No. 808,549. PATENTED DEC. 26, 1905.

C. KOERNER.

GOVERNING DEVICE FOR MOTORS.

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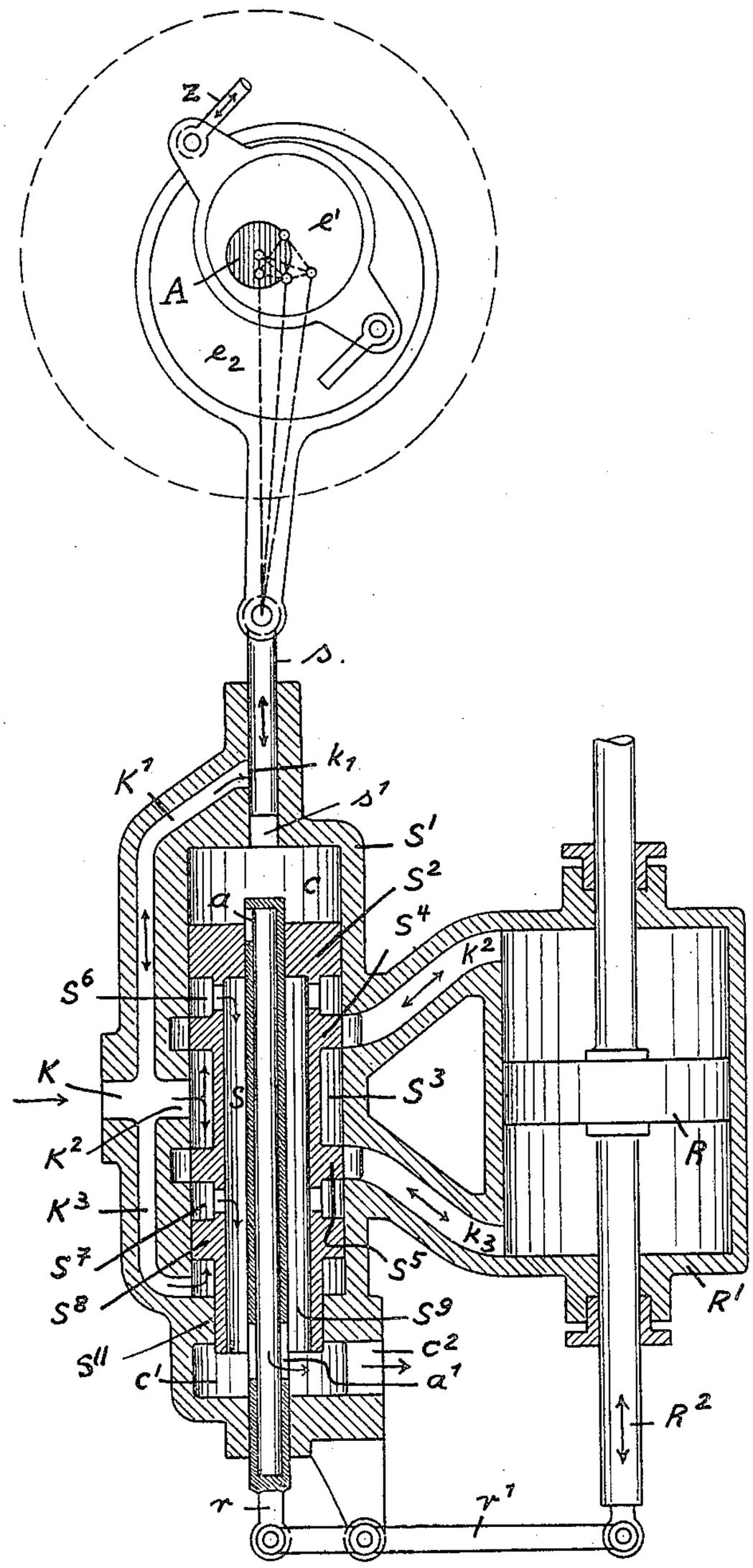

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UNITED STATES PATENT OFFICE.

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GOVERNING DEVICE FOR MOTORS.

No. 808,549. Specification of Letters Patent. Patented Dec. 26, 1905.

Application filed August 10, 1905. Serial No. 273,639.

To all whom it may concern:

Be it known that I, CAMILLO KOERNER, engineer, a subject of the Emperor of Austria-Hungary, residing at Prague, in the Kingdom of Bohemia and Empire of Austria-Hungary, have invented certain new and useful Improvements in Governing Devices for Motors; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to governing devices for motors, more particularly for hydraulic motors, such as turbines, and has for its object to provide a simple, efficient, and very sensitive mechanism of this kind.

