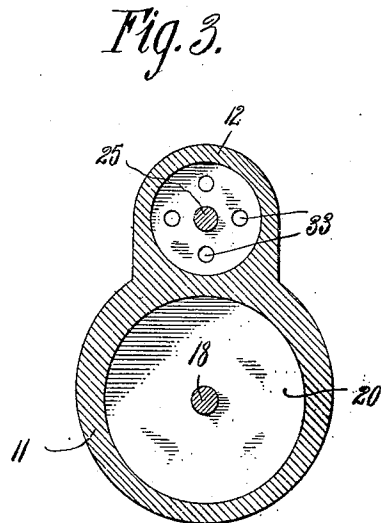
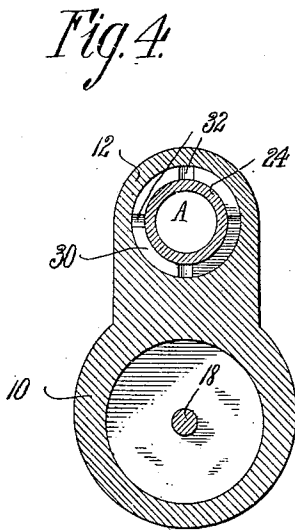
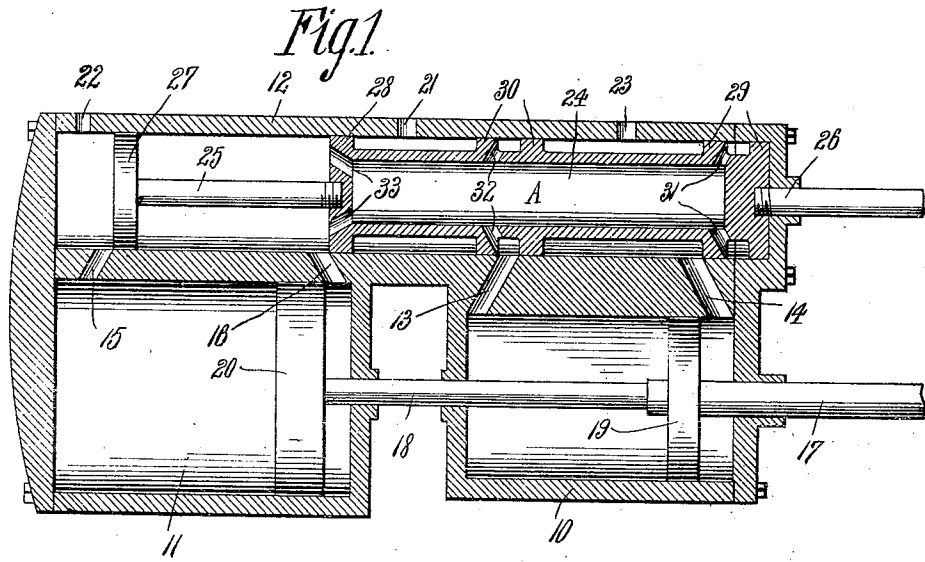


C. BADEN.
COMPOUND ENGINE.
APPLICATION FILED MAR. 27, 1908.

961,094.

Patented June 14, 1910.
2 SHEETS—SHEET 1.



Witnesses
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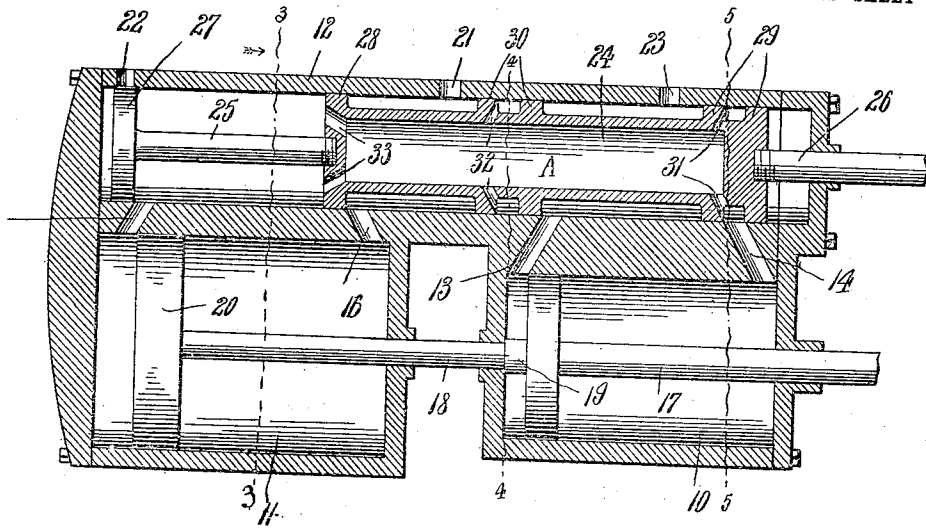


