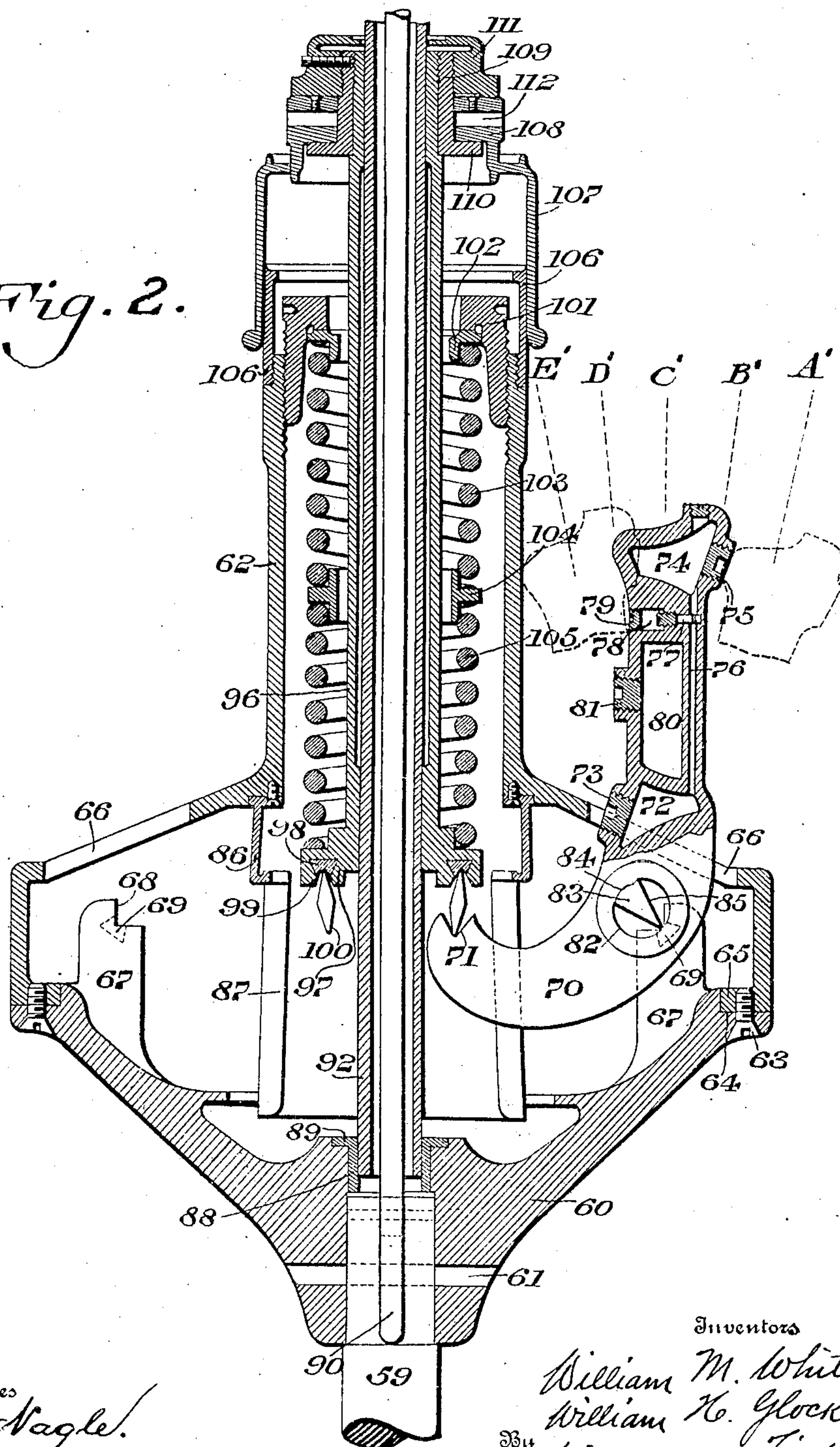
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Fig. 2.



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3 SHEETS—SHEET 3.

Fig. 4.

