

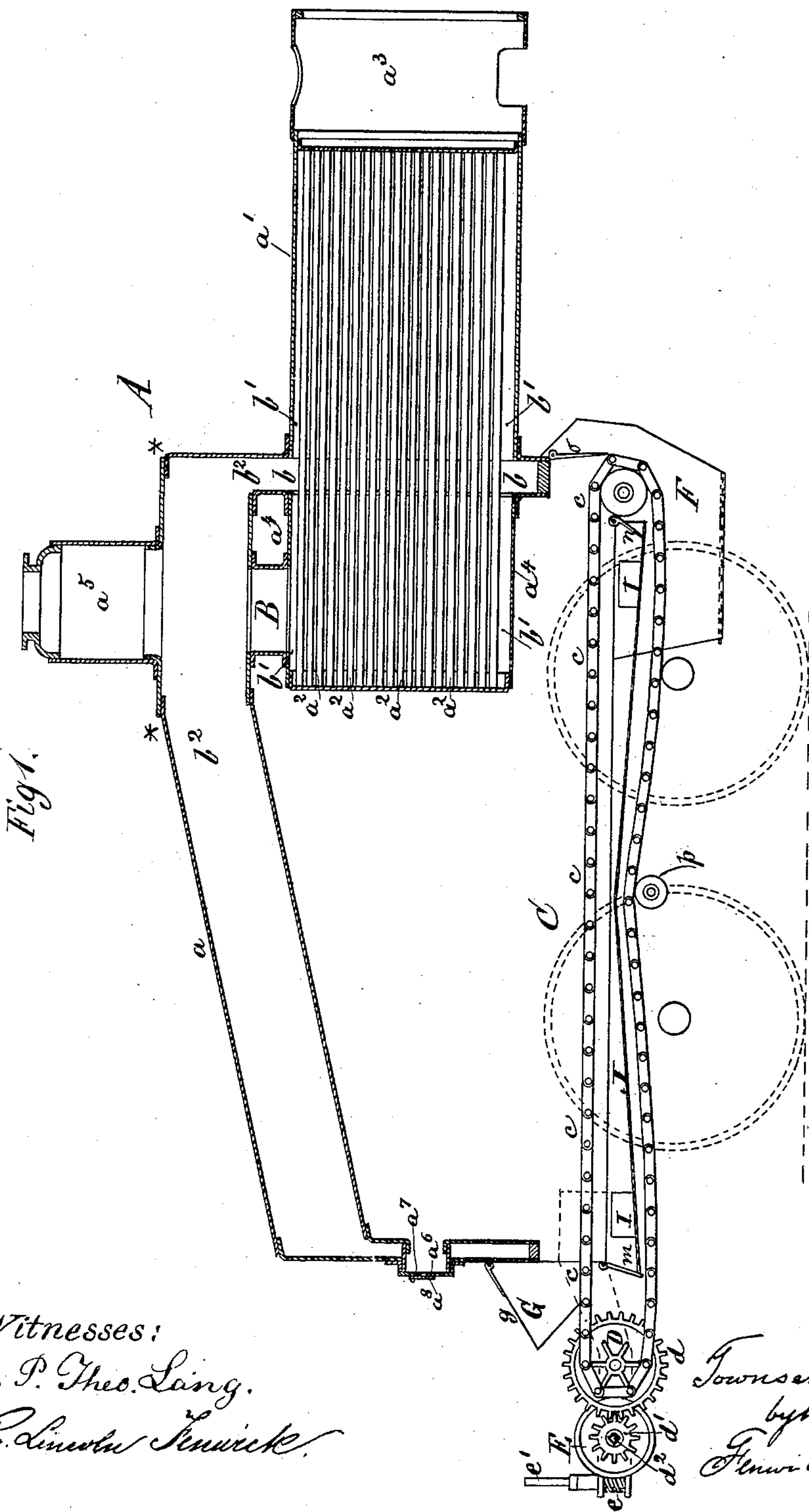
(No Model.)

2 Sheets—Sheet 1.

T. POORE.
STEAM BOILER.

No. 336,430.

Patented Feb. 16, 1886.



Witnesses:
J. P. Theo. Laing.
R. Lincoln Fenwick.

