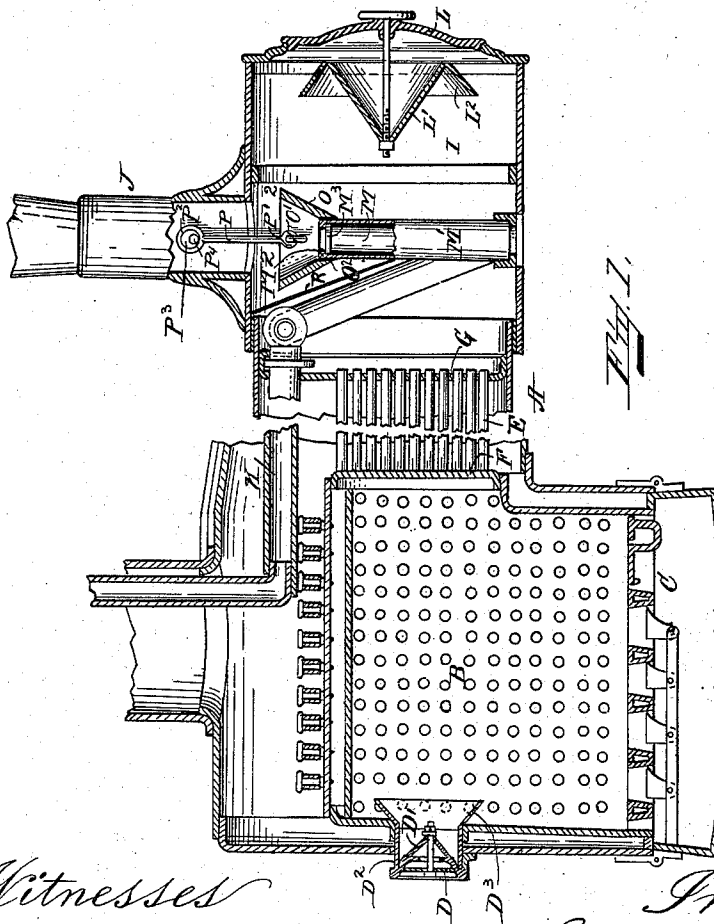
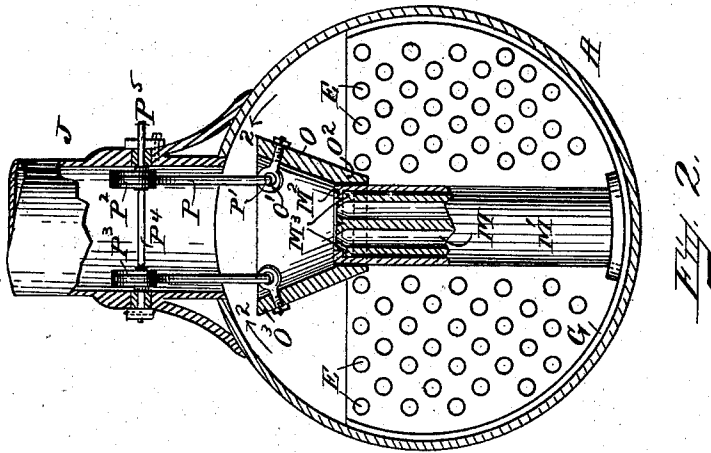


(No Model.)

C. A. COUCH.
LOCOMOTIVE.

No. 562,583.

Patented June 23, 1896.



Witnesses
L. H. Brown
E. L. Harlow

Inventor,
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By J. S. Rusk
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UNITED STATES PATENT OFFICE.

CHARLES A. COUCH, OF BOSTON, MASSACHUSETTS.

LOCOMOTIVE.

SPECIFICATION forming part of Letters Patent No. 562,583, dated June 23, 1896.

Application filed October 19, 1895. Serial No. 566,240. (No model.)

To all whom it may concern:

Be it known that I, CHARLES A. COUCH, of Boston, county of Suffolk, and State of Massachusetts, have invented new and useful Improvements in Locomotives, of which the following is a specification; and I hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements on locomotives, as shown in my Letters Patent No. 528,078, dated October 23, 1894, in which the exhaust-steam passes up through the exhaust-flue and then upward through the smoke-stack to aid the draft.