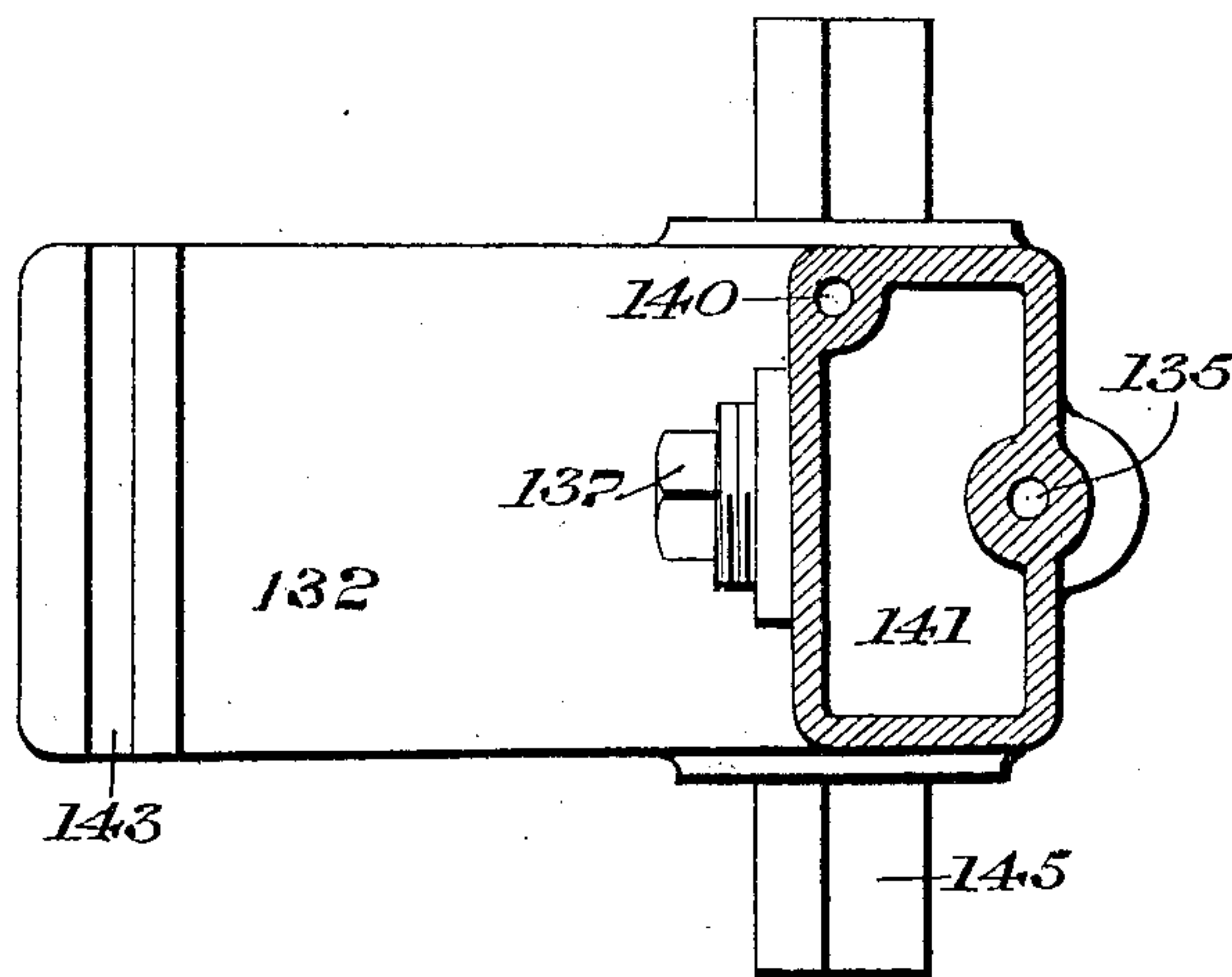
