

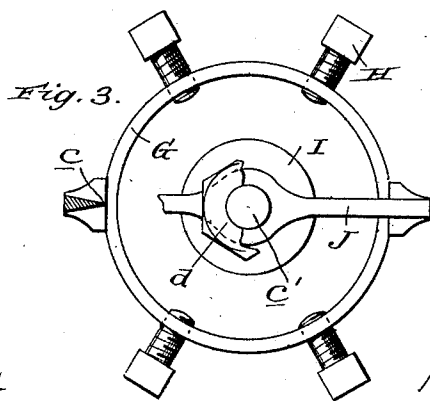
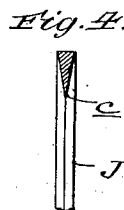
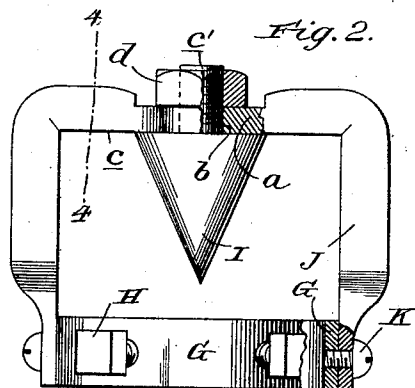
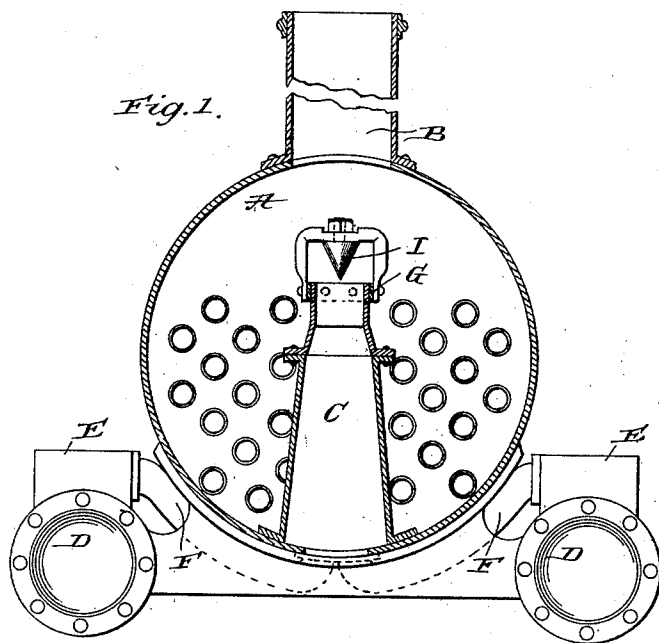
No. 716,635.

Patented Dec. 23, 1902.

J. J. HAYCRAFT.
EXHAUST EXPANDER FOR STEAM ENGINES.

(Application filed May 8, 1902.)

(No Model.)



Witnesses
A. Rudes
N. C. Sealy

Inventor
J. J. Haycraft
By *James J. Sealy* Attorney

UNITED STATES PATENT OFFICE.

JOSIAH J. HAYCRAFT, OF MONTGOMERY, ALABAMA.

EXHAUST-EXPANDER FOR STEAM-ENGINES.

SPECIFICATION forming part of Letters Patent No. 716,835, dated December 23, 1902.

Application filed May 8, 1902. Serial No. 106,433. (No model.)

To all whom it may concern:

Be it known that I, JOSIAH J. HAYCRAFT, a citizen of the United States, residing at Montgomery, in the county of Montgomery and State of Alabama, have invented new and useful Improvements in Exhaust-Expanders for Steam-Engines, of which the following is a specification.

My invention relates to exhaust-expanding means for steam-engines, particularly locomotives, and contemplates the provision of an expander which without retarding the escape of steam from the exhaust-nozzle, and thereby interfering with the free working of the engine, is calculated to expand or spread the steam before the same reaches the stack, with the result that instead of passing in a small stream up through the center of the stack the steam will fully occupy and create a considerable vacuum in the stack, and thereby increase the draft and contribute to the steaming qualities of the engine, as well as to economy of fuel.

