(No Model.) 3 Sheets—Sheet 1.

H. B. MAXWELL.

SPARK ARRESTER.

No. 491,367. Patented Feb. 7, 1893.

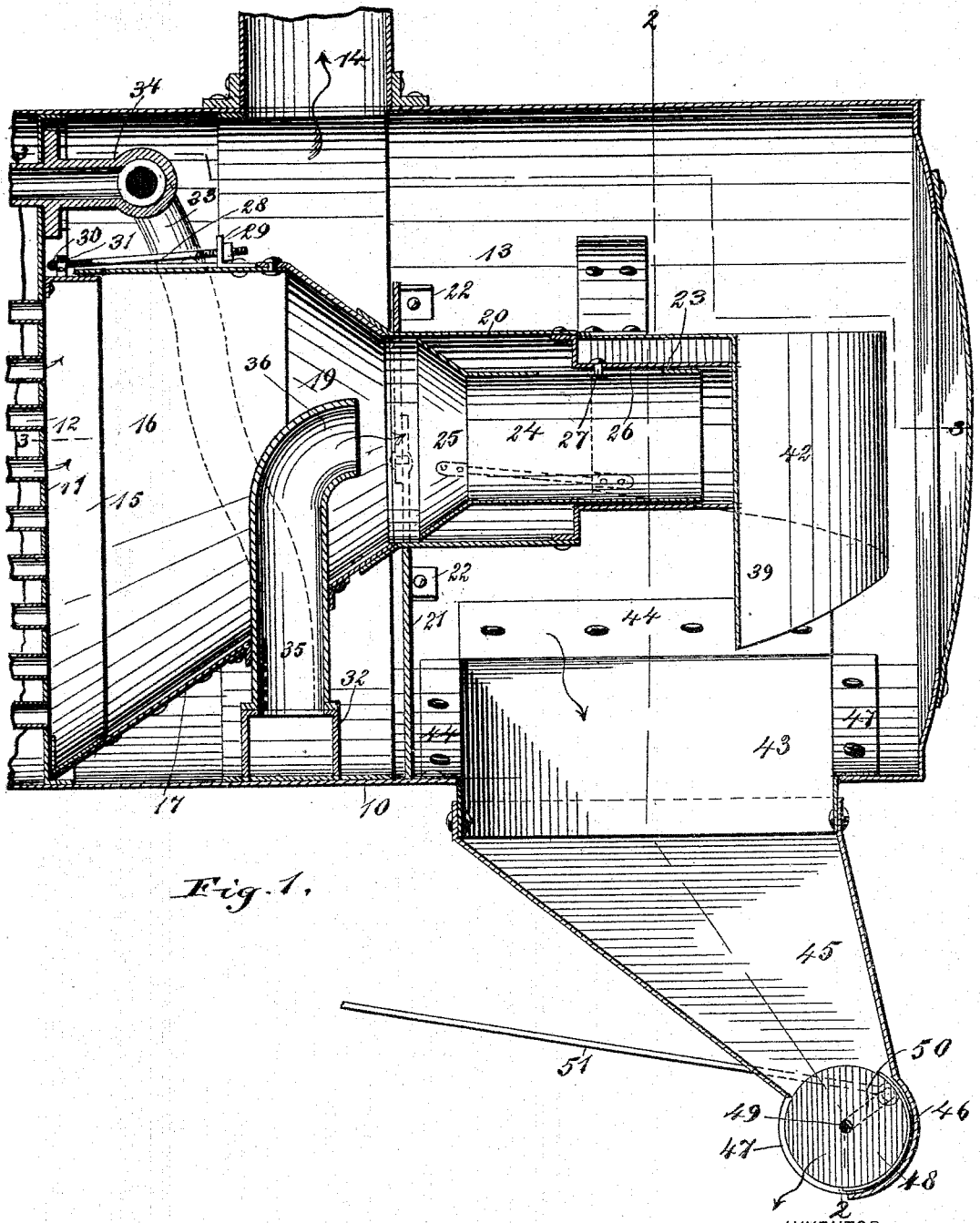

Fig. 1.

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C. Sedgwick

INVENTOR

H. B. Maxwell

BY Munn & Co

ATTORNEYS.