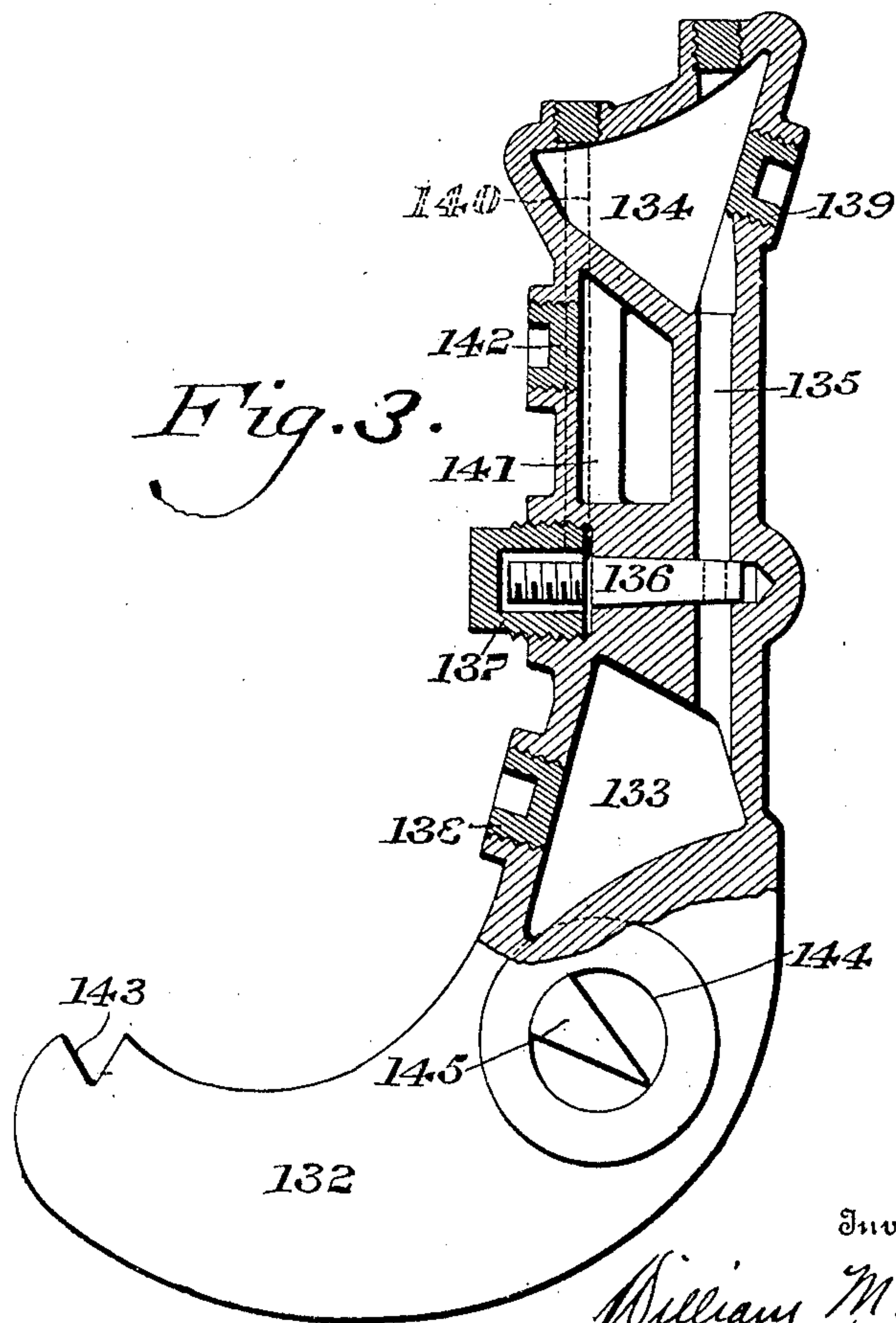


