

No. 830,291.

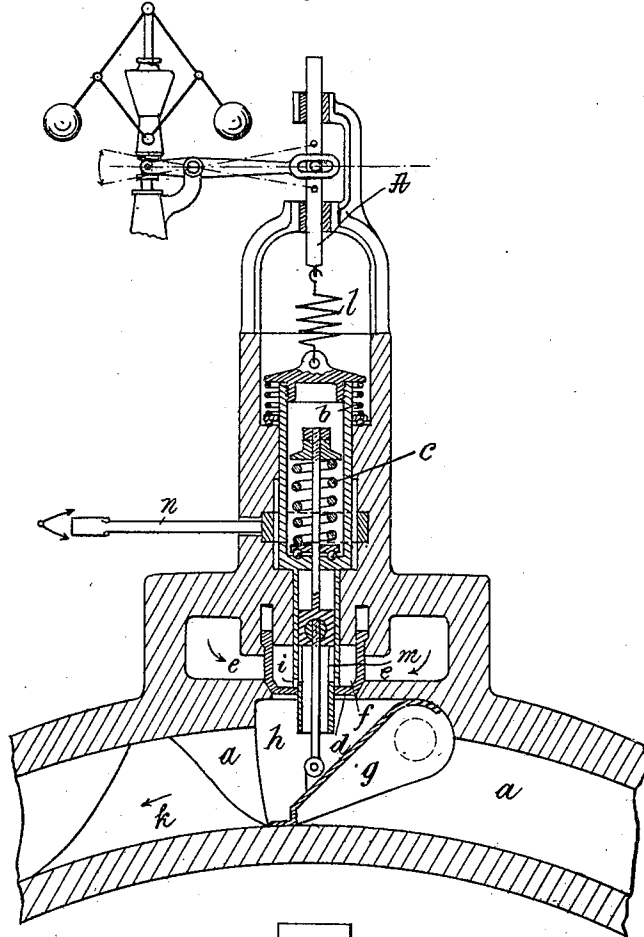
PATENTED SEPT. 4, 1906.

P. BERGER.

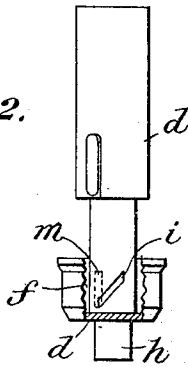
DEVICE FOR DISTRIBUTING STEAM IN ROTARY ENGINES.

APPLICATION FILED FEB. 7, 1906.

*Fig. 1.*



*Fig. 2.*



Witnesses:  
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# UNITED STATES PATENT OFFICE.

PAUL BERGER, OF DUISBURG, GERMANY.

## DEVICE FOR DISTRIBUTING STEAM IN ROTARY ENGINES.

No. 830,291.

Specification of Letters Patent.

Patented Sept. 4, 1906.

Application filed February 7, 1906. Serial No. 299,942.

*To all whom it may concern:*

Be it known that I, PAUL BERGER, mechanical engineer, a subject of the German Emperor, residing at 1 Kettenstrasse, Duisburg, Germany, have invented new and useful Improvements in Devices for Distributing Steam or the Like in Rotary Engines, of which the following is a specification.

The subject of my invention is a device for distributing steam or other pressure agent on its entrance into high-speed engines with rotary piston.

In high-speed engines, whether having reciprocating or rotary piston, the use of valve-gear is generally impracticable, since the necessary increase in speed of the valves with increasing number of revolutions requires such high accelerating forces that the mechanical efficiency, for instance, of steam-engines, is unduly lowered. According to my invention, this difficulty is overcome by the forces required for accelerating the valve parts being diminished as far as possible and by suitable distribution of steam being brought about through the acceleration. The power is economized by the dimensions of all parts being kept as small as the conditions of strength and the required acceleration times allow, and by the actuating mechanism, such as is employed in nearly all well-known gears, being dispensed with, and thus the power necessary for their acceleration saved. Opening and closing of the valve is effected automatically by steam-pressure and springs; regulation of the expansion, in consequence of change of the acceleration forces and times, by the governor.