The objects of my invention are, first, by arranging a heat-deflector in the line of draft to the smoke-stack of the locomotive to deflect the heat before it passes up through the smoke-stack and to cause it to circulate within the smoke-box and tubes before escaping to the smoke-stack; second, to prevent in a great measure the downward draft of cold air into the smoke-box and boiler-tubes and consequent loss of fuel; third, to heat in its passage downward such air as forces itself downwardly into the smoke-box, and, fourth, to provide means for varying the position of the said heat-deflector with reference to its distance from the bottom of the smoke-stack. These and other objects are accomplished by the construction hereinafter shown and described.

My invention consists of certain novel features hereinafter described, and particularly pointed out in the claims.

In the accompanying drawings, which form a part of this application and illustrate a construction embodying my invention, Figure 1 is a longitudinal sectional view taken through the locomotive-boiler. Fig. 2 is an enlarged front view of the same with the front of the smoke-box removed and with parts in section.

A represents a locomotive-boiler of the usual construction and provided with a fire-box B, grate C, fire-door D, fire-tubes E, extending between the flue-sheets F and G, smoke-box I, into which the products of combustion pass from the fire-box B, smoke-stack J, and steam-pipe K, through which the steam passes from the fire-dome to the steam-cylinders.

The inner face D' of the fire-door D is constructed of conical shape, as shown, and the door-frame D² is provided with a flaring collar D³, and there is secured to the front door L of the locomotive a cone L', having a collar L², and the object of thus constructing the fire-door and the cone in the smoke-box is for the purpose of deflecting heat, which being thus deflected is thrown against the sides of the boiler and kept in continuous circulation, and any heat contained in said cone and collar is imparted to the tubes and sides of the boiler, and the cone L' and collar L² in the smoke-box also serve the purpose of changing the course of cinders which might pass into the smoke-box, so as to throw them off at an angle against the sides thereof, after which they drop by their own weight to the bottom of the smoke-box, from which they can be removed.

When a locomotive is going at a high speed, the atmospheric pressure is against it, so if the cone and the collar represented the door they would be of no use, because they would be cool on the side which is exposed to atmospheric pressure and offset the amount of heat that might approach them in the smoke-box; but as the door receives the atmospheric pressure it prevents the atmospheric pressure from touching the cone and collar, which become highly heated by the products of combustion.

Around the exhaust-flue M in line with the smoke-stack there is arranged a cylinder M', provided at its upper end with an inwardly-turned flange M², which rests on the flange M³ of the exhaust-flue M. Located around the upper end of said cylinder M' is a hollow heat-deflector O, preferably having a shape of an inverted truncated cone, and of metal of sufficient thickness to contain considerable heat. This deflector O is supported by suitable rods P, having their lower ends P' connected to the said deflector by eyes O', and the upper end P² of each rod is mounted on an eccentric P³, fixed fast on a shaft P⁴, which is journaled in the sides of the smoke-stack and has an extension P⁵, to which a suitable rod may be connected and extended to the engineer's cab for operating said shaft in order to raise or lower the deflector O by the said eccentrics acting on the upper ends of

the said rods, as the lower end O² of the said deflector O is over and is adapted to slide up and down on the outer surface of the cylinder M.

5 The cast-iron cylinder M is constructed large enough to fit around the steam-exhaust of the locomotive, whether it is a double or a single exhaust, and on the outside is always of a uniform size, and the lower part O² of the
10 deflector O is also constructed of a uniform size, so that it will slide up and down on the cylinder above described when applied to any locomotive in service without the necessity of any alteration being made in the locomotive, and when a single exhaust is used of a
15 smaller size than the double exhaust the flange M² is increased inwardly to fit around the upper end of the exhaust.

The upper edge O³ of the deflector is located on a line sufficiently below the lower opening of the smoke-stack to leave a passage-way Q of greater capacity than that of the smoke-stack, and the diameter of the upper edge of the deflector is greater than the
25 diameter of the lower opening of the smoke-stack, and in practice preferably about three inches, so that the downward draft of cold air is intercepted by the interior of the heat-deflector O.

30 In practice it has been ascertained that after each upward blast of the exhaust a partial vacuum is formed in the smoke-box, causing a downward rush of air through the smoke-stack into the smoke-box and thence through
35 the flues of the boiler, cooling the same and causing a disturbance of the bed of coals in the fire-box, whereby much of the fuel is loosened and the finer particles of the same escape before combustion takes place through
40 the flues of the boiler and smoke-box and are thus lost through the smoke-stack.

After the heated air and products of combustion pass through the fire-tubes E and under the deflector R into the smoke-box I, they
45 strike the cone L' and collar L² and are deflected and then impinge on the outside curved surface of the heat-deflector O and are deflected from their course to the smoke-stack and caused to circulate within the smoke-box and around the said deflector, thereby heating it until they pass upward through the opening Q, as indicated by the arrows, into the smoke-stack and thence into the open air.

