

No. 610,856.

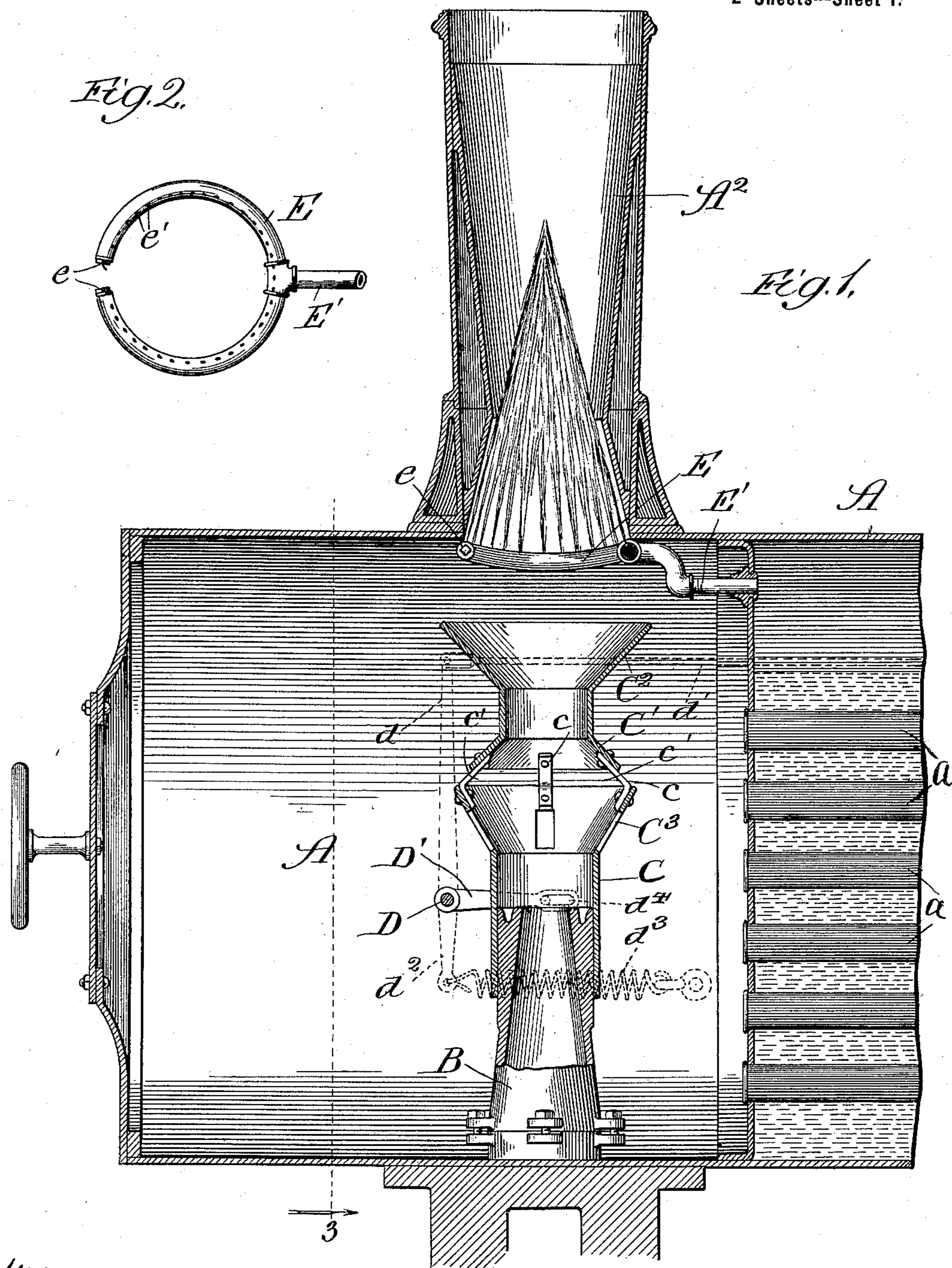
Patented Sept. 13, 1898.

C. A. COUCH.  
LOCOMOTIVE.

(Application filed Nov. 18, 1897.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses:  
Chas. E. Gaylord,  
John D. Allen.

Inventor:  
Charles A. Couch,  
By Banning & Banning, Attorneys.