Fig. 3.



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UNITED STATES PATENT OFFICE.

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GOVERNOR.

No. 878,377.

Specification of Letters Patent.

Patented Feb. 4, 1908.

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To all whom it may concern:

Be it known that we, WILLIAM H. GLOCKER and WILLIAM M. WHITE, citizens of the United States, residing in the city and county of Philadelphia, State of Pennsylvania, have invented a new and useful Governor, of which the following is a specification.

Our present invention relates to governors and consists of a novel construction of oscillating or rocking member, the center of gravity of which is automatically varied according to the conditions and requirements and by the employment of which a constant speed may be maintained for varying loads.

Our invention further consists of a novel construction of oscillating member having a plurality of communicating liquid reservoirs, and novel means for controlling the flow of liquid from one reservoir to the other.

Our invention further consists of other novel features of construction, all as will be hereinafter fully set forth.

For the purpose of illustrating our invention, we have shown two forms of apparatus since these embodiments best illustrate the principles of the invention, although it is obvious that the principal instrumentalities of which our invention consists may be variously arranged and organized.

In the accompanying drawings we have shown the preferred embodiments thereof which we have found in practice to give satisfactory results, although it is to be understood that our invention is not limited to these specific arrangements and organizations of these instrumentalities.

Figure 1 represents a sectional elevation of a turbine engine, showing our invention operatively connected therewith. Fig. 2 represents a sectional view of a portion of Fig. 1. Fig. 3 represents a side elevation partly broken away of one of the governor arms seen in Fig. 2. Fig. 4 represents a transverse sectional view of Fig. 3.

Similar numerals of reference indicate corresponding parts in the figures.

Referring to the drawings: in Figs. 1 to 4 inclusive, we have shown the embodiment of our invention employed in conjunction with a turbine engine. The oscillating members in this embodiment form the governor arms which are provided with communicating fluid chambers or reservoirs having a valve controlled passage connecting the same whereby the flow of fluid from one chamber

to the other may be regulated as desired and in which the action of the governor is automatic, it being apparent that the broad principle of our invention is the same in all of the embodiments which we have shown. In this embodiment we employ, to actuate the valve, rocking members having reservoirs therein which are connected by a restricted passage. These rocking members are adapted to take the place of the weighted governor arms ordinarily employed for this purpose.

59 designates the governor spindle, which is adapted to be driven in any suitable manner.

60 designates a lower casing member fixed on the spindle 59, in the present instance by a key or pin passing through an aperture therein and engaging the spindle 59.

62 designates an upper casing member removably secured with respect to the lower casing 60 by means of screws or equivalent devices 63, the lower casing having an annular recess 64 within which the flange 65 of the upper casing 62 is adapted to be seated.

66 designate apertures through the casing 62.

67 designate internal ribs, flanges or supporting members carried by the casing 60 and provided with angular-shaped recesses 68, there being bearing blocks or hardened members 69 inserted or dove-tailed in the supporting members 67 at the vertices of the angles.

70 designates an oscillating or rocking member which in the present instance consists of a bent lever having at its lower end on the inner face thereof an angular-shaped recess 71.

72 designates a chamber within the member 70 having a removable plug or closure 73 having threaded or other engagement with the member 70, whereby the chamber 72 may be filled as desired.

74 designates a chamber having an aperture leading therefrom which is adapted to be closed by a plug 75 having threaded or other engagement with the member 70.

76 designates a passage communicating with the chambers 72 and 74.

In the present instance we have shown the fluid chambers in the rocking member as being on the same side of the fulcrum.

77 designates a valve member having in the present instance threaded engagement in the member 70, the end of said valve 77 be-

ing adapted to pass into the passage 76 and control the passage of fluid therethrough.

78 designates a chamber within the member 70 which is closed by means of a plug 79 having threaded or other engagement with the member 70.

80 designates a chamber within the member 70 which is closed by means of a plug 81 having threaded or other engagement with the member 70. The member 70 has an aperture 82 extending therethrough in which is adapted to be seated a triangular shaped knife edge, 83, one face of which is curved as at 84, the apex 85 being adapted to engage the hardened plate or bearing 69.

86 designates a sleeve or ring carried by the upper casing 62 and having guide slots or apertures 87 therein through which the lower ends of the rocking members 70 are adapted to extend when the parts are in assembled position.

88 designates a bushing having flanges 89, said bushing being adapted to be seated within the casing 60, the lower end thereof engaging in the present instance the upper end of the governor spindle 59.

90 designates a shaft secured in any suitable manner with respect to the governor spindle 59 and having an enlargement or set collar 91 thereon as seen in Fig. 1.

92 designates a journal sleeve or hollow member, the lower end of which has a bearing in the bushing 88, the upper end thereof being secured by means of a set screw 93 in an aperture 94 of an arm 95. The arm 95 is suitably supported on the casing of the turbine, and since the construction and operation of the turbine is well known to those skilled in the art, and forms, *per se*, no part of our present invention, we have deemed it unnecessary to describe in detail the construction and operation of the same.

