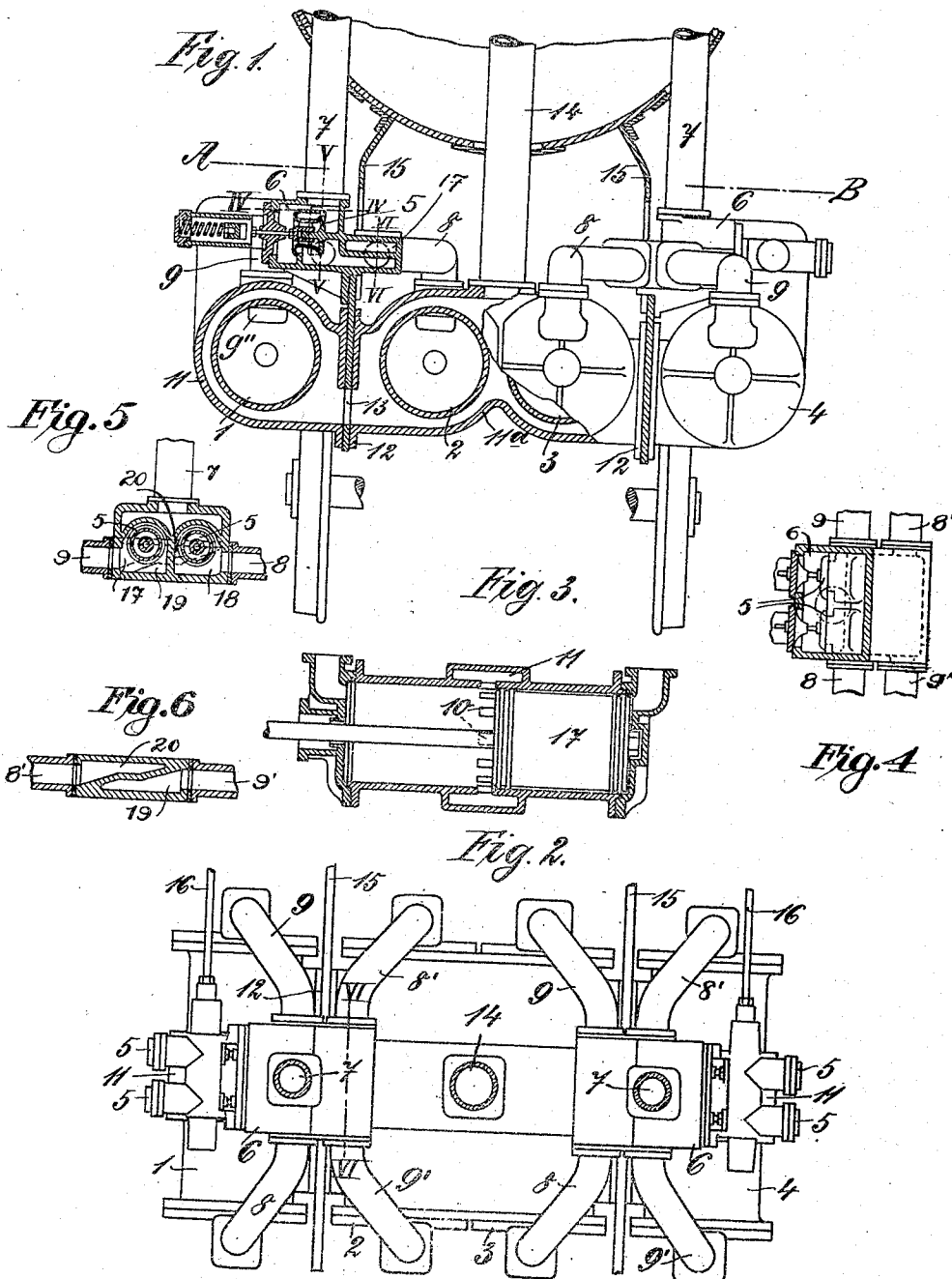


J. STUMPF.
FOUR CYLINDER LOCOMOTIVE ENGINE.
APPLICATION FILED JULY 24, 1909.

980,572.

Patented Jan. 3, 1911.



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UNITED STATES PATENT OFFICE.

JOHANN STUMPF, OF BERLIN, GERMANY.

FOUR-CYLINDER LOCOMOTIVE-ENGINE.

980,572.

Specification of Letters Patent.

Patented Jan. 3, 1911.

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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 certain new and useful Improvements in Four-Cylinder Locomotive-Engines, of which the following is a specification.

10 This invention relates to a four-cylinder single expansion locomotive engine in which the cylinders are divided into pairs arranged adjacent and parallel and set so as to drive cranks at 180° to one another, for the purpose of obtaining good balancing.

15 The object of the present invention is to effect a simplification in the valve gear of such engines. This result is obtained by employing a common admission valve for the opposite ends of the cylinders of a pair and exhaust ports in the cylinders controlled by the pistons so that the engines are what might be called continuous current engines. By continuous current I refer to the constancy in the direction of flow of the steam from the inlet to the exhaust. Thus in engines of this type the steam does not change its direction of flow or return upon its former path in passing from the inlet 30 to the exhaust.

The invention will be more readily understood from the following description of the example given in the accompanying drawings.

