

(No Model.)

2 Sheets—Sheet 1.

R. LINDNER.

STARTING GEAR FOR COMPOUND LOCOMOTIVES.

No. 481,181.

Patented Aug. 23, 1892.

Fig. 1.

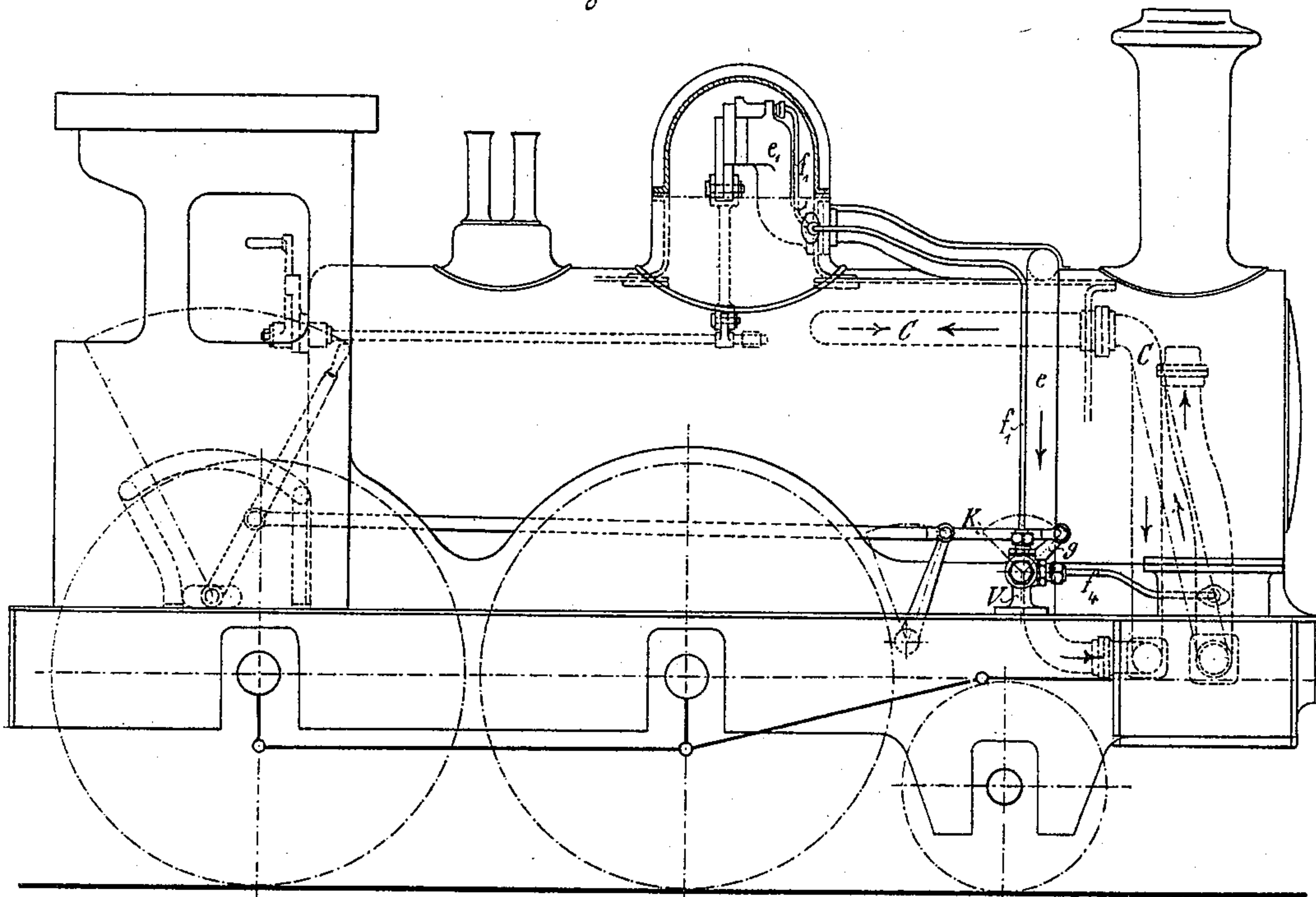
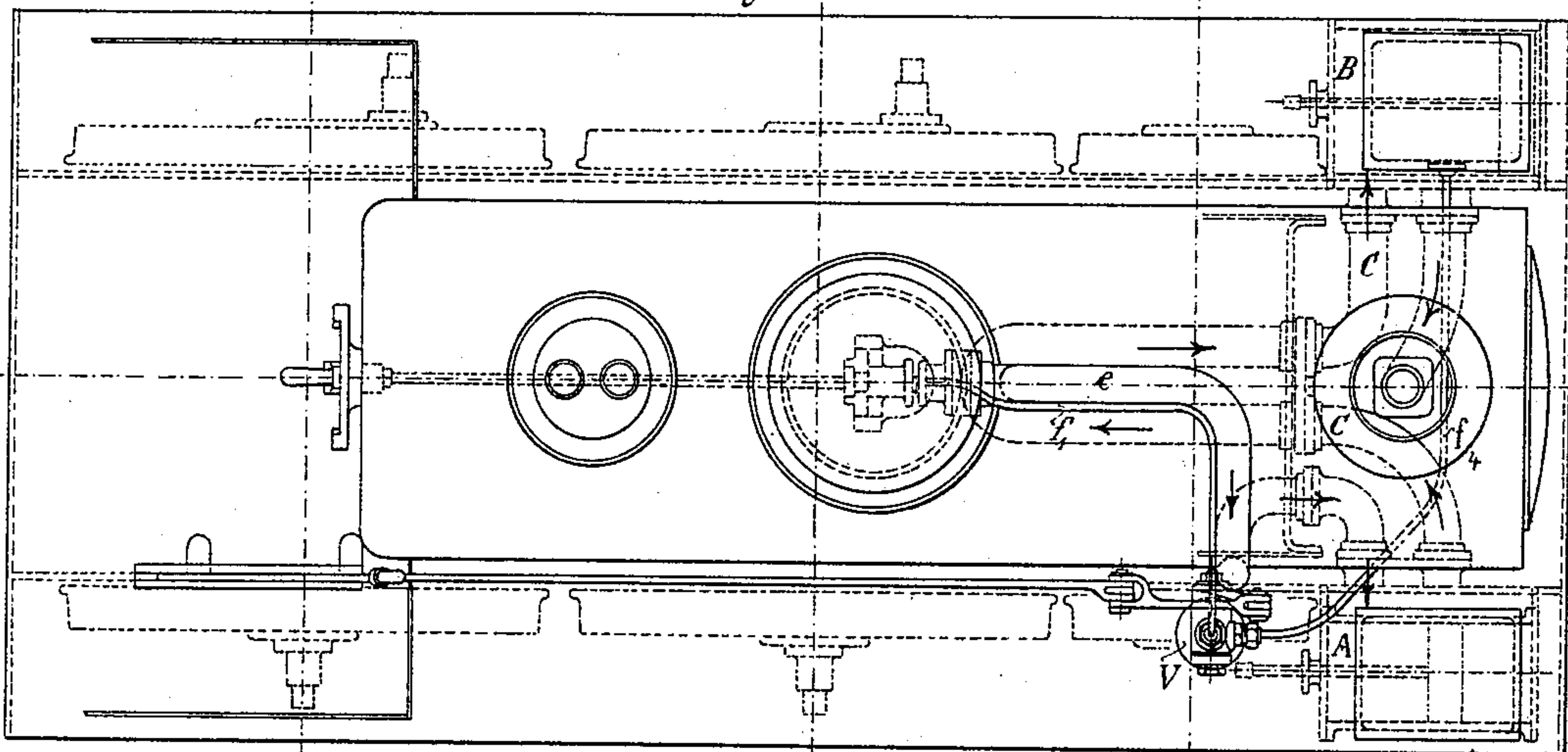


