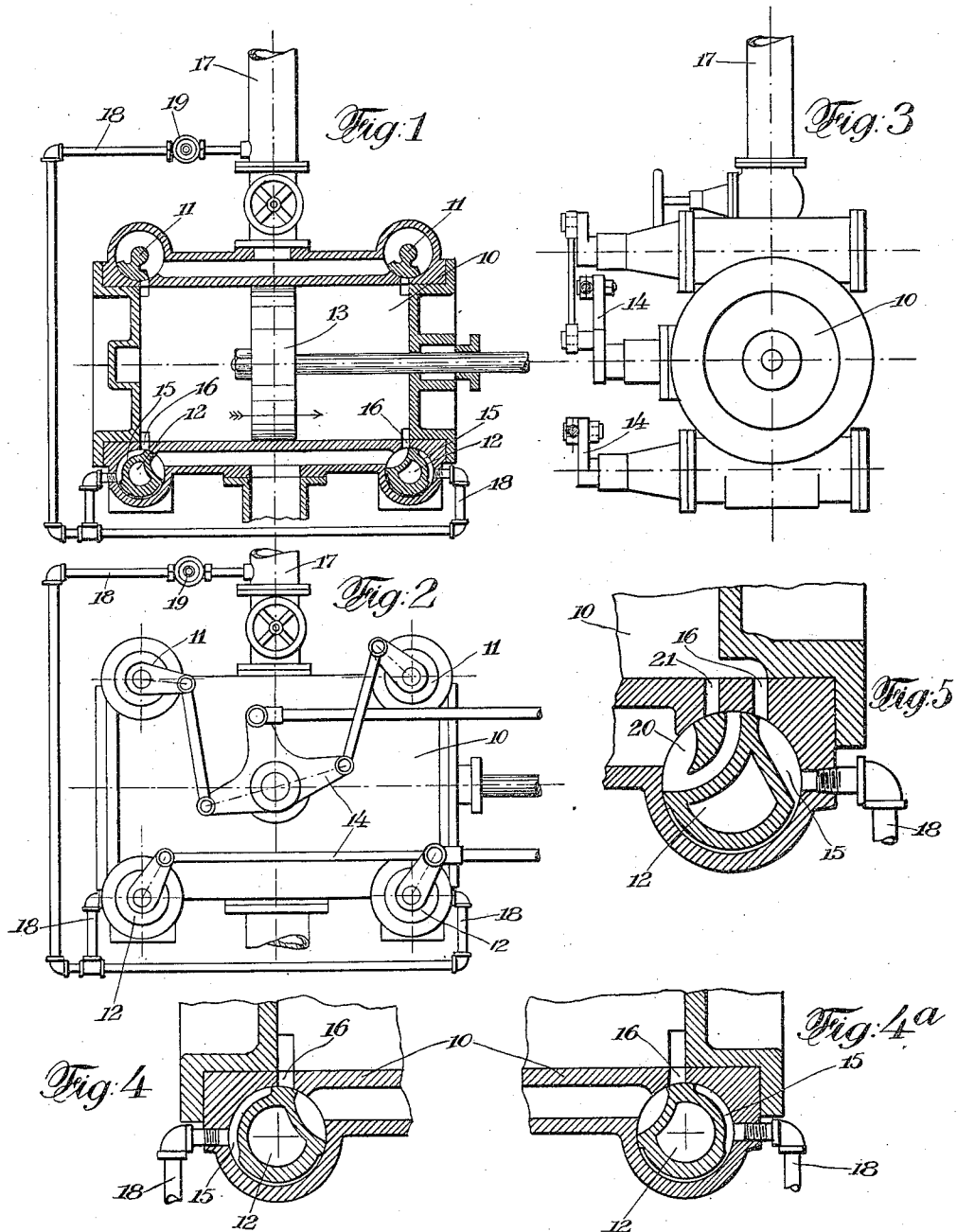


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APPLICATION FILED MAY 2, 1910.

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Patented July 2, 1912.
2 SHEETS—SHEET 1.



