2 Sheets—Sheet 1.

J. FISH.

Compound Engines.

No. 196,207. Patented Oct. 16, 1877.

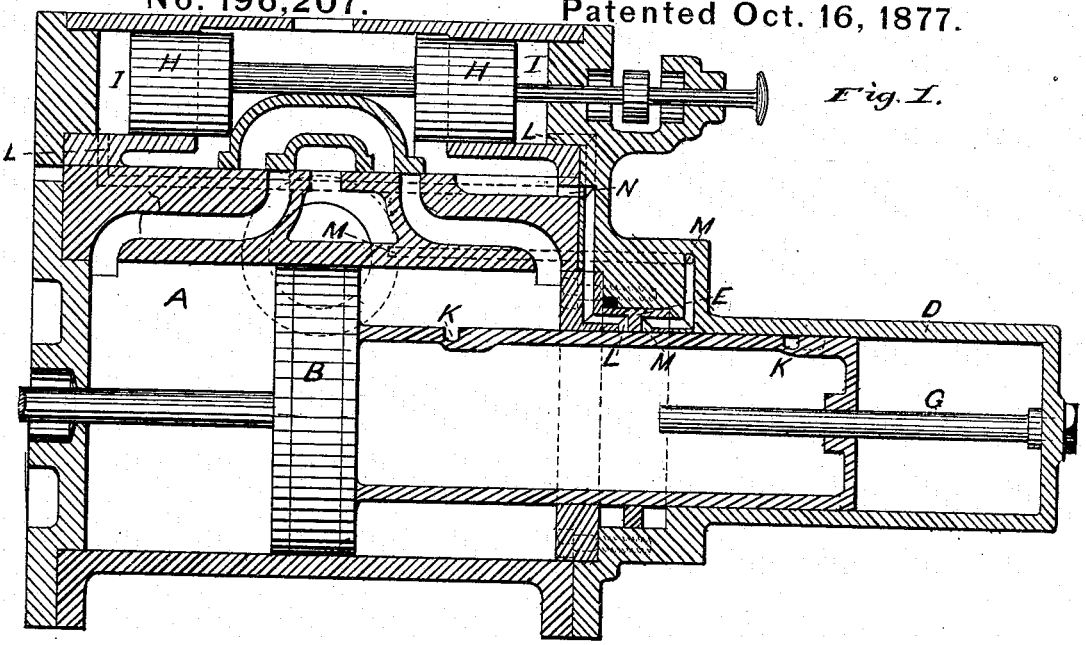
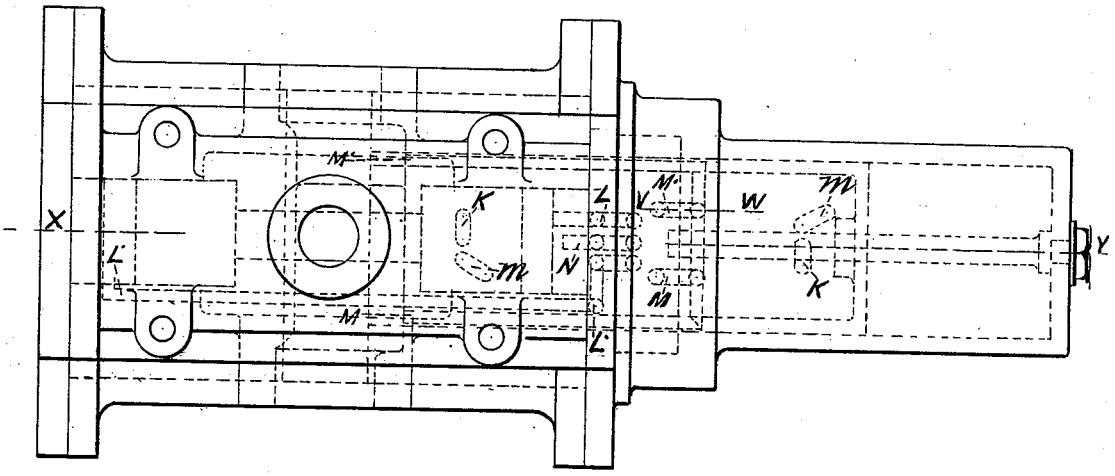


Fig. 1.