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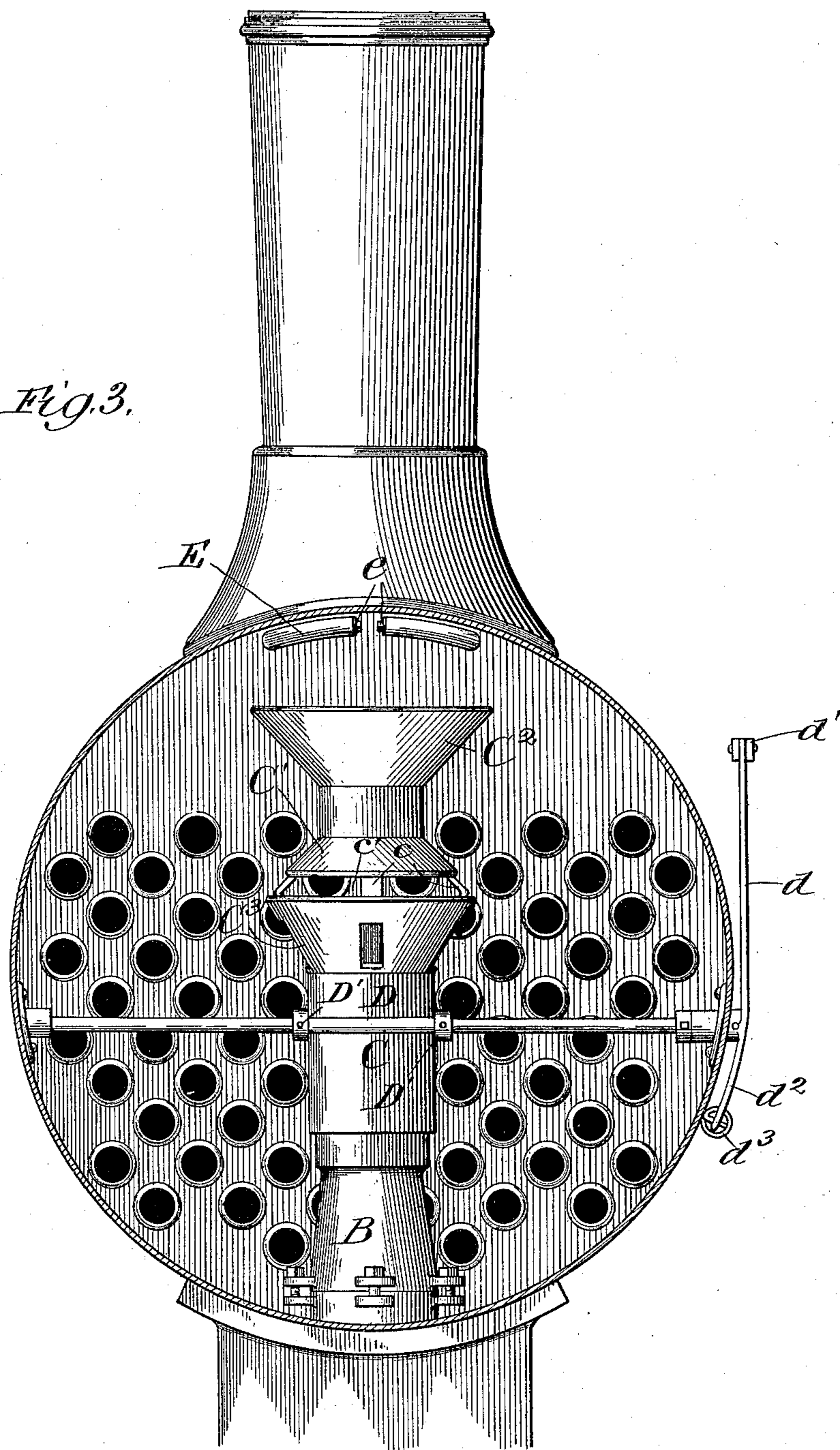
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2 Sheets—Sheet 2.

Fig. 3.



Witnesses:  
E. S. Gaylord,  
L. S. Allen.

Inventor:  
Charles A. Couch,  
By Ranning & Ranning & Sheridan,  
Attys.

# UNITED STATES PATENT OFFICE.

CHARLES A. COUCH, OF CHICAGO, ILLINOIS.