Fig. 2.

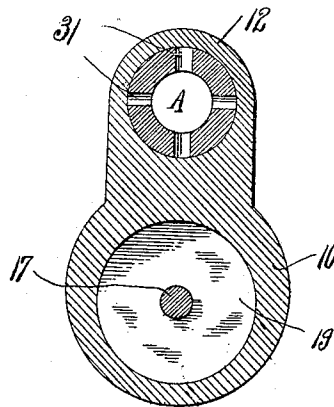


Fig. 5.

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UNITED STATES PATENT OFFICE.

CHARLES BADEN, OF HACKENSACK, NEW JERSEY.

COMPOUND ENGINE.

961,094.

Specification of Letters Patent.

Patented June 14, 1910.

Application filed March 27, 1908. Serial No. 423,623.

To all whom it may concern:

Be it known that I, CHARLES BADEN, a citizen of the United States, residing at Hackensack, in the county of Bergen, State of New Jersey, have invented certain new and useful Improvements in Compound Engines; 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.

This invention relates to compound engines and more particularly to a novel construction of compound steam engine.

In carrying out my invention, I have aimed to simplify the construction of such engines and particularly the construction of the valves therefor.

My engine is comprised, as usual, of a high pressure and a low pressure cylinder, a valve chest which has communication with both cylinders by way of ports, and a valve which works in the valve chest and in the type of engine devised by me, this valve is formed throughout a portion of the length of the stem with a passage, and at one end of this portion with a head, at the opposite end of the portion with a pair of heads which are slightly spaced, and between the first mentioned head and the pair of heads with another pair of heads which are also slightly spaced. Ports open through the tubular portion of the valve stem at points between the heads of each pair mentioned and the passage through the stem opens through the first mentioned head. The paired heads are so located upon the valve stem that they work over the ports which communicate with the high pressure cylinder and as the steam is exhausted from this cylinder to each side of the piston working therein, it passes through the passage in the valve stem and to the low pressure cylinder.

In the accompanying drawings, Figure 1 is a vertical longitudinal sectional view through an engine constructed in accordance with my invention and showing the valve thereof at one limit of its movement, Fig. 2 is a similar view but showing the valve at the other limit of its movement, Fig. 3 is a vertical transverse sectional view on the line 3—3 of Fig. 2, Fig. 4 is a similar view on the line 4—4 of Fig. 2, and, Fig. 5 is a similar view on the line 5—5 of Fig. 2.

In the drawings, the high pressure cylinder is indicated by the numeral 10, the low

pressure cylinder by the numeral 11, and the valve chest by the numeral 12, the said chest being supported upon both of the cylinders. Ports 13 and 14 open from the valve chest into the high pressure cylinder, and similar ports 15 and 16 open from the chest into the low pressure cylinder. But a single piston rod is provided for the two cylinders and this rod is indicated by the numeral 17 and is formed with a reduced portion 18, there being a head 19 fitted upon the rod near the point of junction of its reduced portion with its main portion and this head 19 works in the high pressure cylinder 10, there being a similar head 20 upon the rod at the extreme end of its reduced portion and working in the low pressure cylinder 11.

