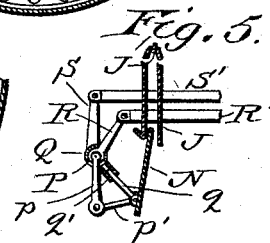
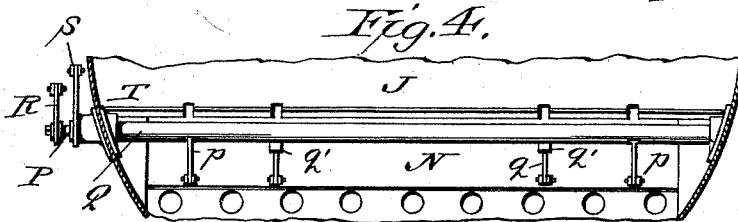
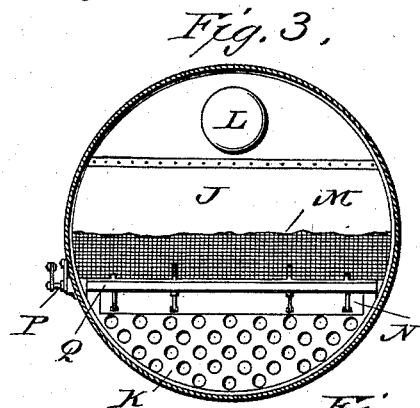
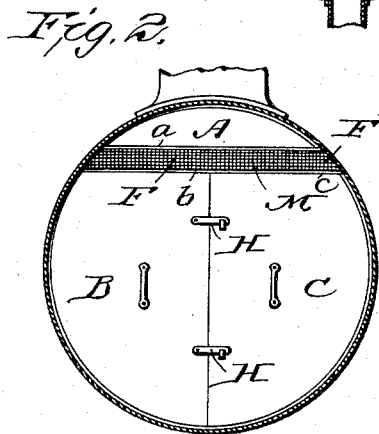
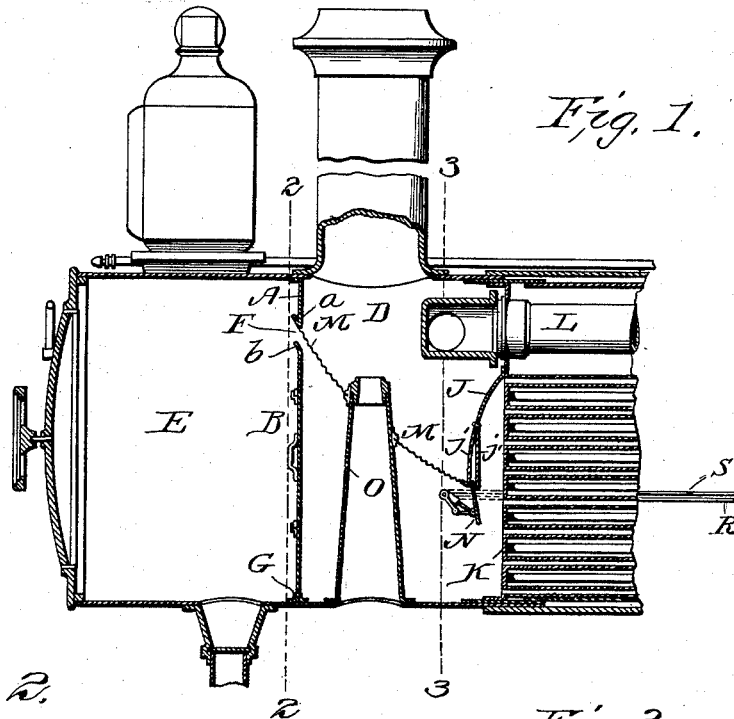


(No Model.)

E. E. HANSON.  
LOCOMOTIVE ENGINE.

No. 522,830.

Patented July 10, 1894.



Witnesses  
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# UNITED STATES PATENT OFFICE.

EARL EDWIN HANSON, OF SPOKANE, WASHINGTON.

## LOCOMOTIVE-ENGINE.

SPECIFICATION forming part of Letters Patent No. 522,830, dated July 10, 1894.

Application filed March 23, 1894. Serial No. 504,876. (No model.)

*To all whom it may concern:*

Be it known that I, EARL EDWIN HANSON, a citizen of the United States, residing at Spokane, Washington, have invented new and useful Improvements in Locomotive-Engines, of which the following is a specification.