## LOCOMOTIVE.

SPECIFICATION forming part of Letters Patent No. 610,856, dated September 13, 1898.

Application filed November 18, 1897. Serial No. 658,883. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES A. COUCH, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Locomotives, of which the following is a specification.

The object of my invention is to provide a locomotive-boiler with a simple, economical, and efficient heat-deflector arranged in the smoke-box and in line with the exhaust-outlet of the smoke-stack; and the invention consists in the features, combinations, and details of construction hereinafter described and claimed.

In the accompanying drawings, Figure 1 is a longitudinal sectional elevation of the front end of a locomotive, showing my improvements attached thereto; Fig. 2, a plan view of the divided ring for providing a steam-jet to the stack; and Fig. 3, a transverse sectional view taken on line 3 of Fig. 1, looking in the direction of the arrow.

In the art to which this invention relates it is well known that the exhaust of the steam through the smoke-stack and the puffing caused thereby create such an artificial draft in the fire-box as to raise the smaller particles of coal from the bed of fuel and carry them out through the flues into the smoke-box and thence out through the smoke-stack. Sometimes these cinders and particles of fuel are ignited and are therefore dangerous from the fact that they oftentimes set fire to the timber, dried grasses, and the like adjacent to the line of railroad-track. A great waste of fuel is also caused from the fact that a great many of these particles of fuel are drawn out of the fire-box before they have a chance to be consumed and generate heat. Further, during the run of a locomotive considerable heat passes into and out of the smoke-box and raises the material therein to a high degree of heat, so that when the engine comes to a stop a partial vacuum is caused therein and cool air rushes into the fire-box and cools such material, causing sudden contraction and warping of the parts, as well as lowering the temperature of the steam. The principal object of my invention, therefore, is to construct a locomotive that will obviate these objections and provide it with mechanisms by which the draft may be regulated, fuel be

economically consumed, and a large portion of the heat absorbed which usually passes out through the smoke-stack.

In constructing a locomotive in accordance with my improvements I use a boiler A, of the desired size, shape, and strength, having a fire-box, tubes or flues *a*, smoke-box A', and smoke-stack A<sup>2</sup>. A steam-exhaust nozzle B is arranged in the smoke-box in line with the smoke-stack, so that the exhaust of the steam may pass out through the same.

In order to provide a heat-deflector, draft-regulator, and spark-arrester, economically burn the fuel, and assist in regulating the temperature of the boiler, I movably mount a deflector on the exhaust-flue and in line with the smoke-stack. This deflector consists of a socket-sleeve portion C, that easily fits the nozzle of the exhaust-flue, a double-cone-shaped intermediate portion C', so as to leave an expansion-chamber *c*, and an upper funnel-shaped portion C<sup>2</sup>. The upper part of this deflector is held in connection with the lower portion by means of the straps *c'*, which are riveted or bolted to both portions, so as to provide annular and radial openings *c'*. This opening or openings is for the purpose of allowing expanded gases at high temperature to force themselves into the longitudinal passage of the deflector and prevent "choking," which might otherwise occur. The upper part of the funnel-shaped portion C<sup>2</sup> is of a diameter slightly larger than the opening of the smoke-stack, so as to effectually close the same whenever it is necessary or desirable so to do. The particular shape of this deflector, as above described and as shown in the drawings, is for the purpose of enabling it to be used in connection with a short nozzle of the exhaust and so that exhaust-steam as it rises may expand without causing undue back pressure. The intermediate expansion-chamber C<sup>3</sup>, formed by the double-cone-shaped portion of the deflector, allows the steam to expand and then concentrate it again, so that it may be forced out through the upper portion and into the stack—in other words, to keep the escaping steam in as near a direct line as possible and enable it to enter the smoke-stack and fill the same within a few inches of the base of the stack.

To move the deflector vertically, I provide a rock-shaft D, having an operating-lever *d*

and rod  $d'$ , that leads to the cab of the locomotive. The lower portion  $d^2$  of this operating-lever is provided with a helical spring  $d^3$ , that acts to retain the parts in a normal open position, as shown in Fig. 1. The rock-shaft is further provided with one or more lever-arms  $D'$ , slotted at  $d^4$ , so as to engage with pins  $d^5$  on the deflector and raise or lower such deflector by the movement of the rock-shaft.