Fig. 2.



Witnesses:

R. Herpich.
E. Schultze.

Inventor:
Robert Lindner

by Robert Lindner

Attorney

(No Model.)

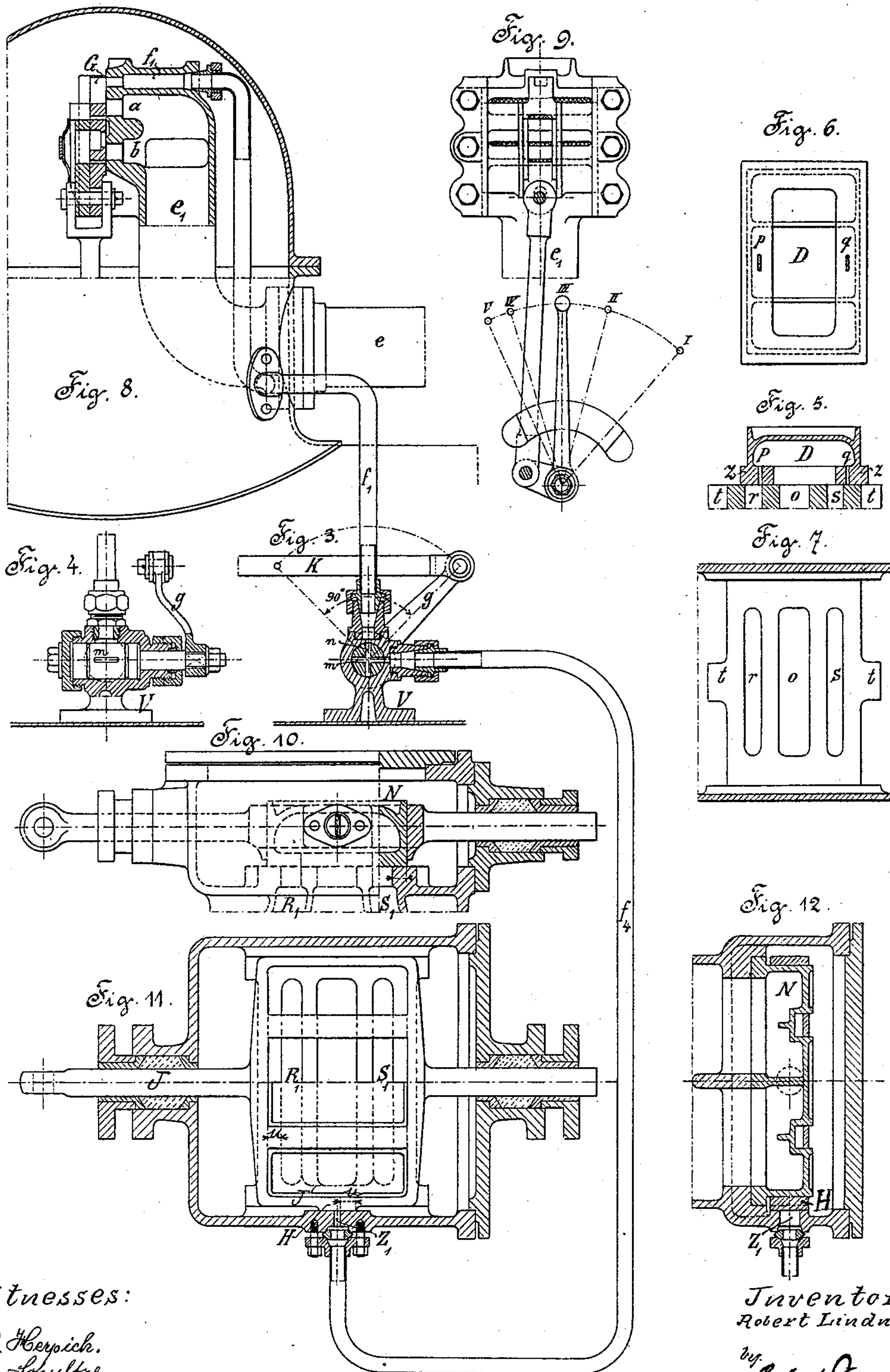
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UNITED STATES PATENT OFFICE.

ROBERT LINDNER, OF CHEMNITZ, GERMANY.

STARTING-GEAR FOR COMPOUND LOCOMOTIVES.

SPECIFICATION forming part of Letters Patent No. 481,181, dated August 23, 1892.

Application filed June 15, 1891. Serial No. 396,332. (No model.) Patented in England March 6, 1890, No. 3,853, and in Germany November 26, 1890, No. 57,044.

To all whom it may concern:

Be it known that I, ROBERT LINDNER, a subject of the King of Saxony, and a resident of Chemnitz, in the Kingdom of Saxony, German Empire, have invented certain new and useful Improvements in Starting-Gears for Compound Locomotives, (for which I have obtained patents in Germany, No. 57,044, dated November 26, 1890, and in Great Britain, No. 3,853, dated March 6, 1890,) of which the following is a full and exact specification.

The invention has for its object a compulsory and precise start of compound engines, which I arrive at by providing the engine with starting-valves and pipes to lead high-pressured steam into the low-pressure cylinder behind the piston of the same.

In order to make my invention more clear, I refer to the accompanying drawings, Sheets I and II, in which similar letters denote similar parts throughout the different views, and in which—

Figure 1, Sheet I, is an elevation of a locomotive, showing the parts of my improvements attached thereto. Fig. 2 is a plan of the same. Figs. 3 to 12, Sheet II, are details of the said improvements, Figs. 3 and 4 showing the starting-cock V of Fig. 1 in two vertical sections. Fig. 5 is a vertical section of the high-pressure slide-valve; Fig. 6, a side view of the same; Fig. 7, a horizontal section of the same. Figs. 8 and 9 are a vertical section and view of the regulator-valve; Figs. 10 to 12, sections of the low-pressure slide-valve.