96 designates a sleeve or tube movably mounted on the tube or journal 92.

97 designates a collar or enlargement carried by the sleeve 96 near its lower end and having inserted therein a hardened bearing or annular block 98, the lower face of the collar 97 having an annular groove 99 therein in order that a polygonal shaped knife member 100 may have engagement with the bearing block 98 and the angular recess 71 in the rocking member 70.

101 designates an annular ring or collar having threaded or other engagement with the upper end of the upper casing 62.

102 designates an annular ring suitably secured to the collar 101 against which one end of a spring 103 abuts, the other end of said spring abutting against a ring or washer 104.

105 designates a spring, one end of which abuts against the opposite face of the washer 104, the other end thereof engaging the inner face of the collar or enlargement 97 of the

sleeve 96. In the present instance, we have shown the springs 103 and 105 as being right and left handed.

106 designates a ring or hollow member having threaded or other engagement with the casing 62 and extending outwardly therefrom, in order to form a bearing for a depending sleeve or ring 107 carried by a clutch collar 108 which in the present instance is mounted on a bushing 109 engaging the sleeve 96 and having a flange 110 against which the inner face of the collar 108 abuts. The collar 108 is maintained in proper position with respect to the valve sleeve 96 by means of a cap 111 engaging the bushing 109 and the collar 108. The latter is provided with an annular recess 112, whereby a lever arm 113 as seen in Fig. 1 may be secured thereto in the usual manner. The other end of the lever 113 is pivoted at 114 to a block 115 movably mounted in a recess 116 in the arm 95, there being a screw 117 engaging the block 115 and provided with a suitable actuating handle 118 whereby the pivotal point 114 of the lever 113 may be raised or lowered as desired.

119 designates a block adjustably mounted on the lever 113 by means of a set screw or equivalent device 120, said block having pivoted or swiveled thereto at 121 a lever 122 having at a suitable point thereon a pin 123 which works in the slot 124 of the link 125 which is operatively connected with the valve stem 126. The link 125 is secured by means of fastening devices such as bolts and nuts 127 to a lever arm 128, which is swiveled at 129 to a block 130 mounted on a piston rod 131.

We have indicated in Fig. 2 in dotted lines the positions which the rocking member 70 will assume when the valve is entirely closed and when the valve is entirely open.

In the embodiment shown in Figs. 3 and 4, we have shown a slightly modified form of oscillating or rocking member. In this embodiment, 132 designates the rocking member, which is provided with chambers 133 and 134, which are connected by means of a restricted passage 135, the fluid passing from one chamber to the other being controlled by means of a valve 136, access to which is permitted by means of a cap or closure 137 having threaded or other engagement with the member 132. In order to fill the chamber 133, we provide a removable plug or closure 138, and in order to fill the chamber 134, we provide a removable plug or closure 139. 140 designates an air passage communicating with the chambers 133 and 134 in order that the fluid, such as mercury, will freely flow from one chamber to the other depending upon the position of the oscillating member 132. It is to be understood that the oscillating member shown in Fig. 2 is preferably provided in a like manner with an air passage,

which will permit the fluid to freely flow from one chamber to the other depending upon the position which the oscillating member 70 assumes. The embodiment shown in Fig. 3 is provided with a chamber 141, which is closed by means of a plug 142. 143 designates an angularly shaped recess with which the knife edge which co-acts with the valve sleeve 96 is adapted to engage. In this embodiment, the member 132 is apertured as seen at 144 and in this aperture a knife edge 145 is adapted to be seated in a manner similar to that already described in connection with Fig. 1.

The operation of these embodiments shown will be readily apparent to those skilled in this art. As the centrifugal force causes the governor arms to move outwardly, the fluid in the chamber 72 will be permitted to pass through the passage 76, into chamber 74, and as the speed of the governor decreases, the fluid will be permitted to pass from the chamber 74, through the passage 76 into the passage 72, or in other words from the upper chamber to the lower chamber. As the sleeve 96 is moved upwardly, the arm 113 will be carried upwardly therewith, thereby raising the arm 122 and the valve rod 126, which controls the admission of motive fluid to actuate the piston. As the speed of the governor decreases, the arms 70 will return to their normal position, which will cause the lever 113 to lower the arm 122 and thereby the valve rod 126. By means of the actuating handle 118, the pivotal point of the lever 113 may be adjusted as may be desired.