35 In these drawings Figure 1 is an end elevation partly in section of a four-cylinder locomotive engine according to the present invention, Fig. 2 is a plan in section on the line A—B of Fig. 1; Fig. 3 is a longitudinal section through one cylinder, Fig. 4 is a horizontal section through a steam chest on the line IV—IV of Fig. 1; Fig. 5 is a vertical section through the steam-chest on line V—V of Fig. 1, and 45 Fig. 6 is a vertical section on the line VI—VI of Figs. 1 and 2.

In carrying the invention into effect according to the form illustrated the four cylinders are arranged side by side with their axes parallel. The adjacent cylinders 1 and 2 form one pair and the cylinders 3 and 4 form another pair. The cranks corresponding to each pair of cylinders are set at 180° to one another. The cylinders 1 and 2 have inlet valves 5 arranged within a casing 6 55 above the cylinders. A steam chest 6 is

supplied with preferably superheated steam through a pipe 7. Two admission valves 5 are arranged within the chest 6 as can be seen in Fig. 2, one of which is adapted to distribute steam to a compartment 17 and the other to a compartment 18. The compartment 17 is connected with a pipe 9 and by a passage 19 with a pipe 9'. The pipe 9 is connected with an inlet port 9" in the rear end of the cylinder 1 and the pipe 9' with a similar port not shown in the forward end of the cylinder 2. The compartment 18 is connected with a pipe 8 and by a passage 20 arranged above the passage 19 with a pipe 8'. The pipe 8 is also connected with an inlet port not shown at the forward end of the cylinder 1 and the pipe 8' with an inlet port not shown at the rear end of the cylinder 2. The arrangement is the same for the pair of cylinders 3 and 4. It will thus be seen that steam is admitted by one or the other of the valves 5 of each pair of cylinders simultaneously into one end of one cylinder and the opposite end of the other cylinder of a pair. The exhaust in each cylinder takes place through ports 10 leading to a chamber or chest 11 arranged around the cylinder. The ports 10 are controlled in a known manner in engines of this type by the piston 17. The valves 5 are operated by a rod 16 which may be reciprocated by means of any suitable admission valve gear for instance the well known Walchaert valve gear.

90 For convenience and simplicity in construction the two central cylinders 2, 3 are cast in one piece and arranged between the side frames 15 of the locomotive engine truck, to which the cylinders are fastened by flanges 12 suitable openings being left in the side frames to allow of the passage of the exhaust. The cylinders 2, 3 thus form a cross stay between the two side frames. The exhaust chests 11 around the cylinders are united through the openings 13 and a common exhaust pipe 14 leads from the central space 11^a to the funnel.

105 By means of the arrangement described above there is not only a considerable simplicity in the valve gear obtained but the efficiency of the engines is considerably increased owing to the continuous current. In such continuous current engines it is known that a considerable clearance space is necessary and this clearance space is provided partly in the pipes 8 and 9. In engines of 110

this type the release usually takes place the last 10% of the stroke. It follows therefore that when the piston 17 in its return stroke again covers the ports 10 that 90% of the cylinder is still filled with steam. This entails of course a considerable compression which necessitates the large clearance space mentioned above, which clearance space should be from about 13-15% of the cylinder volume. This requirement renders it possible to employ the cross pipes 8 and 9 when these cross pipes are so arranged as to form part of the clearance space.

The arrangement described is further exceedingly simplified by the fact that the steam chest 6 is arranged above the cylinders and is not cast in one therewith. The casting of the cylinders is thus exceedingly simple. It will be understood that the details of the device may be considerably altered.

The engine illustrated is intended especially for use with superheated steam but of course may also be employed with saturated steam. It is also especially intended for high pressure as well as high temperature steam.

I claim:—

1. In combination, two steam engine cylinders arranged side by side and each having an inlet port at its end and separate exhaust ports, pistons in said cylinders and arranged to overrun and control said exhaust ports, a steam chest common to said cylinders, a mechanically operated admission valve in said chest, a pocket on said chest, the admission of steam to which is controlled by said mechanically operated valve and connections leading diagonally from said pocket to diagonally opposite ends of the pair of cylinders.

2. In combination, two steam engine cylinders arranged side by side and each having inlet ports at its ends and separate ex-

haust ports, pistons in said cylinders and arranged to overrun and control said exhaust ports, a steam chest common to said cylinders, mechanically operated admission valves in said chest, two pockets on said chest, the admission of steam to which is controlled by said mechanically operated valves, and connections leading diagonally from each of said pockets to the diagonally opposite ends of the pair of cylinders.

3. In combination, two steam engine cylinders arranged side by side and each having inlet ports at its ends and separate exhaust ports, pistons in said cylinders and arranged to overrun and control said exhaust ports, a common chamber into which the exhaust ports of both cylinders open, a steam chest common to said cylinders, mechanically operated admission valves in said chest, two pockets on said chest, the admission of steam to which is controlled by said mechanically operated valves and connections leading diagonally from each of said pockets to the diagonally opposite ends of the pair of cylinders.

4. In combination, two steam engine cylinders arranged side by side and each having inlet ports at its ends and separate exhaust ports, pistons in said cylinders and arranged to overrun and control said exhaust ports, a steam chest common to said cylinders, two mechanically operated lift valves in said chest, two pockets on said chest the admission of steam to which is controlled by said lift valves, and connections leading diagonally from each of said pockets to the diagonally opposite ends of the pair of cylinders.

In witness whereof I have hereunto set my hand in the presence of two witnesses.

JOHANN STUMPF.

Witnesses:

HERMANN BOUIN,
GOTTFRIED KERKAIN.