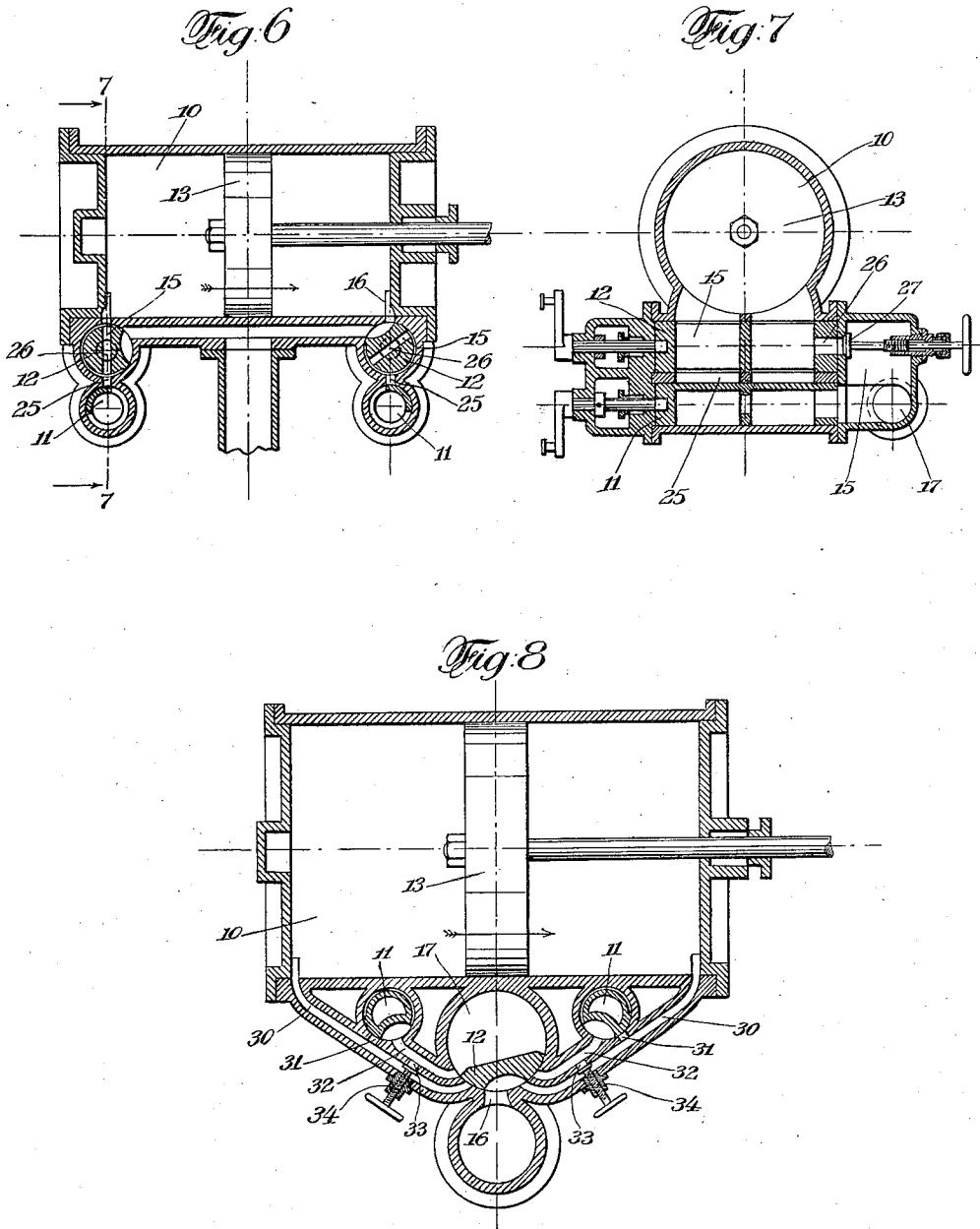
Witnesses:
David Barshell
J. H. Lueder.

Inventor
Franz F. Nickel
By his Attorney Fred P. Schmitt.

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Witnesses:
David Bantell
J. H. Sriedler.

Inventor
Franz F. Nickel
By his Attorney, *Redd P. Schuch*

UNITED STATES PATENT OFFICE.

FRANZ F. NICKEL, OF EAST ORANGE, NEW JERSEY.

STEAM-ENGINE.

1,031,576.

Specification of Letters Patent.

Patented July 2, 1912.

Application filed May 2, 1910. Serial No. 558,865.

To all whom it may concern:

Be it known that I, FRANZ F. NICKEL, a citizen of the United States, and a resident of East Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Steam-Engines, of which the following is a specification.

My invention relates to means for starting steam engines, particularly duplex or cross-compound steam engines arranged with fixed cut-offs.

It has for its object to start such engines without necessitating the changing of the cut-offs, or the turning over of a crank shaft so as to bring one of the cranks of said engine to a starting position. To this end a live steam connection or by-pass around the cut-off valves is provided. The nature of the invention will be best understood, however, when described in connection with the accompanying drawings, which illustrate three types of engines arranged for a fixed cut-off, and in which—

Figure 1 is a longitudinal section of the cylinder, piston and valves of a steam engine with by-pass provided around the cut-off valves. Fig. 2 is a front elevation, and Fig. 3 an end elevation of the same. Figs. 4 and 4^a are detail views of the exhaust valves. Fig. 5 is a detail view of a double ported exhaust valve. Fig. 6 is a longitudinal section of a steam cylinder having two exhaust valves, one at each end of the said steam cylinder, and two cut-off valves located outside of the said exhaust valves. Fig. 7 is a transverse section taken on the line 7—7, Fig. 6, looking in the direction of the arrows. Fig. 8 illustrates another modification, being a longitudinal section of a steam cylinder and valves, only one exhaust valve and two cut-off valves being provided.

Similar characters of reference designate corresponding parts throughout the several views.