Fig. 2.



Witnesses
William Littell
Theodore H. Littell

Inventor
John Fish

2 Sheets—Sheet 2.

J. FISH.

Compound Engines.

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Fig. 3.

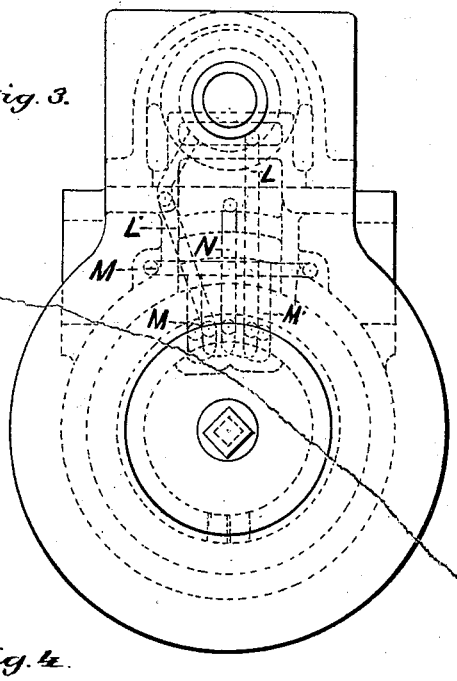


Fig. 4.

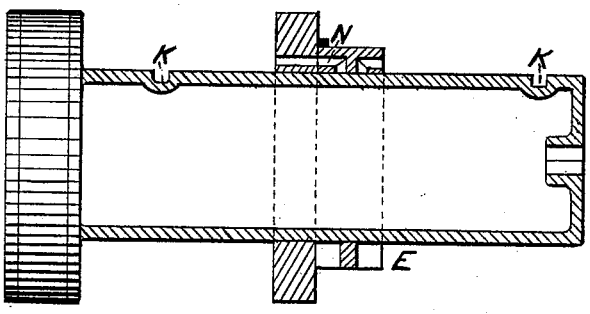
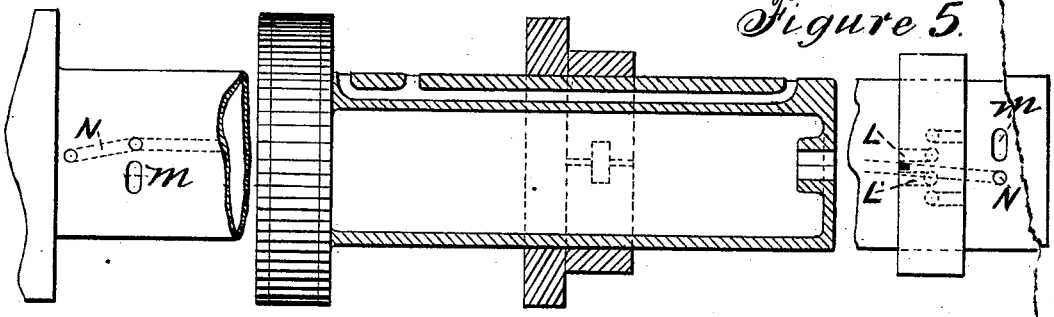


Figure 5.



Witnesses.

William Littell

Theodore F. Littell

Inventor.

John Fish

UNITED STATES PATENT OFFICE.

JOHN FISH, OF SUMMIT, NEW JERSEY.

IMPROVEMENT IN COMPOUND ENGINES.

Specification forming part of Letters Patent No. **196,207**, dated October 16, 1877; application filed December 18, 1876.

To all whom it may concern:

Be it known that I, JOHN FISH, of Summit, in the county of Union and State of New Jersey, have invented an Improvement in Compound Trunk-Engines, of which the following is a specification:

In a trunk-engine cylinder, where only a single piston with an attached trunk is used, and where high-pressure steam is used in the annular space on the trunk side of the piston, I place a contractible packing-ring in a suitable recess in the outside trunk casing or jacket, secured by a follower. In this packing-ring apertures are formed, connecting with passages through the follower to the steam-chest, and to auxiliary cylinders containing pistons which move the slide-valve of the engine. There are also suitable apertures in the packing-ring, connecting to passages in the trunk casing or jacket, and from that to the exhaust-passage in the main cylinder.