With the foregoing object in mind the invention will be fully understood from the following description and claims when taken in conjunction with the accompanying drawings, in which—

Figure 1 is a transverse section taken through the smoke-box of a locomotive and illustrating my improved exhaust-expander in its proper operative position with relation to the exhaust-nozzle; Fig. 2, an enlarged elevation, partly in section, of the exhaust-expanding means or attachment removed; Fig. 3, a plan view, partly in section, of the same; and Fig. 4 a detail section taken in the plane indicated by line 4 4 of Fig. 2.

Similar letters of reference designate corresponding parts in all the views of the drawings, referring to which—

A is the smoke-box of a locomotive, B the stack, C the exhaust-nozzle, D D the cylinders, E E the steam-chests on the cylinders, and F F the conduits between the chests and nozzle, all of which may be and preferably are of the ordinary well-known construction.

G is the band of my improved attachment, which is designed to surround the nozzle C, preferably flush with the upper end thereof, and be fixed to said nozzle by a plurality of

set-screws H, I my improved expander, which is of suitable metal, and J the expander-support, which is preferably of steel, so as not to be liable to wear under the action of the steam. The said support in the preferred embodiment of the invention is bail-shaped and connected at its ends by screws K or other means to the band G. At its middle the support has a flat horizontally-disposed portion *a*, provided with a vertical aperture *b*, and between said portion *a* and its ends it has an inner knife-edge *c*, Figs. 3 and 4, this in order to prevent it from offering any obstruction to the passage of steam.

The expander I is cone-shaped and is provided at its upper or large end with a threaded stem *c'*, which is arranged in the aperture *b* of support J and secured thereto by a nut *d*.

As will be readily observed by reference to Fig. 1, my improved expanding means are susceptible of ready attachment to and removal from an ordinary exhaust-nozzle, the screws H permitting of all the adjustment that is necessary.

In practice the cone-shaped expander is arranged with its point down and at a height of about one-half of an inch above the upper end of the nozzle C and coincident with the center of the nozzle. This is materially advantageous, because while the expander does not interfere with or retard the escape of steam from the nozzle it is enabled to expand or spread the steam before the same reaches the stack B. From this it follows that instead of passing in a small stream up through the center of the stack the steam will fully occupy the stack and by so doing will create a greater vacuum in the smoke-box, and thereby increase the draft and contribute materially to the steaming qualities of the engine. The fact that the expander does not interfere with the free escape of steam from nozzle C is important, since by reason of the same back pressure on the pistons is removed and free working of the engine obtained. The ability of the expander to spread or expand the steam before the same reaches the stack admits of a larger exhaust-nozzle than those extant being employed, produces a free-steaming engine, and effects a great saving in fuel.

I have entered into a detailed description of the construction and relative arrangement

of the parts embraced in the present and preferred embodiment of my invention in order to impart a full, clear, and exact understanding of the same. I do not desire, however, 5 to be understood as confining myself to such specific construction and arrangement of parts, as such changes or modifications may be made in practice as fairly fall within the scope of my claims.

10 Having described my invention, what I claim, and desire to secure by Letters Patent, is—

1. An exhaust-expanding attachment for steam-engines comprising a band, set-screws 15 bearing in threaded apertures in the band, a support connected to and rising from the band, and having an inner knife-edge, and a cone-shaped expander carried by the support, and arranged with its point down.

20 2. In a steam-engine, the combination with an exhaust-nozzle, of an exhaust-expanding attachment comprising a band surrounding the upper end of the nozzle, and fixed thereon by one or more set-screws, a bail-shaped

support connected at its ends to and rising 25 from the band and having an inner knife-edge, and a cone-shaped expander carried by the cross-bar of the support and arranged with its point down and in a plane above the upper end of the nozzle and coincident with 30 the nozzle center.

3. An exhaust-expanding attachment for engines comprising a band having radial, threaded apertures, set-screws bearing in said 35 apertures, a bail-shaped support connected at its ends to and rising from the band, and having an inner knife-edge, and a cone-shaped expander arranged with its point down, below the cross-bar of the support and connected at its upper end to said cross-bar. 40

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

JOSIAH J. HAYCRAFT.

Witnesses:

M. M. SWEATT,
WILLIFORD DUSK.