My invention relates to an improvement in spark-arresters for locomotives and more particularly to locomotives in which the draft deposits the sparks in a forward compartment or spark box, and the smoke escapes through the smoke stack after passing through a diagonal screen located in the smoke arch. And the objects of my invention are to provide an unobstructed passage for the sparks into the spark box; to utilize the entire space occupied by the smoke arch for the escape of the smoke and gases, at need, and to adjust such space from the engine cab simultaneously with the draft without interfering with the operation of the diagonal screen extending across such space. And to this end my invention consists in providing a vertical removable plate dividing the smoke arch from the spark box, a diagonal screen extending from the upper edge of a horizontal opening in the top of the division plate entirely across the smoke arch to the lower fixed edge of the diaphragm or baffling plate, the said diaphragm having a lower extension adjustable vertically and horizontally by means of suitable connections from the engine cab.

In the accompanying drawings which illustrate my invention Figure 1 is a longitudinal vertical section of the extension of a locomotive engine including part of the boiler showing the construction of my improved spark-arrester. Fig. 2 is a transverse vertical section in front of the division plate on the line 2—2 of Fig. 1. Fig. 3 is a transverse vertical section in front of the diaphragm on the line 3—3 of Fig. 1. Fig. 4 is a front view of the adjustable portion of the diaphragm or baffling plate and Fig. 5 is a side view partly in section of the same.

A, B, C, Figs. 1 and 2 represent the sectional division plate between the smoke arch D and the spark box E. It consists of an upper stationary section A permanently attached to the upper part of the extension, and the two lower removable sections B and C seated in the groove G in the wall of the ex-

tension and held together by the straps H I or by other well known devices.

Between the bottom of the permanent section A and the top of the removable sections B, C, I provide a horizontal opening F for the admittance of sparks from the smoke arch D to the spark box E. I find a width of about four inches for the opening F to give satisfactory results.

The bottom rim of the stationary plate A is flared up and inward in the direction of the spark box E as shown at *a* and the top edges of the movable plates B and C are slightly flared in the same direction as shown at *b, c*.

J is the stationary diaphragm or baffling plate which is attached to the flue sheet K below the dry pipe L and above the first set of flues.

N is the movable diaphragm or baffling plate extension for adjusting the open space of the smoke arch D and regulating the draft.

M is a diagonal convex wire netting fastened at its lower edge to the rim *j* of the stationary diaphragm J and at its upper edge to the rim *a* of the stationary division plate A above the aperture F of the spark box E.

O is the exhaust pipe of the engine.

The movable diaphragm plate N is raised and lowered and moved in and out by the mechanism more clearly shown in Figs. 4 and 5 in which Q is a tubular shaft extending horizontally through the smoke arch D at a suitable distance below and away from the rim *j* of the stationary diaphragm J and mounted in horizontal bearings T T' in the sides of the locomotive extension through which it passes on one side to the exterior of the smoke arch where it is connected to the lever S and is rocked from the engine cab by means of the rod S'. The lower edge of the diaphragm plate N is connected to the tubular shaft Q by the pivoted rods *q* which have a limited longitudinal play in the tubular arms *q'* of the shaft Q, while the upper part of the plate N rests in the horizontal groove or slot J' formed in the lower part of the stationary diaphragm J by the elastic double walls *j, j'* or in any other suitable way.

P is a shaft rocking within the tubular shaft Q and having the link arms *p, p'* passing through suitable slots in the tubular shaft Q

and also pivoted to the lower edge of the plate N. A rocking motion is imparted to the shaft P by means of the lever R secured to it on the outside of the engine and connected by the rod R' to the cab. It is thus seen that by rocking the shaft Q an up and down movement is imparted to the diaphragm N and by rocking the shaft P an in and out movement is imparted to it.

10 The operation of my invention is as follows: The smoke and gases of combustion and sparks escaping from under the baffling plate are separated by the screen, the smoke and gases passing out through the smoke stack, and the sparks being guided by the screen into the spark box where they are removed from the constant agitation created by the draft.

Among other advantages, my improved construction enables me to use a diagonal screen with a baffling plate adjustable to increase or diminish the space in the smoke arch while influencing the draft in proportion and without interfering with the screen and irrespective of the use of a divisional plate between the spark receptacle and the smoke arch; it permits the escape of the smoke and gases of combustion through the whole unincumbered space of the smoke arch and the full length of the diagonal screen from the lower rim of the stationary baffling plate to its connection with the division plate, when desired; it presents an unobstructed passage for the sparks along the screen which acts as a guide into the spark box; it gives ready access to the spark box, and it allows the various adjustments of the baffling plate to be made from the engine cab.

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

1. The combination with a locomotive spark arrester consisting of a spark box, a smoke arch adjacent thereto, a flue boiler and a diaphragm or baffling-plate over the flue end in said smoke arch, of a division plate between the spark-box and smoke-arch, consisting of an upper stationary section, two or more lower removable sections, and having an aperture between said stationary section and the top of said removable sections, and a screen extending across said smoke arch and secured at one end to the lower edge of the upper stationary section of the division plate and at the other end to the diaphragm, substantially as described.

