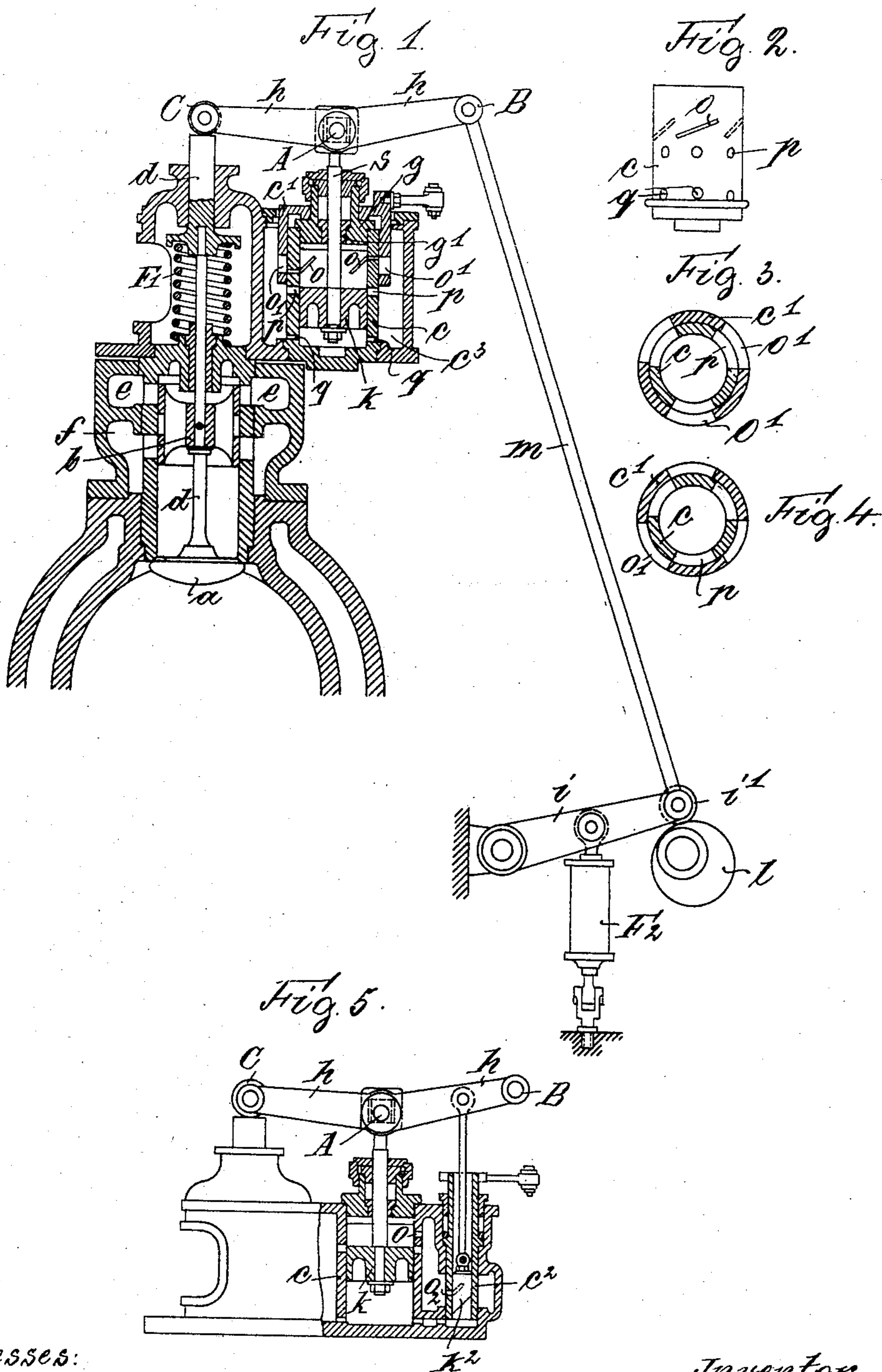


No. 781,160.

PATENTED JAN. 31, 1905.

K. REINHARDT.
REGULATING DEVICE FOR EXPLOSION MOTORS.
APPLICATION FILED OCT. 17, 1903.



Witnesses:
Emil Thaysen
Max Wecker

Inventor:
Karl Reinhardt
by *Alfred J. P. L.*
Attorneys.

UNITED STATES PATENT OFFICE.

KARL REINHARDT, OF DORTMUND, GERMANY.

REGULATING DEVICE FOR EXPLOSION-MOTORS.

SPECIFICATION forming part of Letters Patent No. 781,160, dated January 31, 1905.

Application filed October 17, 1903. Serial No. 177,442.

To all whom it may concern:

Be it known that I, KARL REINHARDT, a subject of the King of Prussia, German Emperor, and a resident of 36 Arndtstrassé, Dortmund, in the Province of Westphalia, German Empire, have invented a new and useful Regulating Device for Explosion-Motors, of which the following is an exact specification.

My invention relates to a regulating device for explosion-motors, and more especially to a device for regulating the movement of the inlet-valve; and it has for its purpose to provide a mechanism by means of which the stroke of the valve, as well as the time during which the valve is opened, can be regulated without any back pressure upon the governor being exercised. I attain this purpose by arranging a lever for moving the valve-spindle, the pivot of which lever can be moved by means of a piston situated in a cylinder filled with oil, the quantity of oil in the cylinder being regulated by means of the governor.