When the locomotive is at a standstill, the draft becomes sluggish, and as a consequence the supply of oxygen for the fire-box is insufficient to support combustion, thereby causing smoke, which is very obnoxious and objectionable, especially at railway-stations. To overcome this objection and in a measure form a spark-arrester, I provide a divided ring  $E$ , which is formed of a piece of steam-pipe plugged at the ends  $e$  and having radial openings or perforations  $e'$ . This divided ring is arranged at the base of the smoke-stack and connected by means of the pipe  $E'$  with a source of steam under pressure, and the openings are so arranged that they radiate in such a manner as to form a cone of steam meeting at a point in the stack. If it is desired, therefore, to increase the draft, steam under pressure is supplied to this divided ring, and as a consequence it forces the heated gases and products of combustion out through the stack, so that atmospheric pressure may force sufficient air and oxygen into the fire-box and assist in combustion.

In operation the products of combustion—heated gases, cinders, and the like, if they be formed—pass from the fire-box through the flues into the smoke-box and first contact the body of the heat-deflector. The upward course of the products is such that they first have to move outwardly before they can move upwardly, thus causing a reactionary current, which permits the heavy cinders and pieces of coal to fall back into the box. It will be noticed that the upper portion of the deflector is large enough in diameter so that when it is raised to its upper limit it, with the stack, incloses the divided ring and if steam be furnished causes a draft, so that the heated gases and products of combustion will pass into the deflector through the annular radial openings and into the stack through its longitudinal opening. It will be observed that by the regulation of the draft the cinders and small particles of coal in the fire-box are not lifted from the bed of fuel—that is, the draft is sufficient to supply the requisite amount of oxygen, but insufficient to cause the raising and drawing out of the heavy particles. The heat-deflector is also of such size that it absorbs a large quantity of the heat from the superheated steam passing therethrough, so that when the engine comes to a standstill this heat is in turn radiated to materially assist in keeping the parts at a uniform temperature, thereby preventing sudden contraction and consequent warping of the parts.

I claim—

1. In a locomotive, the combination of an exhaust-nozzle arranged in the smoke-box in line with the stack, a hollow movable heat-deflector arranged in line with the exhaust-nozzle and the stack portion and having an upper funnel-shaped portion and an enlarged chamber intermediate the funnel portion and the inlet of the deflector, substantially as described.
2. In a locomotive, the combination of an exhaust-nozzle arranged in the smoke-box and in line with the opening of the stack, a hollow heat-deflector movably mounted thereon provided with an upper funnel-shaped portion and an intermediate enlarged double-cone-shaped chamber the heat-deflector being divided so as to form an annular opening communicating with the smoke-box and the longitudinal passage in the deflector, substantially as described.
3. In a locomotive, the combination of an exhaust-nozzle arranged in line with the opening in the smoke-stack, a heat-deflector vertically and movably mounted thereon and interposed between the opening in the exhaust-nozzle and the smoke-stack having an upper funnel-shaped portion of a diameter larger than the opening of the stack and an intermediate double-cone-shaped portion providing an enlarged chamber between the outlet and inlet openings of the deflector such deflector being divided transversely at the double-cone-shaped portion so as to provide annular radial openings therein, and means for vertically moving the deflector so as to open and close the channel between the stack and smoke-box, substantially as described.
4. In a locomotive, the combination of an exhaust-pipe arranged in the smoke-box and in line with the opening of the stack, a heat-deflector arranged in line with the exhaust-pipe and the opening of the stack and provided with an enlarged chamber between the inlet and outlet openings of the deflector, substantially as described.
5. In a locomotive, the combination of an exhaust-nozzle arranged in line with the smoke-stack, a divided hollow ring arranged at the base of the smoke-stack connected with a source of steam under pressure and having radial openings therein arranged at an angle so that steam may be projected into the smoke-stack and form a cone, a vertically-movable heat-deflector arranged on the nozzle of the exhaust-pipe and provided with an upper portion adapted to move up and inclose the divided ring the heat-deflector having radial and longitudinal openings, and means for moving the heat-deflector, substantially as described.

CHARLES A. COUCH.

Witnesses:

THOMAS F. SHERIDAN,  
THOMAS B. MCGREGOR.