It will now be apparent that in all the embodiments we have shown an oscillating member having a plurality of communicating chambers by the employment of which the speed of the governor may be maintained constant for varying loads.

Since it is necessary that an interval of time occur between the passage of fluid from one chamber to the other in order to prevent "racing" of the engine, we employ a restricted passage communicating with the different chambers or reservoirs. By actuating the valve 77 as seen in Fig. 2 or the valve 136 as seen in Fig. 3, the passage of the fluid from one chamber to the other may be restricted or stopped as desired. For convenience of illustration, we have shown our device as being employed in conjunction with well known types of hydraulic engines, but it is to be understood that our invention may be employed in connection with any desired type of engine or governor and a constant speed for varying loads may be maintained.

It will now be apparent from the foregoing that we have produced a novel and useful construction of a governor which embodies the features of advantage enumer-

ated in the statement of invention and the above description and while we have in the present instance illustrated and described the preferred embodiments thereof, it is to be understood that they are susceptible of modification in various particulars without departing from the spirit and scope of the invention or sacrificing any of its advantages.

Having thus described our invention, what we claim as new and desire to secure by Letters Patent, is:—

1. In a speed governor, the combination of a rotatable shaft, a hollow centrifugal member pivoted thereon, said member containing liquid which under the varying centrifugal force due to variations in the speed of rotation of said shaft moves so as to shift the center of gravity of said member, and connections from said centrifugal member for varying the action of the element which controls the supply of power to the motor by which said shaft is rotated.

2. In a speed governor, the combination of a rotatable shaft, a centrifugal member containing a plurality of communicating chambers pivoted thereon, said chambers containing liquid which under the varying centrifugal force due to the variations in the speed of rotation of said shaft passes from one chamber to another to shift the center of gravity of said member, and connections from said centrifugal member for varying the action of the element which controls the supply of power to the motor by which said shaft is rotated.

3. In a speed governor, the combination of a rotatable shaft, a hollow centrifugal member pivoted thereon, said member containing liquid which under the varying centrifugal force due to variations in the speed of rotation of said shaft moves so as to shift the center of gravity of said member, and connections from said centrifugal member for varying the action of the element which controls the supply of power to the motor by which said shaft is rotated.

4. In a speed governor, the combination of a rotatable shaft, a centrifugal member containing a plurality of communicating chambers pivoted thereon; said chambers containing liquid which under the varying centrifugal force due to the variations in the speed of rotation of said shaft passes from one chamber to another to shift the center of gravity of said member, and connections from said centrifugal member for varying the action of the element which controls the supply of power to the motor by which said shaft is rotated.

5. In a speed governor, the combination of a rotatable shaft, a centrifugal member containing a plurality of communicating chambers pivoted thereon, said chambers being both upon one side of the fulcrum of said member and containing liquid which

under the varying centrifugal force due to the variations in the speed of rotation of said shaft passes from one chamber to another to shift the center of gravity of said member, and connections from said centrifugal member for varying the action of the element which controls the supply of power to the motor by which said shaft is rotated.

6. In a speed governor, the combination of a rotatable shaft, a centrifugal member containing a plurality of communicating chambers pivoted thereon, said chambers being both upon one side of the fulcrum of said member and containing liquid which under the varying centrifugal force due to the variations in the speed of rotation of said shaft passes from one chamber to another to shift the center of gravity of said member, connections from said centrifugal member for varying the action of the element which controls the supply of power to the motor by which said shaft is rotated, said connections including a spring pressed member supported by the centrifugal member upon the opposite side of its fulcrum from the chambers.