In order to make my invention more clear, I refer to the accompanying drawings, in which—

Figure 1 is a vertical section of the principal parts of my new construction. Fig. 2 is a detail view of the cylinder filled with oil. Figs. 3 and 4 are horizontal sections of the oil-cylinder and a turnable cylinder situated around the same. Fig. 5 is a modification of the construction shown in Figs. 1 to 4.

In the drawings, *a* is the inlet-valve of an explosion-motor.

d is the valve-spindle. To the valve-spindle *d* a valve-piston *b* is fixed, by the movement of which the gas and air situated in the channels *e* and *f* are allowed to pass into the space above the valve *a* and from there into the cylinder. The regulating is effected in that way that according to the position of the governor the stroke of the valve and of the piston is enlarged or diminished, thereby more or less throttling the quantity of the explosive-gas mixture entering into the cylinder. The stroke of the inlet-valve is regulated, according to the present invention, by adjusting the pivot A of the lever *h*, moving the valve-spindle *d*. The pivot A is situated at the end of the

piston-rod *s* of the piston *k*. This piston *k* is situated in a cylinder *c*, filled with oil.

The cylinder *c* is provided with slots *o* and with a cover *g*, through which passes the piston-rod *s*, a stuffing-box *g'* being provided for packing the piston-rod. Around the cylinder *c* a cylinder *c'* is situated, which is provided with corresponding slots *o'*. This cylinder *c'* can be turned by means of the governor, thereby more or less opening the slots *o* of the cylinder *c*. *i* is a lever moved by means of a cam *l*. The lever *i* is connected, by means of the connecting-rod *m*, to the end B of the lever *h*. At the other end of this lever *h* a roller C is provided, which roller is situated upon the valve-spindle *d*.

F' is a spiral spring which tends to close the valve *a*—that is to say, to press the valve-spindle *d* upward. The spring F' consequently tends to press the pivot A of the lever *h* upward, thereby pressing the oil situated above the piston *k* through the slots *o* and *o'*.

If the cylinder *c'* is turned by means of the governor, and the openings *o* are consequently more or less opened, the piston *k* will find more or less resistance in pressing the oil through the openings, and consequently the pivot A will be more or less raised—that is to say, the roller C will be pressed more or less downward.

If the rod *m* moves downward, the spiral spring F' effects, even in case the pivot A still moves upward, a turning of the lever *h* around the pivot A, so that not only the quantity of gas is more or less throttled by the position of the pivot A, but also the closing of the valve takes place earlier or later. After the valve is closed a spring F² effects that the roller *i'* of the lever *i* is always pressed upon the cam *l*, thereby pressing the piston *k* downward. By the piston *k* being pressed downward the oil situated underneath the piston is pressed through the openings *g* into the space *c³* around the cylinders *c* and *c'*. If the piston *k* is in its lowest position, the openings *p* are open, so that the space above the piston *k* can fill again with oil.

The modification shown in Fig. 5 differs

from the construction above described by the cylinder c' being replaced by a cylinder c^2 , situated at the side of the cylinder c . The cylinder c^2 is also turned by means of the governor and is provided with an inclined slot o^2 . In the cylinder c^2 a piston k^2 , moved by means of the lever h , is situated, the lower surface of said piston being inclined. If the end B of the lever h begins its upward movement, the opening o^2 is closed by means of the piston k^2 . The oil situated above the piston k can consequently not escape through the openings o and o^2 —that is to say, the pivot A cannot be moved and the inlet-valve will consequently be opened. As soon as by the upward movement of the end B of the lever h the piston k^2 begins to open the opening o^2 the oil situated above the piston k can escape. From this moment the pivot A will raise and the inlet-valve will begin to close. After the inlet-valve being closed both pistons move downward again and the cylinders are filled again with oil.

In both constructions it is attained by the arrangement of the oil-cataracts that the stroke of the inlet-valve as well as the time during which the same is opened are regulated by means of the governor without any back pressure upon this governor being exercised.

Having thus fully described the nature of my invention, what I desire to secure by Letters Patent of the United States is—

1. In a regulating device for explosion-motors, the combination of a gas-inlet valve, a valve-piston fixed to the spindle of said inlet-valve, a lever for moving the valve-spindle, a cylinder filled with oil, a piston situated within said cylinder, the lever mentioned above

being pivoted in the piston-rod of this piston, openings provided in said oil-cylinder and means for regulating the passing of oil through said openings, substantially as described and for the purpose set forth.

2. In a regulating device for explosion-motors, the combination of a gas-inlet valve, a valve-piston fixed to the spindle of said inlet-valve, a lever for moving the valve-spindle, a cylinder filled with oil, a piston situated within said cylinder, the lever mentioned above being pivoted in the piston-rod of this piston, a second cylinder, openings provided in said second cylinder, and means for regulating the passage of the openings of said second cylinder, thereby regulating the passing of oil through the openings of the first-mentioned cylinder, substantially as described and for the purpose set forth.

3. In a regulating device for explosion-motors, the combination of a gas-inlet valve, a valve-piston fixed to the spindle of said inlet-valve, a lever for moving the valve-spindle, a cylinder filled with oil, a piston situated within said cylinder, the lever mentioned above being pivoted in the piston-rod of this piston, a second cylinder, openings provided in said second cylinder, means for turning the latter thereby regulating the passing of oil through the openings of the first-mentioned cylinder, substantially as described and for the purpose set forth.

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

KARL REINHARDT.

Witnesses:

WILLIAM ESSENWEIN,
PETER LIEBER.