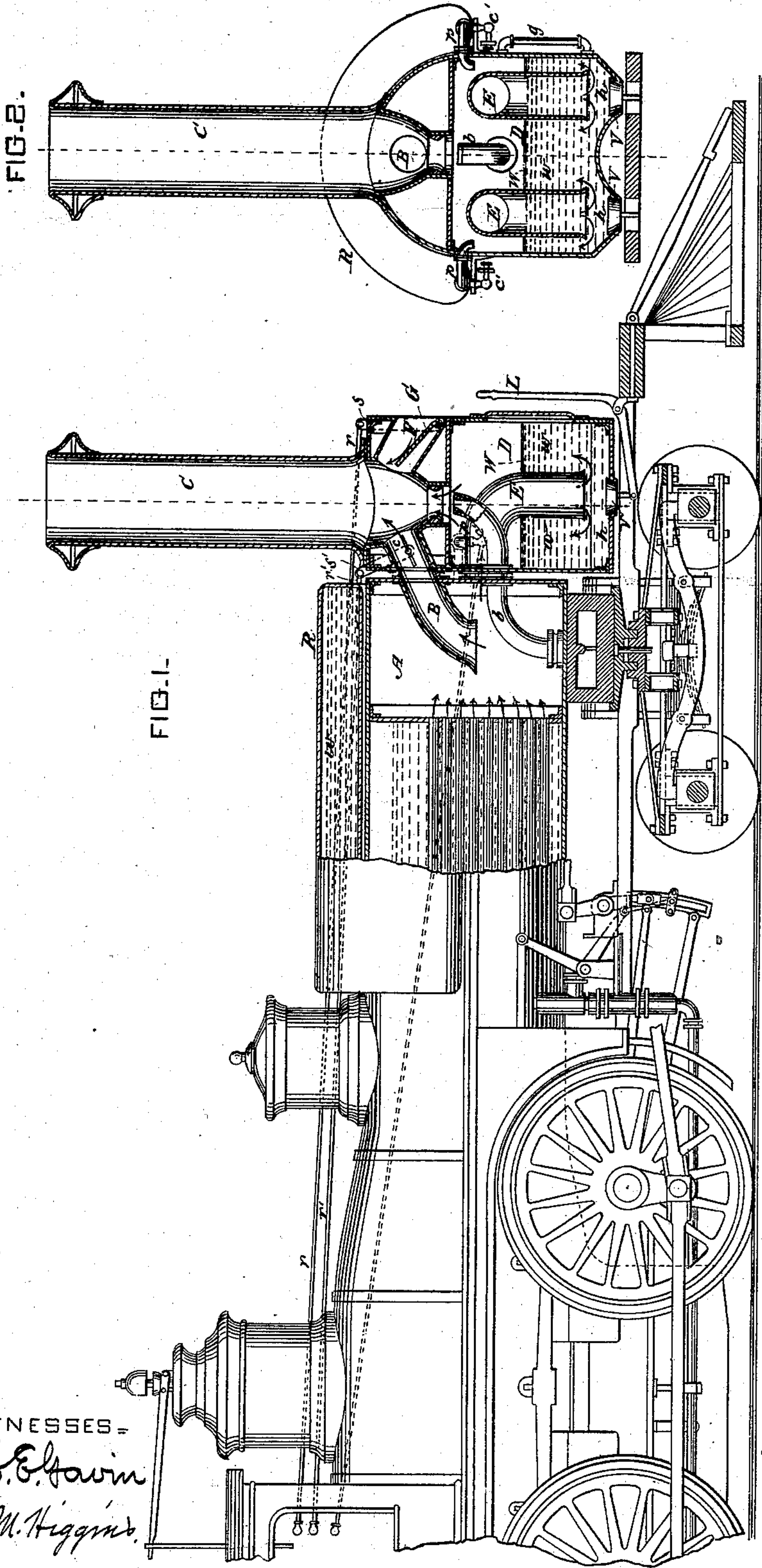


(No Model.)

D. GROESBECK.
Spark Arrester.

No. 235,762.

Patented Dec. 21, 1880.



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UNITED STATES PATENT OFFICE.

DAVID GROESBECK, OF NEW YORK, N. Y.

SPARK-ARRESTER.

SPECIFICATION forming part of Letters Patent No. 235,762, dated December 21, 1880.

Application filed October 28, 1880. (No model.)

To all whom it may concern:

Be it known that I, DAVID GROESBECK, of the city, county, and State of New York, have invented an Improvement in Spark-Arresters; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification.

The drawings represent, in Figure 1, a partially-sectional side view of a locomotive with my improved spark-arrester thereunto applied. Fig. 2 is a section made on the line *xx* in Fig. 1.

The object of the invention is to prevent the sparks from the smoke-boxes of locomotives from passing into their smoke-stacks, and thence out with the smoke, to the great discomfort of passengers in railway-trains.

The invention relates to that class of spark-arresters in which the smoke issuing from the boiler-flues is made to pass through water before entering the smoke-stack, during which passage the sparks and solid matters suspended in the smoke are intercepted and retained in the water tank or receptacle.