7. In a speed governor, the combination of a rotatable shaft, a centrifugal member containing a plurality of communicating chambers pivoted thereon, said chambers containing liquid which under the varying centrifugal force due to the variations in the speed of rotation of said shaft passes from one chamber to another to shift the center of gravity of said member, and connections from said centrifugal member for varying the action of the element which controls the supply of power to the motor by which said shaft is rotated, the pivot of said centrifugal member comprising a knife edge disposed within the body of said member.

8. In a speed governor, the combination of a rotatable shaft, a centrifugal member containing a plurality of communicating chambers pivoted thereon, said chambers containing liquid which under the varying centrifugal force due to the variations in the speed of rotation of said shaft passes from one chamber to another to shift the center of gravity of said member, connections from said centrifugal member for varying the action of the element which controls the supply of power to the motor by which the said shaft is rotated, the pivot of said centrifugal member comprising a knife edge disposed within the body of said means, and a valve within said member controlling the communication between its chambers.

9. In a device of the character described, a rocking member having a plurality of fluid-containing chambers movable therewith and communicating with each other, a chamber intermediate said chambers, a valve mechanism operatively connected with said member, a knife edge within the body of said

member and on which the said member is fulcrumed, a governor spindle, a casing fixed thereon, and a bearing within said casing on which said knife edge is supported.

10. In a device of the character described, a rocking member having a plurality of fluid-containing chambers movable therewith and communicating with each other, a chamber intermediate said chambers, a valve mechanism operatively connected with said member, said fluid-containing chambers being both upon one side of the fulcrum of said member, a knife edge within the body of said member and on which the said member is fulcrumed, a governor spindle, a casing fixed thereon, and a bearing within said casing on which said knife edge is supported.

11. In a device of the character described, a rocking member having a plurality of fluid-containing members movable therewith and communicating with each other, a chamber intermediate said chambers, a valve mechanism operatively connected with said member, a valve within said member controlling the communication between said fluid-containing chambers, a knife edge within the body of said member and on which the said member is fulcrumed, a governor spindle, a casing fixed thereon, and a bearing on which said knife edge is supported.

12. In a device of the character described, a rocking member having a plurality of fluid-containing chambers movable therewith and communicating with each other, a chamber intermediate said chambers, a valve mechanism operatively connected with said member, a valve within said member controlling the communication between said fluid-containing chambers, said fluid-containing chambers being both upon one side of the fulcrum of said member, a knife edge within the body of said member and on which the said member is fulcrumed, a governor spindle, a casing fixed thereon, and a bearing within said casing on which said knife edge is supported.

13. In a device of the character described, a rocking member having a plurality of fluid-containing chambers movable therewith and communicating with each other, a chamber intermediate said chambers, a valve mechanism operatively connected with said member, said fluid-containing chambers being both upon one side of the fulcrum of said member, a valve within said member controlling the communication between said fluid-containing chambers, a knife edge within the body of said member and on which the said member is fulcrumed, a governor spindle, a casing fixed thereon, and a bearing within said casing on which said knife edge is supported.

14. In a device of the character described, a rocking member having a plurality of fluid-containing chambers movable therewith and communicating with each other, a chamber

intermediate said chambers, a valve mechanism operatively connected with said member, a knife edge within the body of said member and on which the said member is fulcrumed, a governor spindle, a casing fixed thereon, a bearing within said casing on which said knife edge is supported, and a spring-pressed member engaged by the other end of said member.

10 15. In a device of the character described, a rocking member having a plurality of fluid-containing chambers movable therewith and communicating with each other, a chamber intermediate said chambers, a valve mechanism operatively connected with said member, a knife edge within the body of said member and on which the said member is fulcrumed, a governor spindle, a casing fixed thereon, a bearing within said casing on which said knife edge is supported, and a slotted ring in said casing through the slot of which said member extends.

16. In a device of the character described, a rocking member having a plurality of fluid-containing chambers movable therewith and communicating with each other, a chamber intermediate said chambers, a valve mechanism operatively connected with said member, said fluid-containing chambers being both upon one side of the fulcrum of said member, a knife edge within the body of said member and on which the said member is fulcrumed, a governor spindle, a casing fixed thereon, a bearing within said casing on which said knife edge is supported, and a slotted ring in said casing through the slot of which said member extends.