(No Model.) 3 Sheets—Sheet 2.

H. B. MAXWELL.

SPARK ARRESTER.

No. 491,367. Patented Feb. 7, 1893.

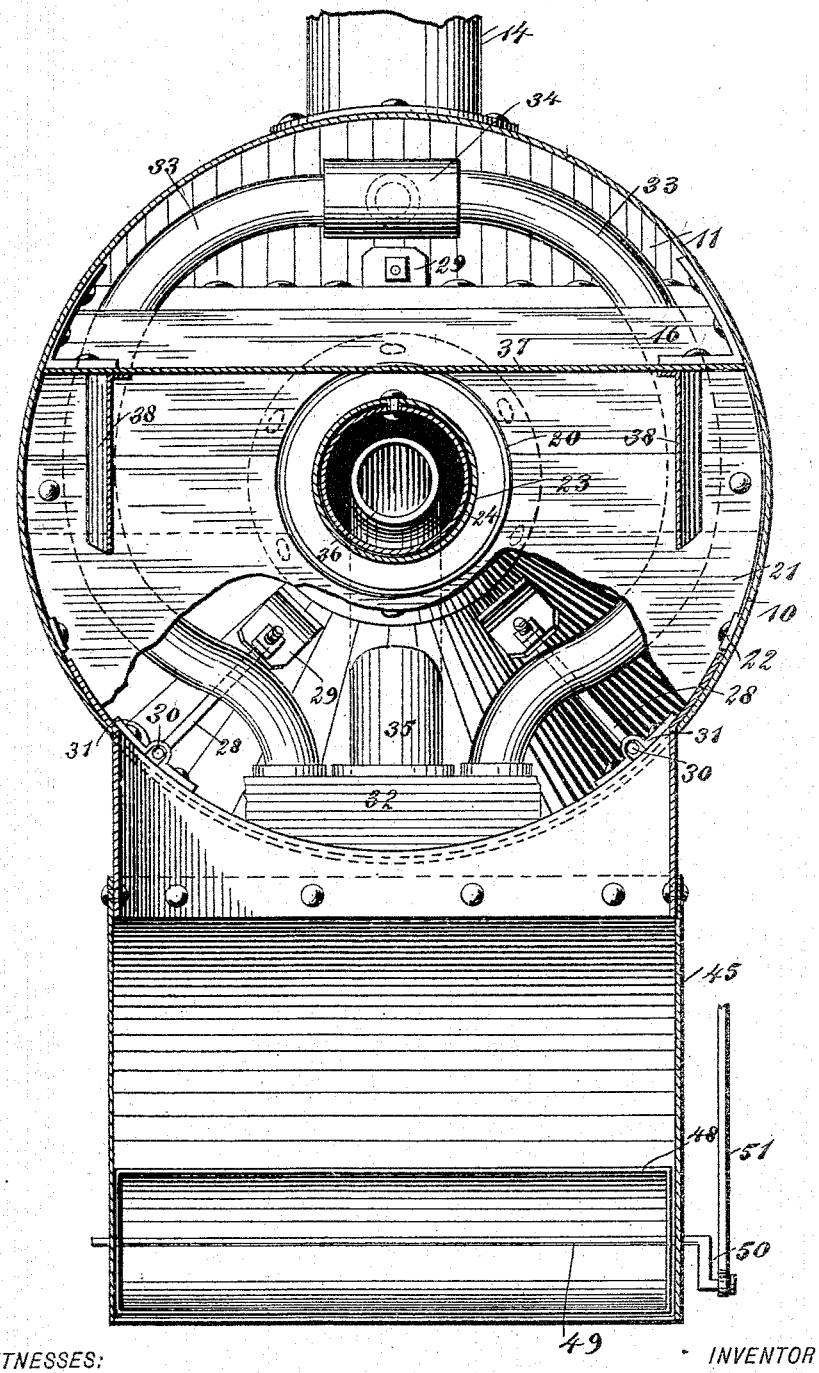

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Fig. 2.

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(No Model.) 3 Sheets—Sheet 3.

H. B. MAXWELL.

SPARK ARRESTER.

No. 491,367. Patented Feb. 7, 1893.