Hitherto in apparatus of this kind there has been a deficiency of power to draw or force the smoke through the water. There has also been difficulty in keeping up a supply of water for long runs of express-trains sufficient to compensate for the loss by evaporation. Proper provision for effecting a draft while the locomotive is standing on the track has not been made. It is the purpose of my invention to remedy these and other defects, and to render a spark-arrester acting in accordance with the principle named a thoroughly efficient apparatus.

In the drawings, A represents the smoke-box, into which the smoke debouches from the boiler-flues, as indicated by arrows in Fig. 1.

From the smoke-box a branch pipe, B, leads directly into the smoke-stack C. A direct passage for the smoke is thus supplied, which can be used at times when the locomotive is standing still, and also while the fire is being kindled in the furnace. A butterfly-valve, *c*, is employed to close this passage when the spark-arresting apparatus is desired to work.

Instead of connecting the smoke-stack directly with the smoke-box into which the smoke

and gases emerge from the flues, as has heretofore been done, I attach it to a tank, D, and lead the exhaust-nozzle *b* through the side of both the smoke-box and the tank, terminating it at or near the bottom part of the smoke-stack, which part is contracted in its horizontal cross-section, as shown in Figs. 1 and 2.

From the smoke-box A a bent pipe or pipes, flue or flues, E, lead into the tank D, the end of the said pipe or pipes within said tanks opening downward near the bottom of the tank at any suitable distance below the upper surface of the water retained in said tank, which water is represented at *ww*, and is supplied as needed from a saddle-back reservoir, R, carried on the front part of the boiler. The supply is effected through pipes *p*, Fig. 2, and is controlled by cocks *c'*, operated from the cab of the locomotive, as indicated in dotted outline in Fig. 1.

The bottom of the tank is made with pockets or concavities *h*, into which the collected solid matters settle. At the lower part of these concavities are fitted valves V, provided with some suitable means for opening them from the outside. A lever, L, may be used for this purpose, and it may, if desired, be provided with means for operating it from the cab of the locomotive.

A glass gage, *g*, to indicate the height of the water in the tank may be employed, placed in such position that its indications may be seen from the cab; or any other suitable indicator which can give its indications inside or outside of the cab may be employed.

Above the tank D is a passage, F, which opens from the front obliquely upward into the lower part of the smoke-stack. In this passage is placed an adjustable deflector, G. The adjustment of the deflector G is effected by the engineer in the cab by a rod, *r*, Fig. 1, provided with suitable catches or fastenings, which hold the deflector in position after the adjustment is made.

The rod *r* is pivoted to a crank-lever, *s*, attached to a horizontal shaft or bar which carries the deflector G. A similar arrangement, *r' s'*, enables the engineer in the cab to control the opening and closing of the butterfly-valve *c* in the branch pipe B.

When the locomotive is moving forward the

adjustment of the deflector G enables the draft through the smoke-stack to be so far increased that the gases of combustion are drawn through the water, leaving the suspended solid matters
 5 in the tank, the operation of the entire apparatus being as follows: The valve *c* being closed, the exhaust-steam, by its induction into the smoke-stack in an upward direction, acts in the usual manner. At the same time air
 10 blowing through the passage F with high velocity aids in drawing the smoke and gases from the tank D, the sum of the actions of the exhaust-steam and the current through F being ample to draw the smoke and gases through
 15 the water and discharge them out through the smoke-stack. The action of the air-current can be increased or diminished by the proper adjustment of the deflector D.

When the deflector is turned down into its
 20 lowest position the action of the air passing through F is at its minimum, and from this position it can be elevated till the action reaches the maximum.

It is not necessary to enter upon a calculation of the effects produced by the deflector
 25 when set at various points. It is sufficient for the purposes of this specification to say that its action is precisely similar to that of like deflectors in ventilating-flues which, by their
 30 rapid motion through the air, or by the action of winds through the flues or passages in which they are placed, induce a current through any other passage or space with which the first-named flue is connected, or, if said space
 35 be wholly inclosed, produce a partial vacuum therein.

To prevent the swashing of the water in the tank D, I place at the water-level a horizontal

wire screen, W, or a screen of perforated metal or other equivalent, which is attached to the
 40 sides of the tank to check the swashing of the water.

What I desire to secure by Letters Patent is expressed in the following claims:

1. The combination, with the smoke-box of
 45 a locomotive, of a tank for containing water exterior to said smoke-box, a pipe or passage, E, leading from the smoke-box, connecting said smoke-box and tank, and having the end
 50 farthest from the smoke-box open below the water-level in said tank, and a smoke-stack having its lower part connected with, inserted, or opening into said tank, substantially as and for the purpose specified.

2. The combination, with the smoke-box A,
 55 pipe or passage E, tank D, and smoke-stack C, of the flue or passage F, placed in front and opening into the smoke-stack, and the adjustable deflector G, arranged in said flue, substantially as and for the purpose described. 60

3. The combination of the smoke-box A, smoke-stack C, and the branch pipe B, provided with a valve, *c*, substantially as and for the purpose specified.

4. The combination, with the smoke-box A,
 65 flue E, tank D, and smoke-stack C, of the water-reservoir R, pipes *p*, and cocks *c'*, substantially as and for the purpose set forth.

5. The combination, with the water-tank D,
 70 of the screen W, placed at the water-level in said tank, substantially as and for the purpose set forth.

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Witnesses:

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