In the accompanying drawing an elevation, partly in section, of the improved governing device is shown.

A is the governor-shaft. e' is an eccentric carried by the same and actuated by a governor (not shown) on such shaft through the medium of links z in such a manner that it is turned round the said shaft when the speed of the latter varies. e^2 is a second eccentric carried by the eccentric e' and provided with strap connected to a plunger s, working in a cylindrical bore s' of a valve-casing S'. When the eccentric e' is turned round the shaft A, owing to a change in the speed of the governor-shaft, it carries round with it the eccentric e^2, thereby varying the eccentricity of the latter relatively to the governor-shaft A, and hence also the stroke of the plunger s in the same sense—that is to say, such stroke increases and decreases as the speed of the governor-shaft increases or decreases, respectively.

I wish it to be understood that I do not limit myself to the above-described mechanism for varying the stroke of the plunger s, as I may use any mechanism by which the stroke of this plunger is varied in the same sense as the speed of the governor-shaft.

The bore s' leads into a chamber c in the valve-casing S' at one side of a slide-valve S, working in such valve-casing, and c' is a chamber in the valve-casing at the other side of the slide-valve. The latter chamber is in permanently open connection with an exhaust-port c^2. r is a hollow rod guided in the valve-casing S' and provided with lateral openings or slots a a' near its top and bottom end, respectively. The slide-valve S is freely movable along the rod r and is provided with a head-plate S^2, tightly fitting this rod near its top end.

K is a part in the valve-casing through which liquid under pressure is admitted from a suitable reservoir (not shown) into a channel K', leading to a port k' in the bore s' to a port K^2, opposite an annular groove S^3 in the slide-valve located between two collars S^4 S^5. S^6 S^7 are two annular grooves in the slide-valve between the collar S^4 and the head S' and between the collar S^5 and a collar S^8 of the slide-valve. These annular grooves are provided with ports leading to the central chamber S^9 of the slide-valve, which chamber is open toward the chamber c'.

K^3 is a channel leading from the port K to the under side of the collar.

S^8 and S^{10} represent the lower cylindrical end of the slide-valve, turned down to a smaller diameter than the collar S^8 and snugly fitting an inwardly-projecting collar S^{11} in the valve-casing. Channels k^2 and k^3 of the valve-casing lead to the upper and lower chamber of a cylinder R', respectively, in which works a piston R, the rod R^2 of which is connected by a lever r', pivoted to the valve-casing with the rod r, and, on the other hand, may be connected in any convenient manner to a suitable mechanism for controlling the speed of the motor, such as a hatch or throttle-valve or the like.

The operation of this governing device is the following: When the governor-shaft revolves, the plunger s is reciprocated in the bore s', and thereby forces liquid supplied from a suitable reservoir through port K, channel K', and port k' into the chamber c. This liquid escapes through slot or slots a, the hollow rod r, slot or slots a', and the chamber c' to the exhaust-port c^2. In the normal state—that is to say, when the position of the slide-valve and the rod r is exactly that corresponding to the speed of the governor-shaft—the quantity of liquid forced into the chamber c by the plunger s per unit of time (which, all other things being equal, is proportional to the length of the stroke of the piston s) is exactly the same as the quantity of liquid escaping through the exhaust-port k^2. Now if the speed of the governor-shaft increases the eccentrics e' e^2 are turned round the shaft A, whereby the eccentricity of the latter relatively to this shaft, and hence also the stroke of the plunger s, is increased. Therefore a larger quantity of liquid will be forced into the chamber c in a