Inventor:
Townsend Poore
by his attys
Fenwick and Lawrence

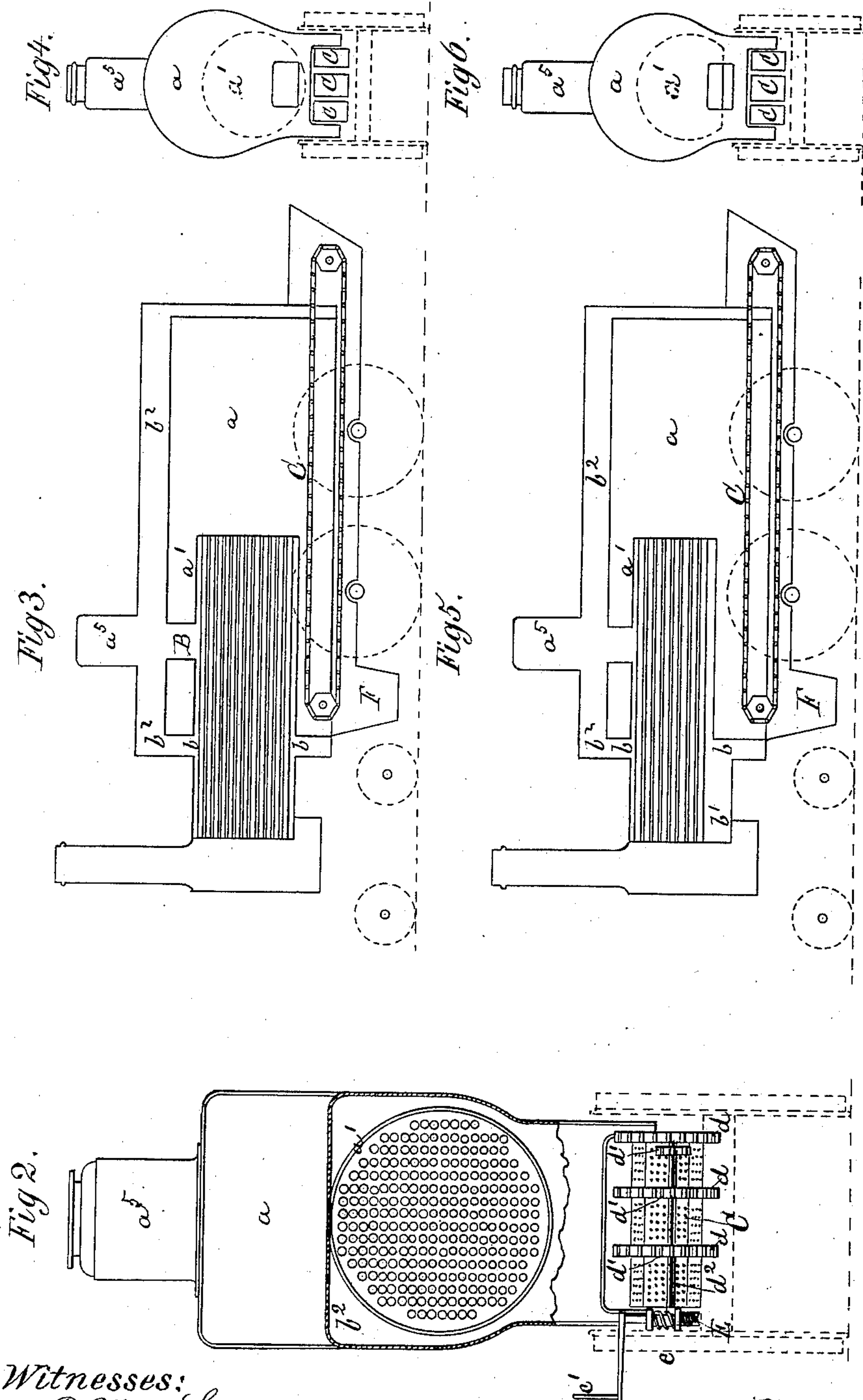
(No Model.)

2 Sheets—Sheet 2.

T. POORE.
STEAM BOILER.

No. 336,430.

Patented Feb. 16, 1886.



Witnesses:
J. P. Theo. Lamy.
R. Lincoln Fenwick

Inventor:
Townsend Poore
by his atty
Fenwick and Lawrence

UNITED STATES PATENT OFFICE.

TOWNSEND POORE, OF SCRANTON, PENNSYLVANIA.

STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 336,430, dated February 16, 1886.

Application filed April 20, 1885. Serial No. 162,927. (No model.)