Referring now to Figs. 1 to 4^a of the drawings, 10 designates a steam cylinder of the Corliss type of engine, having two steam valves 11 on top of said cylinder—one at each end. Two exhaust valves 12 are provided at the bottom of said cylinder, and are located likewise—one at each end. A piston 13 reciprocates within the cylinder 10, the valves 11 and 12 being operated in the well known manner through the valve gear 14.

The exhaust valves 12 are designed to act also as main or distributing valves instead of simply as exhaust valves, as is the case in an ordinary Corliss engine with releasing gear. For this purpose they are provided with a steam chamber or passageway 15 adapted to communicate with the exhaust ports 16 of the cylinder 10, as well as with a live steam supply pipe 17 through suitable pipe connections 18. A suitable hand valve or automatic valve 19 is provided in the pipe connection 18 so that live steam may be admitted to the chamber 15 and thereby to cylinder 10, thus providing a by-pass around the valves 11. This permits live steam to be admitted for the greater part of the stroke into cylinder 10 through port 16 behind the piston 13, even though the steam valves 11 be closed (Fig. 1.) It is thus possible to start the engine at any particular point by simply opening the valve 19.

In Fig. 5 I have shown the exhaust valve 12 in the form of a double ported valve, an additional port 20 being provided therein to cooperate with an additional exhaust port 21 in the cylinder 10. In this embodiment there is but one live steam chamber or passageway 15 as before, and this is adapted to cooperate with the port 16 only, while both ports 16 and 21 serve as exhaust ports. The valves 12 are to be designed in this embodiment in such a manner that the port 21 is closed by the valve when port 16 is open to the live steam connection.

In Figs. 6 and 7 I have illustrated a modification in the location of the valves, the two exhaust valves 12 being at the bottom of the cylinder 10, one at each end as before, and the two cut-off valves 11 being located outside of the said exhaust valves. In this embodiment the steam chamber 15 is adapted to communicate with the source of steam supply 17, as well as with valve 11 through a port 25 communicating with the two said valves 11 and 12. The steam thus passes through both valves into the cylinder 10 and advances the piston 13, valve 11 cutting off the supply at a predetermined point of the stroke. In case both cut-off valves be closed in starting, provision is made to admit the steam to cylinder 10, by-passing the valves 11, through a port 26 which communicates with the steam chamber 15 and with the source of steam supply 17, and is controlled by a suitable valve 27. To start the engine,

it is necessary, therefore, merely to open this valve 27 and by-pass the said cut-off valves 11.

Fig. 8 illustrates another modification, only one exhaust valve 12 being provided in conjunction with two cut-off valves 11. Ports 30 communicate with cylinder 10 and with the exhaust port 16 which is controlled by the valve 12. Auxiliary ports 32 are adapted to communicate with the source of steam supply 17 and with the said ports 30 through suitable openings 31, controlled by the cut-off valves 11. Auxiliary communications 33 are provided between the said ports 30 and 32 and are controlled by the hand valves 34 so that the steam may be by-passed about the cut-off valves 11 in starting the engine.

Where there are a plurality of cylinders, provision may be made whereby the corresponding by-pass valves can be simultaneously operated.

The arrangements herein disclosed are applicable to duplex steam engines having two steam cylinders or two sets of steam cylinders arranged side by side with cranks set at 90°, or to cross-compound engines having a high pressure cylinder and a low pressure cylinder arranged side by side with an intermediate receiver to equalize the pressure. In the latter case the receiver would be provided with the usual live steam connection so that the engine might start on either cylinder.

The changes in construction necessary to effect these desirable results are extremely simple, especially in an engine such as shown in Figs. 1 to 3, and may readily be made to engines already built. I do not wish, however, to restrict myself to the particular type of engine shown nor to the specific form of valve construction disclosed.

What I claim and desire to secure by Letters-Patent is:—

1. In a steam engine: a steam cylinder; suitable means to control the cut-off and exhaust; a live steam connection to said cut-off controlling means; a normally closed live steam connection to said exhaust controlling means, adapted to afford communication between said live steam connection and each end of said cylinder through a passage way in said exhaust controlling means; and manually controlled means in said normally closed steam connection to open the same, whereby live steam will be alternately admitted through the said passage way to opposite sides of the cylinder.

2. In a steam engine: a steam cylinder; exhaust valves communicating therewith; cut-off valves superposed upon said exhaust valves and adapted to communicate with the same through a connecting passage way, the exhaust valves each being provided with a passage way adapted to communicate respectively with the said connecting passage way and with a corresponding end of the cylinder; a live steam connection to said cut-off valves; manually controlled means normally closing a passage way adapted to afford communication between the live steam connection and the said passage ways of the exhaust valves, and to admit live steam to the said passage ways of the exhaust valves, whereby live steam is alternately admitted therethrough to opposite ends of said cylinder.

Signed at Hazleton in the county of Luzerne and State of Pennsylvania this 28th day of April A. D. 1910.

FRANZ F. NICKEL.

Witnesses:

DAISY TEMPLE,
JOHN J. KELLEY.