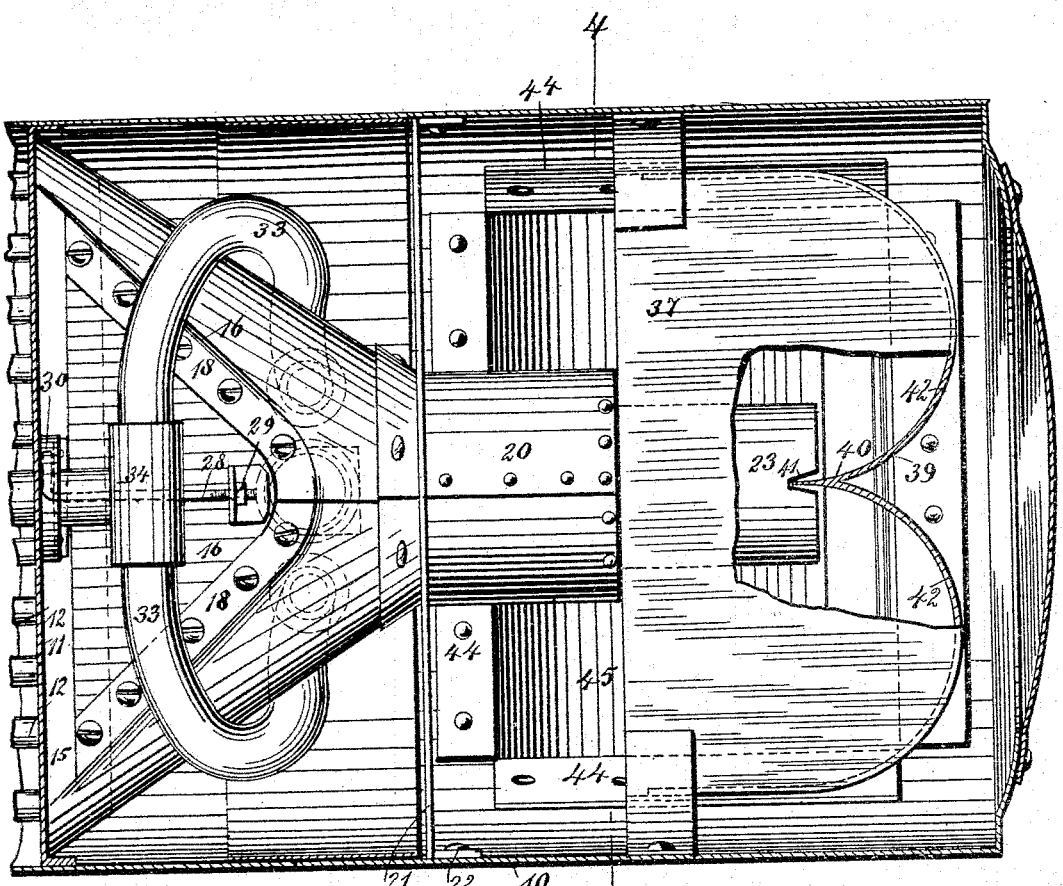

Fig. 3.

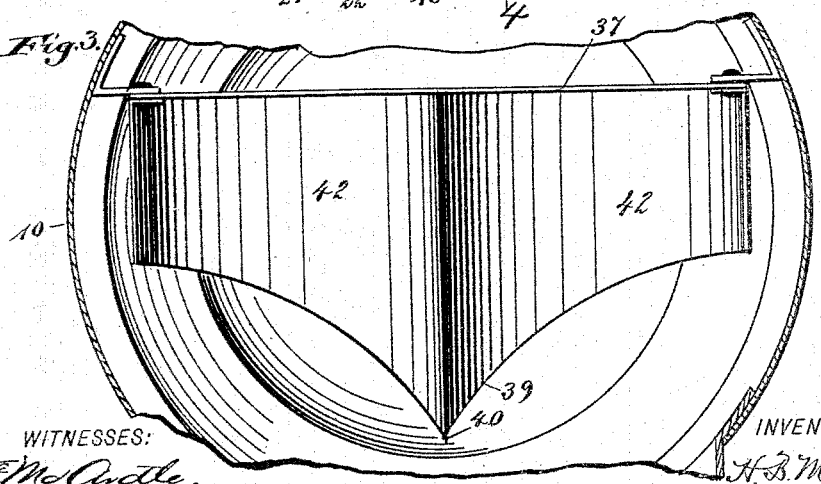

Fig. 4.

