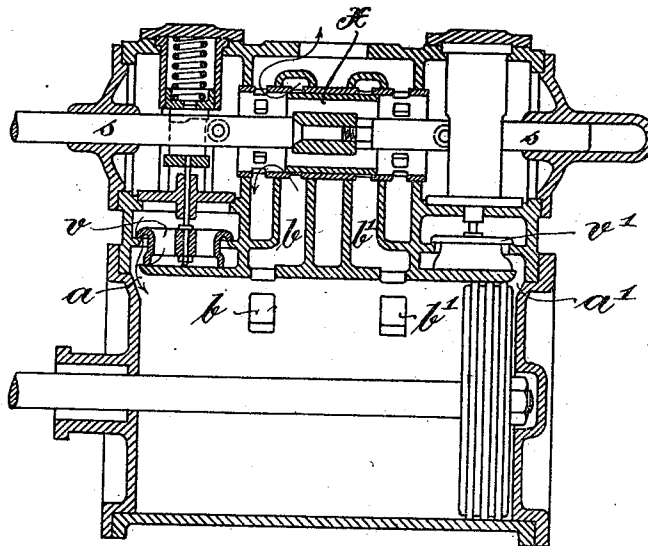


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STEAM ENGINE.

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UNITED STATES PATENT OFFICE.

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STEAM-ENGINE.

952,764.

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To all whom it may concern:

Be it known that I, JOHANN STUMPF, a subject of the King of Prussia, and resident of 33 Kurfürstendamm, Berlin, in the Kingdom of Prussia, Germany, professor, have invented new and useful Improvements in Steam-Engines, of which the following is a specification.

This invention relates to steam engines especially locomotive steam engines, in which the inlet is controlled by valves while the exhaust takes place through separate ports in the cylinder walls only used for exhaust. According to the present invention in order to provide for easy control of the exhaust the exhaust ports lead to a casing in which there is arranged a slide valve, and so that the slide valve may not be brought in contact with high pressure and high temperature steam the exhaust ports are arranged to lead from the cylinder at a point midway in the length thereof.

It is already known that piston and other slide valves are not suited for high pressure and high temperature (superheated) steam, and it has been proposed to employ lift valves for the steam inlet control and piston valves for the exhaust control. Such gears were impracticable for use in locomotives on account of the complication introduced by the special eccentrics for the inlet and the exhaust valves. It has also been proposed to overcome the difficulty of complication mentioned above by employing four lift valves which were actuated from a single cam rod but this construction is objectionable on account of the fact that the exhaust valves require a much greater opening. Such an increased opening introduces difficulties in the case of high speed engines on account of the increased stroke of the valve and therefore this construction was not well adapted to the requirements of locomotives.

The objections above mentioned are avoided by employing in combination with lift valves controlling the steam inlet a single reciprocating rod for operating all the valves while a slide valve is employed for controlling the exhaust.

By this construction the valve gear is very simple as the valves are all arranged in one line as described above with reference to the four lift valve arrangement and only a single slide valve is required which is actuated directly by the reciprocating rod

carrying the cams for the lift valves and is arranged between said lift valves.

Another advantage of this construction is that the slide valve does not require to be brought into contact with the hot steam. If exhaust ports for the steam are provided in the neighborhood of the center of the cylinder only steam which has already expanded somewhat and therefore is reduced in temperature finds its way to the bearing faces of the piston valves. Thus in addition to the combination of a single slide valve and a single reciprocating rod the present invention provides means whereby the said slide valve is completely shut off from contact with steam of high pressure and temperature.

The invention is illustrated in one convenient form in the accompanying drawing, which shows a vertical sectional elevation through an engine cylinder and valve box. The inlet valves *v* and *v'* are actuated by a reciprocating cam rod *s* in the known manner. Between the lift valves *v* *v'* and fixed to move with the reciprocating rod *e* is the exhaust slide valve *x* which is of the piston type and reciprocates within its casing. After passing through the inlet valves *v* *v'* the steam passes by way of the ports *a* *a'* to the cylinder. The piston in its motion uncovers exhaust openings *b* *b'* whereby the steam is allowed to pass into the piston valve casing only after it has been expanded, that is to say only after its temperature and pressure are reduced. The piston valve is also of course protected from the pressure of compression. Thus it will be seen in the figure that if the piston moves from right to left compression will only start after the piston has overrun the port *b*. Thus owing to the arrangement of the ports *b* and *b'* at intermediate points in the length of the cylinder the valve *x* is protected not only from the high temperature admission steam but also from the compression pressure.

I claim:—

In steam engines for high pressure and high temperature steam, the combination with the engine cylinder and a reciprocating piston therein, of a valve box having live steam admission ports in communication with the cylinder at the ends thereof, and a plurality of exhaust ports arranged at points intermediate the ends of the cylinder, reciprocable lift valves arranged within the end portions of the valve box and control-

ling the passage of steam through said admission ports, a reciprocating exhaust controlling valve also arranged within the valve box and operating at an angle to the direction of movement of the inlet valves, said
5 exhaust valve comprising means for controlling the exhaust through said several exhaust ports, a reciprocating valve rod connected to and movable with the exhaust
10 valve and having means cooperating with

the lift valves to alternately actuate the latter, the said exhaust ports being so located as to be cut out of operation when the piston overruns.

In witness whereof I have hereunto set
may hand in the presence of two witnesses. 15
JOHANN STUMPF.

Witnesses:

HERMANN RONIN,
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