17. In a device of the character described, a rocking member having a plurality of fluid-containing members movable therewith and communicating with each other, a chamber intermediate said chambers, a valve mechanism operatively connected with said member, a valve within said member controlling the communication between said fluid-containing chambers, a knife edge within the body of said member and on which the said member is fulcrumed, a governor spindle, a casing fixed thereon, a bearing on which said knife edge is supported, and a slotted ring in said casing through the slot of which said member extends.

18. In a device of the character described, a rocking member having a plurality of fluid-containing chambers movable therewith and communicating with each other, a chamber intermediate said chambers, a valve mechanism operatively connected with said member, a valve within said member controlling the communication between said fluid-containing chambers, said fluid-containing chambers being both upon one side of the fulcrum of said member, a knife edge within the body of said member and on which the said member is fulcrumed, a governor spindle, a casing

fixed thereon, a bearing within said casing on which said knife edge is supported, and a slotted ring in said casing through the slot of which said member extends.

19. In a device of the character described, a rocking member having a plurality of fluid-containing chambers movable therewith and communicating with each other, a chamber intermediate said chambers, a valve mechanism operatively connected with said member, said fluid-containing chambers being both upon one side of the fulcrum of said member, a valve within said member controlling the communication between said fluid-containing chambers, a knife edge within the body of said member and on which the said member is fulcrumed, a governor spindle, a casing fixed thereon, a bearing within said casing on which said knife edge is supported, and a slotted ring in said casing through the slot of which said member extends.

20. In a device of the character described, a rocking member having a plurality of fluid-containing chambers movable therewith and communicating with each other, a chamber intermediate said chambers, a valve mechanism operatively connected with said member, a knife edge within the body of said member and on which the said member is fulcrumed, a governor spindle, a casing fixed thereon, a bearing within said casing on which said knife edge is supported, a spring-pressed member engaged by the other end of said member, and a slotted ring in said casing through the slot of which said member extends.

21. In a device of the character described, a rocking member having a plurality of chambers therein on one side of the fulcrum, there being a passage communicating with said chambers, a chamber intermediate said chambers, a valve adapted to control said passage, and a valve sleeve operatively connected with said member actuated thereby said member containing liquid which under the varying centrifugal force due to variations in the speed of rotation moves to shift the center of gravity of said member.

22. In a device of the character described, a rocking member having a plurality of fluid-containing chambers carried thereby, there being a passage communicating with said chambers, a valve adapted to control said passage, there being a chamber located intermediate said fluid-containing chambers, a closure therefor, and a valve mechanism operatively connected with said member.

23. In a device of the character described, a spindle, a casing carried thereby, a rocking member having an aperture therethrough, a knife edge mounted within said aperture, a supporting flange carried by said casing and engaging said knife edge, said member having a plurality of communicating fluid con-

taining chambers, there being a plurality of passages communicating with said chambers, a chamber intermediate said chamber a valve in said intermediate chamber adapted to control said passage, and a valve mechanism operatively connected with said member.

24. In a device of the character described, a spindle, an apertured casing carried there-
10 by, provided with internal supporting flanges, rocking members within said casing and extending through the apertures thereof, knife edges engaging said apertures and said supporting flanges, there being a plural-
15 ity of communicating fluid containing chambers carried by said member and connected by a plurality of passages, a valve adapted to control one of said passages, a journal bushing non-rotatably mounted within said
20 casing, a sleeve having sliding engagement therewith, a knife edge intermediate said sleeve and said members, and means co-acting with said sleeve to actuate the valve mechanism of the engine.

25. In a device of the character described, 25
a spindle, an apertured casing secured there-
to and provided with supporting flanges, ap-
ertured rocking members within said casing
and extending through the apertures of said
casing, knife edges mounted within the aper- 30
tures of said members and engaging said
flanges, there being a plurality of communi-
cating fluid containing chambers carried by
said member and provided with a plurality
of passages communicating therewith, a 35
valve adapted to control one of said pas-
sages, a journal bushing non - rotatably
mounted within said casing, a sleeve mount-
ed on said bushing, an internal cap carried
by said casing, a spring interposed between 40
said cap and the inner end of said sleeve, and
a knife edge engaging said sleeve and said
rocking member.

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