The cool draft of air downward through the smoke-stack is interrupted in its passage by striking the heated interior surface of the deflector, where it becomes heated, and if any escapes below said deflector into the smoke-box and boiler-tubes it is at a sufficiently high
60 temperature so as not to chill the tubes and flue-sheet. As the downward draft is nearly abolished, the upward draft through the boiler-tubes is nearly uniform, so that the fire in the fire-box is not disturbed, thereby
65 preventing the escape of smaller particles of fuel.

In order to meet the various conditions arising

from the use of the same locomotive for different purposes, as for yardwork, freight-service, and express-service, the deflector O
70 must be capable of adjustment up and down in order to increase or decrease the distance between the bottom of the smoke-stack and the top of the deflector, and there should be provided to the said deflector a movement of
75 about six to eight inches, but in all cases the distance between the bottom of the smoke-stack and the top of the deflector should be not less than four inches. In service where there is a strong draft the deflector is raised,
80 while in service where the draft is light the deflector is lowered, so that in the case of freight-trains, where the steam is all exhausted through the stack and the products of combustion are, by the continuous exhaust,
85 drawn out, the deflector does not have to be lowered to the same extent as it would be in the case of express-service, because in freight-service the continual puffing of the engine causes a great draft and the exhaust up the
90 smoke-stack is of much greater velocity than in express-service, while in express-service, when the engine has reached its velocity, the draft is much less, although the amount of coal used is about the same. Consequently
95 in express-service, in order to create a better draft, the deflector O is lowered, while in freight-service it is raised.

The products of combustion impinging against the deflector are deflected and radiated backward through the tubes and over the fire-box, thus damming up the heat, and when the said deflector becomes extremely hot by the heat impinging against its sides it
100 throws off a large amount of heat, which passes back into the tubes and is imparted to the water in the boiler.

The departure of the products of combustion being slowed up by means of this deflector O, it results that the coal is not lifted off
110 the grates and carried through the flues, as in the ordinary construction of locomotives, but in case any cinders are carried through the tubes they strike against the cone and collar of the fire-door, or against the cone and collar
115 attached to the front door, and are turned off and drop down into the fire-box or to the bottom of the smoke-box, respectively, as they have lost their velocity.

Of course it will be understood that if desired the cylinder or barrel M' may move with said deflector and may be made of one piece with the said deflector O, or instead of being made of one casting the deflector O can be suitably secured to said barrel.
125

It will also be understood that any suitable means for raising and lowering the deflector O may be used instead of the rods P and eccentrics shown, as, for instance, suitable chains or levers may be used.
130

I do not limit myself to the arrangement shown, as the same may be varied without departing from the spirit of my invention.

Having thus ascertained the nature of my

invention and set forth a construction embodying the same, what I claim as new, and desire to secure by Letters Patent of the United States, is—

5 1. In a locomotive, a hollow heat-deflector located at the top of the exhaust-flue and interposed and supported between the boiler-tubes and the smoke-stack and having its sides inclined inwardly and downwardly, and
10 means for varying the position of the said deflector with relation to the bottom of the smoke-stack.

2. In a locomotive, in combination with an exhaust-flue, the hollow, inverted, conical-
15 shaped heat-deflector located at the top of the said exhaust-flue and interposed and supported between the boiler-tubes and the smoke-stack, and means for varying the position of the said deflector with relation to the
20 bottom of the smoke-stack.

3. In a locomotive, in combination with an exhaust-flue, the hollow, inverted, conical-shaped heat-deflector located at the top of the said exhaust-flue and interposed and sup-
25 ported between the boiler-tubes and the smoke-stack, and having its upper diameter greater than the lower diameter of the smoke-

stack, and means for varying the position of the said deflector with relation to the bottom of the smoke-stack.

4. In a locomotive, a heat-deflector interposed and supported between the boiler-tubes and smoke-stack, and having its upper diameter greater than the lower diameter of the smoke-stack, and means for varying the position of said heat-deflector with relation to the bottom of the smoke-stack.

5. In a locomotive, a hollow heat-deflector located at the top of the exhaust-flue and interposed and supported between the boiler-tubes and the smoke-stack and having its upper diameter greater than the lower diameter of the smoke-stack, and means for varying the position of said deflector with relation to the bottom of the smoke-stack.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, on this 14th day of October, A. D. 1895.

CHARLES A. COUCH.

Witnesses:

L. W. STAPLES,
L. H. TROW.