To all whom it may concern:

Be it known that I, TOWNSEND POORE, a citizen of the United States, residing at Scranton, in the county of Lackawanna and State of Pennsylvania, have invented a new and Improved Combined Locomotive Furnace or Fire-Box and Boiler and Grate Therefor, of which the following is a specification.

My invention consists, first, in an improved construction of a locomotive boiler and furnace with increased heating-surface by extending the furnace portion in a forward direction, so as to include in its combustion-chamber or fire-room a part of the cylinder which contains the usual tubes or flues, and by so reducing the diameter of said flue-cylinder that the flues occupy the inner space of the same up to its top, thereby transferring the room or space ordinarily allowed for steam from the cylinder to the steam room or space of the furnace, and by making a water or steam connection around the cylinder between it and the furnace or fire-box at the forward end of the same, and by making a steam or water connection between the rear portion of the cylinder and water and steam space above the crown-sheet of the furnace or fire-box; and, second, it consists in certain constructions and combinations of parts, as will be hereinafter described, and specifically claimed.

The objects of my invention are, to increase the direct fire-surface, to decrease the bulk of the cylinder, and consequently the top-heaviness of the boiler, while a free escape for steam is secured, and to produce an effective locomotive-boiler, although heated with an inferior quality of fuel, and an improved combined boiler furnace and grate adapted for burning culm.

In the accompanying drawings, illustrating my invention, Figure 1 is a central vertical longitudinal section of the combined locomotive fire-box and steam-boiler and endless-chain grate. Fig. 2 is a front view of the same, portions of the front being broken away to show the arrangement of the flue-tubes of the cylindrical portion of the boiler. Figs. 3, 4, 5, and 6 are views of modified constructions of my invention.

A in the drawings represents the combined fire-box and boiler, comprising a locomotive

furnace or fire-box portion, a , with water-spaces b and b^2 between its walls, and a steam-dome, a^5 , and a cylindrical tubular boiler portion, $a' a^2 a^4$, placed below the water-line of the combined fire-box and boiler, the same having a water-space, b' , flue-tubes a^2 , and smoke-chamber a^3 , leading to smoke-stack, as shown. The said fire-box, with water-spaces between its walls, is made with an increased length—say it is lengthened to an extent equal to the distance included between the * * in Fig. 1— which length may be equal, say, to the portion a^4 of the boiler which is inclosed by the walls of the fire-box, as shown.

The cylindrical and tubular portion of the boiler may be about the ordinary length used on locomotives of a given size, and it has its part a^4 constructed within the combustion-chamber of the fire-box, so as to be surrounded by the fire of the furnace, and this portion is connected to and suspended from the top portion of the fire-box a by means of a short stout pipe, B, its front open end being connected with the water-space b^2 and steam-dome a^5 of the fire-box by means of a circular cylindrical portion of the combined furnace water-way, b . The other portion, a' , of the cylindrical portion of the combined furnace or fire-box and boiler is constructed outside the fire-box, being fastened thereto, while its forward end is connected to the smoke-box a^3 , or stack of the locomotive. The flue-tubes a^2 are extended from rear to front flue-sheets, one sheet being at the rear end of the part a^4 of the cylindrical portion of the combined fire-box and boiler, while the other is near the smoke-box, as shown.

From the drawings it will be seen that the spaces for containing water to be generated into steam are brought into the most intimate and effective relation to the fire for the production of steam; also, that the communication between one water-space and another is established in a very direct manner, while a large and free escape for the steam produced is secured, and at the same time a very strong structure produced.

My construction of combined steam-generating fire-box and boiler gives a combustion-chamber of extra length, while the cylindrical tubular portion of the structure may be of

the length usually adopted for a given-sized locomotive; and by this means an additional direct fire-surface from the walls of the fire-box, and also from the part a^4 of the cylindrical and tubular portion of the structure, is secured, thus very greatly increasing the steam-generating capacity of the combined locomotive fire-box and boiler. Furthermore, by this construction the fire-box, on account of its great length and the large amount of fire-surface, is adapted for the employment of an endless traveling chain grate, and the use of fine fuel, such as culm or siftings of coal.

The most practical way of applying an endless-chain grate is to construct the fire-bed of a series of chains, C, composed of linked grate-plates c , as shown; and when several chains formed of such plates are adopted, the chains may be supported on girders in the same manner as is shown and described in my pending application, No. 162,319, filed April 15, 1885, and moved together or separately by means of spiders D, provided with gear-wheels d , into which are meshed pinions d' on a square or other suitable shaft, d^2 . The pinions d' are loosely fitted on the shaft d^2 , and when meshed with the wheels d , operate the spiders connected therewith, and thereby cause the chains to move slowly, and when it is desired not to move a certain one of the chains when the others are moved the pinion belonging to the spider of the said certain chain is slipped upon the shaft d^2 , out of range of the wheel d , as illustrated in Fig. 2. The shaft d^2 is provided with a worm-wheel, E, which is operated by a worm, e , with a crank-handle, e' , suitably hung upon the furnace.