When the piston is at either end of its stroke, pockets or chambers are formed in the trunk, so as to connect the steam-supply opening in the packing-ring with the port in the ring connecting to the auxiliary cylinder, the piston of which gives the required motion to the main valve. Close to the steam connection-chamber in the trunk is a pocket or aperture connecting from the steam-port of the opposite auxiliary cylinder to the exhaust-opening in the packing-ring, and from thence to the exhaust-passage in the main cylinder. The exhaust-aperture in the trunk is so placed in relation to the steam-aperture in the trunk as to give the proper amount of lead necessary.

To keep the trunk and its chambers in line with the ports in the contractible packing-ring, I attach in the center and to the inside of the trunk-casing a guide-bar of any section that will keep the trunk and piston from turning.

I am aware that compound trunk-engines have been made with double piston-heads, having apertures in the trunk, and suitable openings in the ring or bush surrounding it, and by this arrangement to withdraw the steam from auxiliary cylinders, the pistons of which gave motion to the main slide-valve; but the trunk has been made to work through a solid ring or bush, and the aperture is formed so as to conduct the steam through the bush. Now, although the joint between the bush or ring and trunk may be tight at first, when it begins to wear there is no means of preventing a leak without renewing the ring. If split, so as to contract on the trunk, there will be a leak between the ring and its seating.

In my improvement the manner in which I form the ports—so as to conduct the steam through the contractible ring to the apertures which supply the live steam and admit it to the auxiliary cylinders, and from the auxiliary cylinders to the main exhaust-port—is essentially different, and is a point I consider of great practicable importance to the success of its economic working. The packing-ring is contractible, so that any wear is taken up by the ring itself. The steam-supply, steam, and exhaust apertures or ports only enter halfway diametrically through the ring. They are then deflected at right angles, and pass out through the end surfaces of the ring. These surfaces are made steam-tight between the follower and trunk-casing, like an ordinary metallic-packed piston, so that the ring has liberty to follow the wear between itself and the trunk, and at the same time keep its joints on the end perfectly steam-tight.

The accompanying drawings form a part of this specification, and represent the best means of carrying out my improvement in its application to compound engines.

Figure 1 is a longitudinal section through the line marked *x y* in Fig. 2, up to the vertical center of the trunk packing-ring. The section then cuts through the line marked *v w*, to show part of the exhaust-port in the packing-ring and passage leading from it in the trunk-casing.

The main cylinder is marked A, main piston is marked B, trunk is marked C, trunk-casing is marked D, contractible packing-ring is marked E, the follower is marked F, guide on trunk is marked G, auxiliary pistons are marked H H, auxiliary cylinders marked I I, steam-chambers in trunk are marked K, exhaust-chambers in trunk marked M M′, steam-supply apertures marked N, steam-supply apertures in packing-ring, and apertures from them to their respective cylinders, marked L

L′, and the exhaust-ports in packing-ring, and apertures from them to main exhaust-ports, marked M M.

Fig. 2 is a plan. Fig. 3 is an end view. Fig. 4 is a section of trunk, packing-ring, and follower, showing how the steam-supply passage may be carried directly through the follower into the main cylinder and take its steam from there. Fig. 5 is a section of trunk, follower, and packing-ring, showing how the steam-supply can be carried from the cylinder to the packing-ring port through a channel-way in the trunk, dispensing with a supply-port in the packing-ring.

I claim as my improvement—

1. A contractible packing-ring, having ports for the distribution of steam to the auxiliary cylinders of the slide-valve-moving pistons in a compound trunk-engine, in combination with the trunk, having steam-passages to connect with ports in the above-mentioned contractible packing-ring, substantially as specified, and as herein set forth.

2. The guide-bar attached to the trunk-casing, in combination with the trunk, having steam-passages which connect with ports in the contractible packing-ring, substantially as specified, and for the purpose as herein set forth.

JOHN FISH.

Witnesses:

JAMES S. SANDFORD,

ARCHD. GRACIE.