2. The combination with a locomotive spark arrester having a downwardly extending stationary diaphragm or baffling plate and a screen secured at one edge to said baffling plate, of a horizontally and vertically adjustable diaphragm extension supported below the stationary diaphragm or baffling plate at its lower edge, substantially as described.

3. The combination with a locomotive spark arrester having a downwardly extending stationary diaphragm or baffling plate located in

the smoke arch, of a horizontally and vertically adjustable diaphragm extension, supported below the stationary diaphragm or baffling plate at its lower edge, and a screen secured at its lower edge to the lower edge of the stationary diaphragm and extending diagonally upward and across the smoke arch, substantially as described.

4. The combination with a locomotive spark arrester consisting of a spark-box, a smoke arch adjacent thereto, a flue boiler and a stationary diaphragm or baffling plate extending downwardly over the flue end in said smoke arch, of a division plate between said spark box and smoke arch having an opening across the top, a diagonal screen extending across said smoke arch and secured at its upper edge, to the division plate above the opening and at its lower edge, to the lower edge of the stationary diaphragm or baffling plate, and a horizontally and vertically adjustable diaphragm extension, supported below the stationary diaphragm or baffling plate, at its lower edge below the screen, substantially as described.

5. In a locomotive spark arrester the combination of the stationary diaphragm or baffling plate J located in the smoke arch and having the double elastic walls  $j j'$  at its lower edge and the vertically adjustable diaphragm extension, consisting of the horizontal shaft Q rocking in bearings T T' in the smoke arch and provided with longitudinally adjustable arms consisting of the tubular part  $q'$  and the pin  $q$  sliding therein, the movable diaphragm N having its upper edge supported between the double elastic walls  $j j'$  of the stationary diaphragm, and its lower edge pivoted to the pins  $q$ , the rocking lever S on the shaft Q and suitable rod connections with the engine cab, substantially as described.

6. In a locomotive spark arrester, the combination of the stationary diaphragm or baffling plate J located in the smoke arch and having the horizontally extending double elastic walls  $j j'$  at its lower edge, and the horizontally adjustable diaphragm extension consisting of the horizontal shaft P rocking in suitable bearings in the smoke arch, and having the link arms  $p p'$ , the movable diaphragm N having its upper edge supported between the double elastic walls  $j j'$  of the stationary diaphragm and its lower edge pivoted to the links  $p'$  the rocking lever R on the shaft P and suitable rod connections with the engine cab, substantially as described.

7. In a locomotive spark arrester, the combination of the stationary diaphragm or baffling plate J, located in the smoke arch and having the double elastic walls  $j j'$  at its lower edge, of the vertically and horizontally adjustable diaphragm consisting of the horizontal tubular shaft Q rocking in bearings T T' in the smoke arch and provided with longitudinally adjustable arms  $q' q$ , the shaft P rocking within the tubular shaft Q and having the link arms  $p p'$  projecting through

suitable slots in the tubular shaft Q, the movable diaphragm N having its upper edge supported between the double elastic walls  $j j'$  of the stationary diaphragm and its lower edge pivoted to the arms  $q$  and  $p'$ , the rocking levers S and R mounted respectively on the shafts Q and P and their rod connections S' and R', substantially as described.

8. In a locomotive spark arrester consisting of a spark-box, a smoke arch adjacent thereto, a flue boiler and a stationary diaphragm or baffling plate extending downwardly over the flue end in said smoke arch, the combination of the divisional plate between said smoke-arch and spark box, consisting of the stationary top section A the removable lower sections B seated in the groove G and having the straps H I, the stationary diaphragm J having the double elastic walls  $j j'$ , the diagonal screen M extending entirely across the smoke arch and secured at its lower extremity to the lower rim of the stationary diaphragm J and at its upper extremity to the lower rim of the stationary section A of the division plate and above the aperture F and the vertically and horizontally adjustable diaphragm extension consisting of the horizontal tubular shaft Q rocking in bearings T T' in the smoke arch and provided with longitudinally adjustable arms

$q' q$ , the shaft P rocking within the tubular shaft Q and having the link arms  $p p'$  projecting through suitable slots in the tubular shaft Q, the movable diaphragm N having its upper edge supported between the double elastic walls  $j j'$  of the stationary diaphragm and its lower edge pivoted to the arms  $q$  and  $p'$ , the rocking levers S and R and their rod connections S' and R', substantially as described.

9. The combination with a locomotive spark arrester having a spark-box and an adjacent smoke arch, of a division plate between the same having the aperture F and consisting of the upper stationary section A, the lower removable sections B, C their straps H I, the grooved seat G in the walls of the extension for the removable sections, and a screen having one edge secured to the upper stationary section A, above the aperture F, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

EARL EDWIN HANSON.

Witnesses:

JOHN C. ONDERDONK,  
CYRUS HAPPY.