WITNESSES:
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UNITED STATES PATENT OFFICE.

HARRY BAILEY MAXWELL, OF STROMSBURG, NEBRASKA.

SPARK-ARRESTER.

SPECIFICATION forming part of Letters Patent No. 491,367, dated February 7, 1893.

Application filed October 11, 1892. Serial No. 448,552. (No model.)

To all whom it may concern:

Be it known that I, HARRY BAILEY MAXWELL, of Stromsburg, in the county of Polk and State of Nebraska, have invented a new and Improved Spark-Arrester, of which the following is a full, clear, and exact description.

My invention relates to improvements in spark arresters such as are adapted for use on locomotives and other engines of similar type.

The object of my invention is to produce a spark arrester which, instead of interfering with the draft of the engine as many spark arresters do, will increase the draft so that the engine will make steam rapidly, which is arranged so as to absolutely prevent any live sparks from being thrown from the stack of the engine, which is provided with a convenient carrier adapted to receive and carry the sparks and deliver them at any desired point.

To these ends my invention consists in certain features of construction and combinations of the same, as will be hereinafter described and claimed.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar figures of reference indicate corresponding parts in all the views.

Figure 1 is a central longitudinal vertical section of the spark arrester embodying my invention, showing it in position in the smoke box of a locomotive; Fig. 2 is a vertical cross section through the smoke box on the line 2—2 in Fig. 1; Fig. 3 is a sectional plan on the line 3—3 in Fig. 1; and Fig. 4 is a broken cross section on the line 4—4 in Fig. 3, looking toward the front end of the smoke box.

The boiler and smoke box has the usual arch or shell 10, and the boiler flues 12 deliver into the smoke box through the flue sheet 11 in the usual way. The smoke box 13 has also the usual smoke stack 14 opening from the top. Secured to the flue sheet and to the adjacent shell 10, is a forwardly extending flange 15 which encircles all the flues, and to this is attached a forwardly extending shell 16 which is gradually reduced toward its front end and this shell is preferably made up of three pieces bolted together at the bottom, as shown at 17, and two pieces at the top, as shown at 18.

The shell 16 forms an exhaust chamber and its front end is sharply reduced, as shown at 19 in Fig. 1, and this end terminates in a horizontal, forwardly extending nozzle 20 which is held in a central partition or diaphragm 21 arranged transversely in the smoke box 13 and extending upward to the top of the exhaust nozzle, this diaphragm or partition being secured to the shell 10 by means of suitable flanges 22, and the rivets extending through the flanges and shell. The extreme front end of the nozzle 20 is again reduced, as shown at 23, and within the reduced portions 20 and 23 is a longitudinally movable petticoat pipe 24 which has a flaring rear end 25 adapted to fit snugly in the nozzle 20 of the exhaust chamber, while the body portion of the petticoat pipe fits the reduced end 23 of the nozzle. The petticoat pipe is slotted longitudinally, as shown at 26, and a screw 27 extends through the slot and binds the petticoat pipe to the nozzle and, by means of the screw and slot, the petticoat pipe may be adjusted back and forth and fastened so as to give the necessary blast to regulate the draft of the furnace.

The wall of the exhaust chamber 16 is held in place by means of fastening bolts 28 which are arranged at nearly equidistant points around it, these bolts having their front ends secured to lugs 29 on the wall of the exhaust chamber and their rear ends formed into hooks 30 which engage keepers 31 secured to the flange 15 and to the shell 10, as shown best in Figs. 1 and 2. Beneath the exhaust chamber is the usual steam box 32 which connects by means of steam pipes 33, which encircle the exhaust chamber, and a T-pipe 34 with the boiler dome, this arrangement being substantially of the usual kind and being for the purpose of using high pressure steam to increase the draft when necessary.

Leading upward from the steam box 32 and extending through the bottom wall of the exhaust chamber, is an exhaust nozzle 35, which at its upper end is bent forward, as shown at 36, and this bent portion delivers straight into the petticoat pipe 24. The steam box receives exhaust steam from the engine in the usual way and this bent nozzle enables the steam to be sent forward directly through the reduced end of the exhaust chamber, so that a great suction and draft is produced, and conse-

quently the engine will make steam very easily and a comparatively small amount of fuel is necessary.