In a starting-gear patented to me in various countries I used to combine the starting cock or valve V with the receiver C C by a pipe f^4 . In the present invention, however, the plug of this valve V is connected to the starting-lever by a lever g and a rod K. By the full throw of the reversing-lever from one extreme position to the other it is moved through an angle of ninety degrees, so that when the lever is in its forward position the port n is in communication with the steam-pipe f' , leading to the regulator-valve, and the port m in communication with the pipe f^4 , leading to the low-pressure slide-valve.

When the lever is in its backward position, the communication is the same, the port m having the same position as n in the first case,

and vice versa. In any intermediate position of the reversing-lever the valve V is closed. The steam is admitted from the pipe f^4 to the low-pressure cylinder B through the port Z'. 55

In order to regulate the entrance of steam from the pipe f^4 into the steam-chest of the low-pressure cylinder B, I attach a slide H to the valve-buckle N, as shown in Fig. 11. This slide H is integral with or firmly secured to the low-pressure slide-valve N, the valve-rod J, or valve-buckle J'. The latter, as shown, slides on the bottom of the slide-valve case and the slide H at or about at middle height of the same. By making the lap u of the slide H equal to the outside lap u of the valve N one of the ports R' or S' is opened or closed at the same time the port Z' opens or closes. 65

When the slide H is in its middle positions, which is always the case when not starting by means of the low-pressure cylinder, the port Z' is covered, and thus steam is admitted to the low-pressure slide-valve chest only when it can proceed to the low-pressure cylinder by one of the ports R' or S'. The entrance of steam from the low-pressure-valve chest into the receiver C is thus prevented, except when said steam has also admission to the low-pressure cylinder. The amount of steam passing the cock or valve V will be regulated by the slide-valve e' , (illustrated in detail by Figs. 8 and 9,) and also attached to the engine, as in Figs. 1 and 2. The slide of this valve has a lug G cast on, which covers or uncovers the port leading into the pipe f' . 75

The motion of the slide is regulated by the handle illustrated by Fig. 9, which can be moved from one position to the other, (indicated by the numbers 1 and 5.) At 1 the ports are all closed, and no steam can enter the same. While moving from 2 to 5, the main ports a and b , leading into the high-pressure pipe e , are opened. At the beginning and ending of this opening the port leading into the pipe f' will be closed. The opening thereof only takes place while the handle is moved between 3 and 4, and while passing from 4 to 5 the port f' will be full open. The steam admitted to the high-pressure cylinder A by the steam-pipe e exhausts into the low-pressure cylinder B through the pipe C C, which at the same time serves as a receiver, 80 85 90 95 100

and the steam of the low-pressure cylinder B exhausts into the air or into a condenser. The high-pressure slide-valve D is provided with ports p q on the exhaust side (see Figs. 5 and 6) in order to relieve the high-pressure piston from unequal strain, as the steam has admission to both sides of the same. These ports p and q place the exhaust-port o in communication with the two steam-ports r and s as soon as the valve D shuts off. The bar z is either equal to or greater than the breadth of the ports r and s , so that steam cannot pass from the valve-chest into the exhaust-port o , but allows of steam passing from the exhaust-port into the back and front side of the cylinder. The effect of this arrangement is the following one:

In starting the engine the reversing-lever is thrown full over, and thereby the regulator-valve e' passes in rapid succession through the five positions indicated in Fig. 9. The high-pressure pipe e is first opened, and thus the high-pressure cylinder A at first gets full of steam without being influenced by counter-pressure. As the reversing-lever approaches its extreme position the regulator-valve e' admits steam to the pipe f' , and thus to the valve V, and the lever having reached its farthest position this steam is let through one of the ports m or n of the valve V into the

pipe f^1 and the low-pressure cylinder B. Thus if one of the cranks should be in or near its dead-point the other would start the engine. As it happens very seldom that the locomotive runs at full steam, the valve V will generally be closed after starting, allowing the steam to be admitted only to the high-pressure cylinder A through the pipe e , and thus the engine will work like an ordinary compound engine.

Having thus fully described the nature of my said invention, what I desire to secure by Letters Patent of the United States is—

In a starting-gear for compound engines, the slide H, fitted to the valve-buckle N of the low-pressure valve, in combination with the pipe f^1 for the auxiliary steam, provided with a suitable valve V, and the high-pressure cylinder A, the receiver-pipe C, and the low-pressure cylinder B, having a port Z', fed by the steam-pipe f^1 and regulated by the slide H, for the purpose set forth.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

ROBERT LINDNER.

Witnesses:

H. F. MERRITT,
R. E. JAHN.