The valve chest 12 is cylindrical in form and extends throughout the entire length of both of the cylinders 10 and 11 and this chest is formed through its wall, at a point substantially mid-way of its ends, with an exhaust port 21, adjacent one end with another exhaust port 22, and between its other end and the exhaust port 21 with an inlet port 23. The valve which works in this chest is indicated in general by the reference character A and comprises a tubular or hollow stem 24 into one end of which is screwed a stem 25. The valve rod, indicated by the numeral 26, is threaded at its end into one end of the tubular portion 24 of the valve stem as is clearly shown in the longitudinal sectional views of the drawings and formed upon the stem 25 of the valve stem at the extreme end thereof is a head 27, there being a similar head 28 formed upon the stem at the inner end of the tubular portion thereof. Formed at the opposite end of this tubular portion or in other words at that end into which the valve rod 26 is threaded, is a pair of heads 29, there being a similar pair of heads 30 formed upon the tubular portion 24 of the valve stem between the heads 29 and the head 28. Ports 31 open into the tubular portion of the valve stem between the heads of the pair 29 and ports 32 open into the said portion of the valve stem between the heads of the pair 30. Communication is established between the valve chest or rather that portion between the heads 27 and 28, and the interior of the tubular portion 24 of the valve stem by ports 33.

When the valve A is in the position shown in Fig. 1 of the drawings, the exhaust from

the high pressure cylinder 10 is free to pass through the port 13, the port 32, and by way of the passage through the portion 24 of the valve stem, and the port 16, into the low pressure cylinder 11 and behind the piston working therein. When the valve is in this position, steam enters through the steam inlet 23 and into the high pressure cylinder through the port 14, the exhaust from the low pressure cylinder 11 passing through the port 15 and through the exhaust port 22. When the valve is moved to position shown in Fig. 2, the steam intake is through the port 13 and into the high pressure cylinder 10. At such time, the exhaust from the high pressure cylinder is by way of the port 14, between the heads of the pair 29, and through the port 31, the hollow portion 24 of the valve stem through ports 33 and through the port 15 and into the low pressure cylinder 11, the exhaust from this last mentioned cylinder being then through the port 16 and the exhaust port 21.

From the foregoing description of my invention, it will be seen that I have provided, in a compound engine, a very simple construction of valve which may be reciprocated in the ordinary manner and which will properly control the ports opening into the high and low pressure cylinders.

What is claimed, is:—

1. The combination with high and low pressure cylinders and a steam chest, each of said cylinders being provided with a pair of ports leading to said steam chest, of a piston valve provided with a hollow body, a pair of heads located at one end thereof, and a second pair of heads located intermediate the ends of said body, the inner heads of said pairs being spaced apart a distance substantially equivalent to the distance between the ports leading to the high pressure cylinder, said valve having ports leading from between each pair of the heads to the interior thereof, a perforated head formed on said piston valve at the opposite end to the first pair of heads, a stem secured

at one end to said perforated head, a head on the other end of said stem, the last mentioned heads being spaced apart a distance substantially equivalent to the distance between the ports leading to the low pressure cylinder, said steam chest being provided with an exhaust port adapted to be closed by the head on the stem, a second exhaust port lying between the perforated head and the intermediate pair of heads, and a steam port lying between the two pairs of heads.

2. The combination with high and low pressure cylinders and a steam chest, each of said cylinders being provided with a pair of ports leading to said steam chest, of a piston valve provided with a hollow body, a pair of heads located at one end thereof, and a second pair of heads located intermediate the ends of said body, the inner heads of said pairs being spaced apart a distance substantially equivalent to the distance between the ports leading to the high pressure cylinder, said valve having ports leading from between each pair of the heads to the interior thereof, a perforated head formed on said piston valve at the opposite end to the first pair of heads, a stem secured at one end to said perforated head, a head on the other end of said stem, the last mentioned heads being spaced apart a distance substantially equivalent to the distance between the ports leading to the low pressure cylinder, said steam chest being provided with an exhaust port adapted to be closed by the head on the stem, a second exhaust port lying between the perforated head and the intermediate pair of heads, and a steam port lying between the two pairs of heads, the ports in said piston valve being all inclined toward the perforated head thereof.

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

CHARLES BADEN.

Witnesses:

ALFRED F. KROPP,
MAX GRAPENTINE.