The invention is illustrated in the accompanying drawings, in which—

Figure 1 is a vertical section of the gear, and Fig. 2 an elevation and part section of the valve seen at right angles to Fig. 1.

The action of the gear is as follows: The steam entering through the annular passage *e*, in the open position of the valve, presses upon the flap *g*, which controls the steam-inlet to the cylinder *a*. Owing to this steam-pressure, the flap *g*, hitherto held closed by the springs *b c*, will be opened with great rapidity and in its end position shuts off the cylinder *a* just after the piston *k* has passed the flap. During this procedure the valve *d*, in consequence of the steam-pressure acting upon its lower face, remains at first open and allows steam to enter the cylinder behind the piston. At the same time the spring *c* will

be put in a state of tension and will exercise its closing action on the valve *d* at the same moment in which this valve *d* is balanced by steam entering the space *f*. This balancing of the valve takes place, owing to the apertures *m* in the hollow head *h*, Figs. 1 and 2, during opening of the flap *g* coming in front of the slanting slots *i* in the valve *d*, and thereby presenting to the steam passing through the head *h* a passage into the interior of the valve *d*. This opening of the slanting slots *i* takes place similarly, as in the well-known Rider slide-valve, the exact moment depending upon the position which the slots *i* occupy relatively to the apertures *m*. This relative position, however, can be altered by means of the governor, which, engaging the lever *n*, causes the valve *d* to turn on its axis, so that simultaneously with variation of the moment of balancing the valve the steam is cut off earlier or later, whereby alteration in the expansion is effected. Furthermore, the closing of the valve also depends upon the tension of the springs *b c*. In order to allow an increase or decrease of the tension of the said springs, the spring *l*, adapted to act against the latter, is suspended from a point *A*, which is under control of the governor. When the speed of the engine increases, the governor will cause the suspension-point *A* of the spring *l* to descend, thereby decreasing the tension of the expanded spring *l*. In consequence thereof the tension of the spring *c*, that is entirely or partly released, will be increased and cause a more rapid closure of the valve *d*. When the speed of the engine diminishes, the contrary will take place.

Since the forces that come in consideration are small, it is possible to use the same governor to simultaneously impart the desired rotation to the lever *n*.

The masses and forces are so adjusted that the valve on being balanced, in consequence of the difference in the acceleration times which the flap *g* requires for full-opening and the valve itself for closing, cuts off the steam at the exact moment in which the volume of steam required for the time being for expansion has entered the cylinder.

The steam which has entered the cylinder during this period now expanding drives the piston *k* before it until the pressure of the steam has sunk so far at the end of the stroke that the spring *c* again begins to close the flap *g*. At the same moment the steam-outlet is opened, so that the steam-pressure in

the cylinder-space *a* and in the inner space *f* of the valve *d*, sinks to the exhaust-pressure and the spring *b* fully opens the valve *d*. At the same time the piston *k* passes the flap and the procedure commences anew.

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

1. In combination with a rotary-piston cylinder presenting an annular steam-channel, a spring-controlled valve closing the passage between the said channel and the cylinder-space, a hollow spring-controlled head sliding within the valve and possessing slots adapted to register to a greater or less extent with slots in the said rotary valve-body a valve actuated by the said head and controlling the cylinder-space, and a governor controlling the said springs, all operating substantially as and for the purposes set forth.

2. In combination with a rotary-piston

cylindr presenting an annular steam-channel, a spring-controlled valve closing the passage between the said channel and the cylinder-space, a hollow spring-controlled head sliding within the valve and possessing slots adapted to register to a greater or less extent with slots in the rotary valve-body, a valve actuated by the said head and controlling the cylinder-space, and a governor controlling the said springs and adapted to turn the said perforated valve-body on its axis relatively to the perforated head, all operating substantially as and for the pupose set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

PAUL BERGER.

Witnesses:

PETER LIEBER,  
EMMA HERBER.