For a more particular illustration and description of the grate C, when made of several endless chains, reference is here made to my pending application for a patent, No. 162,319, filed April 15, 1885.

If a single endless-chain grate is adopted, it will be suitably supported by side and central girders sustained by transverse girders set into the walls, and the slack of the chain may be kept up by rollers, as p .

The fire-box has an ash-box, as F, below the portion a^4 of the cylindrical tubular boiler portion of the combined fire-box and boiler, and is provided with a door, a^6 , with a peep-hole, a^7 , which is covered by a slide, a^8 . The peep-hole permits observation, and when the progress of the fire is too slow the door can be opened for regulating the combustion. A suitable hopper, G, with swinging lid g , is applied below the door a^6 and above that portion of the grate which is outside the fire-box, for the purpose of charging the grate with fuel. In the sides of the fire-box doors I, for admitting air and implements for cleaning off ashes and debris from the grate, may be provided, and between the upper and lower portions of the endless-chain grate an ash screen or platform, J, inclined in opposite directions, may be used, as shown and described in my aforesaid pending application, No. 162,319,

filed April 15, 1885. There may also be hinged plates $m n o$, for closing the openings or passages of the fire-box through which the grate travels.

In the views Figs. 3 and 4 my invention is shown applied to a straight or wagon-top combined fire-box and boiler, and in Figs. 5 and 6 the boiler part a^4 is shown with a flat bottom. The flat bottom will give more room between part a^4 and the grate than when part a^4 is made cylindrical.

When the boiler is brought into use, the cylinder is filled to the top with water, and in the fire-box the crown-sheet is covered to a reasonable depth with water, above which the steam is collected and conducted away from the dome a^5 . By this mode the steam is confined to a comparatively compact space without decreasing the ordinary steam capacity of the locomotive. There is comparatively less cooling-surface than in the ordinary locomotive, and the place where the steam is collected is in the hottest and most effective steam-producing portion of the boiler and therefore, the best adapted for this purpose of any other portion of the whole structure.

In all the figures of the drawings my combined fire-box and boiler is represented supported upon wheels, as in locomotives; but it may be used without wheels for stationary engines, or for steamboat-engines without essentially changing the described construction and without departing from the principle of my invention.

I am aware of the state of the art prior to my inventions, as indicated by Letters Patent Nos. 192,725 and 283,672; but in the former of these the flue-tubes do not extend any distance into the fire-box or combustion-chamber proper of the furnace, and the flue-sheet is at the front of the fire-chamber, and therefore the length of the combined fire-box and boiler is much greater than mine, with no greater amount of direct fire-surface than is secured in my boiler, and, besides this, the large amount of the rear portion of the tubular boiler is not thrown bodily into the fire-chamber, as in my construction. In the latter patent the tubular boiler is not applied longitudinally with the fire-box, and the general construction and combination is such that an upright instead of a locomotive combined fire-box and boiler is produced, wherein the tubular portion of the structure is transverse to or at right angles to the sides of the fire-box, and there is no practical construction of a tubular cylindrical locomotive-boiler outside the fire-box, with a large portion of the same directly thrown in contact with the fire in the fire-chamber proper, as in my plan.

I also am aware of English Patent No. 591 for 1883, wherein the boiler-tubes are extended into the fire-box, and make no claim to anything claimed in said patent.

What I claim as my invention is—

1. The combination, with the locomotive-boiler furnace having its front portion ex-

5 tended, as at $x x$, of a cylinder applied partly inside and partly outside the furnace and attached to the front end of the same, below the water-line, and containing the usual boiler-flues, and of suitable water and steam connections between the furnace and cylinder, substantially as and for the purpose described.

2. The combined boiler-furnace comprising a furnace having the extended front portion, as

$x x$, flue-cylinder $a' a'$, steam and water way 10 d , and steam and water connection B between the cylinder portion a' and the top portion of the furnace, substantially as and for the purpose described.

TOWNSEND POORE.

Witnesses:

J. F. SNYDER,
HENRY JIFKINS.