given time than can escape therefrom in the same time, and consequently the slide-valve S will be forced downward. By this the area of the slot or slots *a* left uncovered by the head S^2 of the slide-valve, and therefore also the quantity of liquid escaping through the same, is increased, while at the same time liquid under pressure is permitted to enter into the cylinder R′ below the piston R from ports K and K^2 through the annular groove S^3 and k^2, while liquid from the cylinder-chamber above the piston is permitted to escape through port k^2, annular groove S^6, and the central chamber S^9 of the slide-valve. Thus the piston R is caused to move downward, thereby operating in any convenient manner the admission-controlling mechanism to diminish the speed of the motor; but as the piston R moves downward the rod *r* is moved upward, thereby still further increasing the free area of the slot or slots *a* in the rod *r*, and this results in a diminution of the pressure of the liquid on the upper side of the head S^2, so that the slide-valve is raised by the pressure of the liquid coming from the reservoir and acting against the under side of the collar S^8 until the free area of the slot or slots *a* has been reduced so far that the fluid escapes as rapidly from chamber *c′* as it is forced into the chamber *c*, and its collars S^4 S^5 again close the ports k^2 k^3. When the speed of the governor-shaft decreases, the stroke of the plunger *s* diminishes, and a smaller quantity of liquid is forced into the chamber *c* than escapes through port c^2. The liquid-pressure acting against the under side of the collar S^8 raises the slide-valve, so that liquid is permitted to enter into the cylinder R′ above the piston R through ports K K^2, groove S^3, and port k^2 and to escape from below the piston R through port k^3, groove S^7, and central chamber S^9. The piston R then moves upward and operates to cause the speed of the motor to be increased and at the same time causes the rod *r* to move downward, whereby the free area of the slot or slots *a* is diminished, so that the pressure in the chamber *c* increases, whereby the slide-valve is forced downward into its normal position. Thus in either case the slide-valve is returned automatically into its normal position without being connected to the governor by special gearing, so that such gearing is dispensed with and its necessary reaction upon the governor is avoided, which is a great advantage over the governing devices of this class as heretofore constructed. Moreover, the governing device above described is very sensitive, because the slight periodical variations of pressure in the chamber *c* assist in overcoming any friction.

The connection between the piston-rod R^2 and the hollow rod *r* by the lever *r′* may be dispensed with without departing from the essence of my invention. In this case if the slide-valve S is shifted in either direction owing to a variation in the speed of the shaft A it will remain in this position until by the reverse variation of the speed of the governor-shaft caused by the operation of the piston R the stroke of the plunger *s* has been brought to the normal length, when the slide-valve, too, is returned to its normal position by the difference of pressures on the head S^2 and on the under side of the collar S^8, respectively. By connecting the hollow rod *r* with the piston the action is rendered more rapid.

I claim—

1. In combination with a valve-casing, a slide-valve in such casing, a chamber in such casing at one end of the slide-valve, a cylindrical bore leading into such chamber, a plunger working in such bore, a shaft for operating such plunger and means for varying the stroke of said plunger in accordance with the variations of speed of an exhaust-chamber in the valve-casing at the other end of the slide-valve a hollow rod tightly passing through the slide-valve and provided with two sets of slots leading to the two chambers respectively, a head at one end of the slide-valve, a collar near the other end of the slide-valve such end projecting from the said collar being smaller in diameter than the said collar, grooves and further collars on the said slide-valve between the head and the first-named collar, a source of liquid under pressure and ports and chambers in the said valve-casing connecting such source with a port leading to the aforesaid bore with a port opposite the said end of the said slide-valve and with a port between these two last-named ports, a cylinder, ports in the valve-casing connected to the two ends of such cylinder and adapted to be controlled by the said grooves and further collars on the slide-valve, a piston working in the said cylinder and means operated by such piston for controlling the speed of a motor driving the said shaft substantially as and for the purpose described.

2. In combination with a valve-casing, a slide-valve in such casing, a chamber, in such casing at one end of the slide-valve, a cylindrical bore leading into such chamber, a plunger working in such bore, a shaft for operating such plunger, and means for varying the stroke of said plunger in accordance with the variations of speed of such shaft an exhaust-chamber in the valve-casing at the other end of the slide-valve, a hollow rod tightly passing through the slide-valve and provided with two sets of slots leading to the two chambers respectively a head at one end of the slide-valve, a collar near the other end of the slide-valve, such end projecting from the said collar being smaller in diameter than the said collar, grooves and further collars on the said slide-valve between the head and

the first-named collar, a source of liquid under pressure and ports and channels in the said valve-casing connecting such source with a port leading to the aforesaid bore with a port opposite the said end of the slide-valve and with a port between these two last-named ports, a cylinder, ports in the valve-casing connected to the two ends of such cylinder and adapted to be controlled by the said grooves and further collars on the slide-valve, a piston working in such cylinder means operated by such piston for controlling the speed of a motor driving the said shaft and means for connecting such piston with the said hollow rod, substantially as and for the purpose described.

In testimony whereof I affix my signature in presence of two witnesses.

CAMILLO KOERNER.

Witnesses:

EMIL MAURER,

ADOLPH FISCHER.