The delivery end of the exhaust chamber nozzle is housed in by a transverse partition 37 which extends horizontally across the smoke box and is secured to the shell 10 at its opposite edges, and depending parallel plates 38 which are secured to the plate 37 near opposite edges, and which hang down into the lower portion of the smoke box. The nozzle 20 delivers directly upon a doubly curved deflector 39 which is arranged vertically in front of it, this deflector having a central vertical edge 40 at the middle which is preferably held in notches 41 at the forward end of the reduced portion 23 of the nozzle 20, and the edge of the deflector extends across the center of the nozzle. The deflector is also provided with outwardly curved wings 42 which are bent forward and then backward, and these wings receive the smoke and sparks from the nozzle 20 and throw them backward into the smoke box.

Beneath the deflector 39 is a carrier which receives the sparks, and this carrier has a rectangular upper portion 43 which extends through the shell of the smoke box and has flanges 44 at the top which lie upon the shell and are firmly riveted thereto. The lower portion 45 of the carrier is of rectangular cross section and extends downward and forward, this portion of the carrier being reduced at its lower end and terminating in a cylindrical portion 46 which is cut away on the back side, as shown at 47. In the cylindrical portion of the carrier is a semi-cylindrical valve 48, having closed ends, and this valve is carried by a shaft or stem 49 which is journaled in opposite sides of the carrier, and the shaft terminates at one end in a crank 50 to which a rod 51 is attached, and this rod may be extended back to the engine cab or to levers operated in the cab, and the valve may be controlled from this point.

The operation of the spark arrester is as follows: The steam, either direct or exhaust, is delivered into the exhaust chamber through the nozzle 35 and the bent end 36 of the nozzle causes a strong current to be thrown forward through the nozzle of the exhaust chamber, and this coupled with the shape of the exhaust chamber, creates a strong draft and all the products of combustion are carried forward and delivered upon the deflector 39, the wings 42 of which reverse the current and throw it back into the smoke box. The sparks and cinders strike against the diaphragm 21 and are prevented from rising by the top plate 37 and side plates 38 and drop finally into the carrier beneath, from which they may be dumped when necessary, while the more volatile products rise in the front portion of the smoke box and between the back edge of the partition 37 and diaphragm 21 and pass upward and outward through the stack 14.

The construction of the exhaust chamber and the arrangement of the nozzle 35 enables a strong draft to be easily produced, so that it is not necessary to use an exhaust nozzle with as greatly reduced an end as those usually employed, and consequently there is no back pressure on the engine pistons and the engine works very easily, while from the foregoing description it will be seen that no sparks can possibly escape.

Having thus described my invention, I claim as new, and desire to secure by Letters Patent,—

1. The combination with an engine having the usual flues and smoke box, of a reducing exhaust chamber arranged in the smoke box and having its walls fastened to the flue sheet around the flues, a reducing nozzle produced on the front end of the exhaust chamber, a housing to cover the top and sides of the outlet of the chamber, a vertical diaphragm extending downward in the smoke box from the rear portion of the housing, a curved deflector arranged in front of the chamber nozzle and adapted to throw back the product emitted by the nozzle, and an exhaust nozzle extending through the wall of the chamber and delivering into the nozzle of the chamber, substantially as described.

2. In a spark arrester, the combination with the exhaust chamber having a reducing nozzle, and an exhaust nozzle held to deliver into the nozzle of the chamber, of a longitudinally adjustable petticoat pipe held in the chamber nozzle, substantially as described.

3. In a spark arrester, the combination with the reducing exhaust chamber arranged to receive the products of combustion from the engine flues, of a housing arranged to cover the top and sides of the outlet of the chamber, a vertical diaphragm embracing the outlet of the chamber and extending across the smoke box of the engine, and a deflector arranged opposite the outlet of the chamber, the deflector having a central edge extending across the outlet, and oppositely curved wings adapted to throw the products of combustion back beneath the housing, substantially as described.

HARRY BAILEY MAXWELL.

Witnesses:
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BENJAMIN F. ECKLES.