C. MARTENS.

RECIPROCATING ENGINE.

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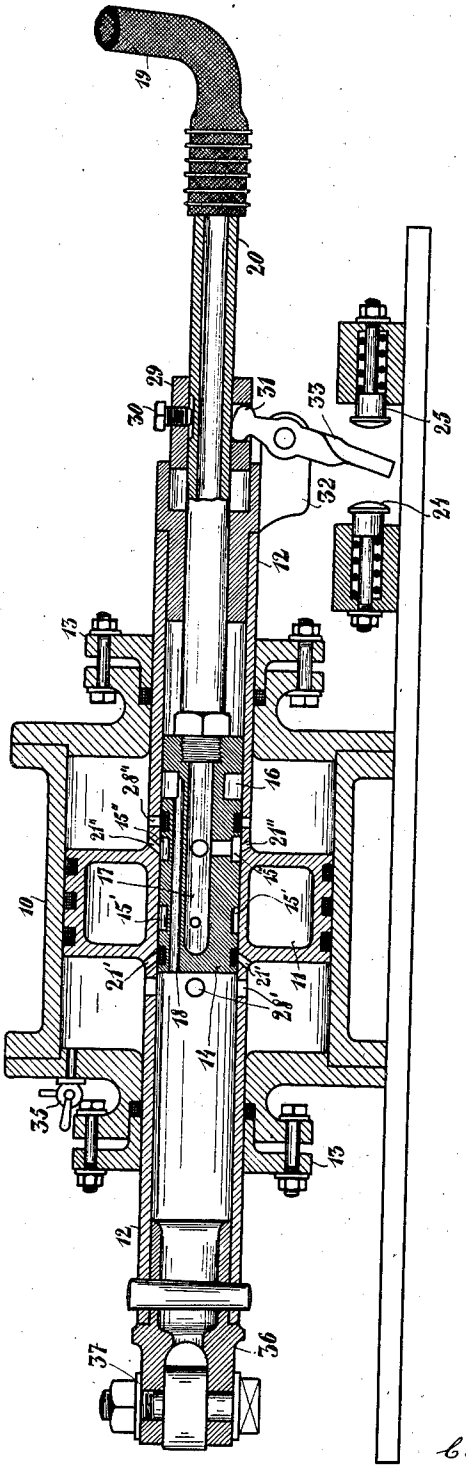


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# UNITED STATES PATENT OFFICE.

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## RECIPROCATING ENGINE.

1,032,689. Specification of Letters Patent. Patented July 16, 1912.

Application filed September 15, 1911. Serial No. 649,454.

*To all whom it may concern:*

Be it known that I, CARL MARTENS, a citizen of Germany, and residing at Riemke, near Bochum, Germany, have invented new and useful Improvements in Reciprocating Engines, of which the following is a specification.

This invention relates to a novel reciprocative double acting engine which is so constructed that it may be reliably operated without the use of a fly-wheel. For this purpose, the engine is provided with novel and effective means that prevent it from stopping at the end of the piston stroke without reversing the controlling valve even when overloaded. The engine may furthermore be readily converted from a double acting engine into a single acting engine.

In the accompanying drawing which is a longitudinal section through my engine, 10 is the cylinder and 11 the working piston. The latter is carried by a hollow rod 12 guided in corresponding stuffing boxes 13 of cylinder 10. Within piston rod 12 is slidably mounted a cylindrical controlling valve 14 provided with inlet ports 15′, 15″ which communicate with a central duct 17 of said valve. Duct 17 communicates with the pressure medium supply through a flexible pipe 19 coupled to a tubular extension 20 of valve 14. In proximity to piston 11, stem 12 is provided with ducts 21′, 21″ which are adapted to register with ports 15′, 15″ respectively. Adjacent to ducts 21′, 21″, stem 12 has radial exhaust ports 28′, 28″ respectively of which ports 28″ are adapted to register with a circumferential duct 16 of valve 14, said duct communicating through a passage 18 with the interior of stem 12 at the left hand side of said valve. The driving pressure medium is exhausted from stem 12 through the open end 36 thereof, said end being connected by a pin 37 to the apparatus to be actuated.

To the tubular extension 20 of valve 14 is adjustably secured by screw 30 a sleeve 29 within a suitable perforation of which is received the head 31 of a lever 33 pivoted to lugs 32 of piston rod 12. The free end of lever 33 is adapted to alternately abut against adjustable spring-influenced stops 24, 25.

In the position of the parts shown in the drawing, piston 11 is on its way toward the left, the pressure medium passing from passage 17 through ports 15″ and ducts 21″ into cylinder 10 at the right hand side of the piston to thus drive the latter from right to left. During this movement of the piston, the valve 14 is taken along by stem 12 owing to frictional contact. The previously spent pressure medium at the left hand side of piston 11 escapes through ports 28′, hollow stem 12 and the open end 36 thereof. While the piston approaches the end of its left hand stroke, lever 33 abuts against stop 24, so that the movement of valve 14 is accelerated and ports 15′ are made to register with ducts 21′, while duct 16 is brought into communication with exhaust ports 28″, ports 28′ being closed at the same time. In this way the movement of piston 11 is reversed, the pressure medium entering through duct 17, ports 15′ and ducts 21, while the exhaust is effected through ports 28″, ducts 16, 18 and the open-ended stem 12.

By the construction described, a reliable operation of the engine is obtained, and an accidental stopping of the engine at the end of one of the piston strokes is prevented. This is due to the fact that prior to the end of each piston stroke, the movement of the controlling valve 14 is accelerated in contradistinction to the constructions hitherto generally employed, in which the controlling valve came to a standstill before the piston reached its end position. Thus with my improved construction, the controlling valve is always sufficiently displaced to effect a reliable reversing of the engine even if the piston is considerably retarded at the end of its stroke owing to overloading.

If it is desired to convert the engine into a single acting engine, the ports 15′ are plugged up or otherwise closed, and a valve 35 of cylinder 10 is opened. In this way the pressure medium if supplied only to cylinder 10 at the right hand side of piston 11, while valve 35 permits a free entrance and exit of air into cylinder 10 at the left hand side of the piston.

I claim:

1. A reciprocative engine comprising a cylinder, an inclosed piston, a hollow piston rod, a controlling valve axially slidable within said rod and adapted to be taken along thereby through frictional contact, a pair of stops, and a two-arm lever adapted to engage said stops and operatively connected to the valve.

2. A reciprocative engine comprising a cylinder, an inclosed piston, a hollow piston

rod, a controlling valve axially slidable within said rod and adapted to be taken along thereby through frictional contact, a pair of stops, and a two-arm lever pivoted to the piston rod and operatively connected to the valve, said lever being adapted to engage the stops.

3. A reciprocative engine comprising a cylinder, an inclosed piston, a hollow piston rod, a controlling valve axially slidable within said rod and adapted to be taken along thereby through frictional contact, a tubular extension on said valve, a perforated sleeve adjustable on said extension, a lever pivoted to the piston rod and accommodated within the sleeve-perforation, and a pair of adjustable stops adapted to be alternately engaged by a second arm of said lever.

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