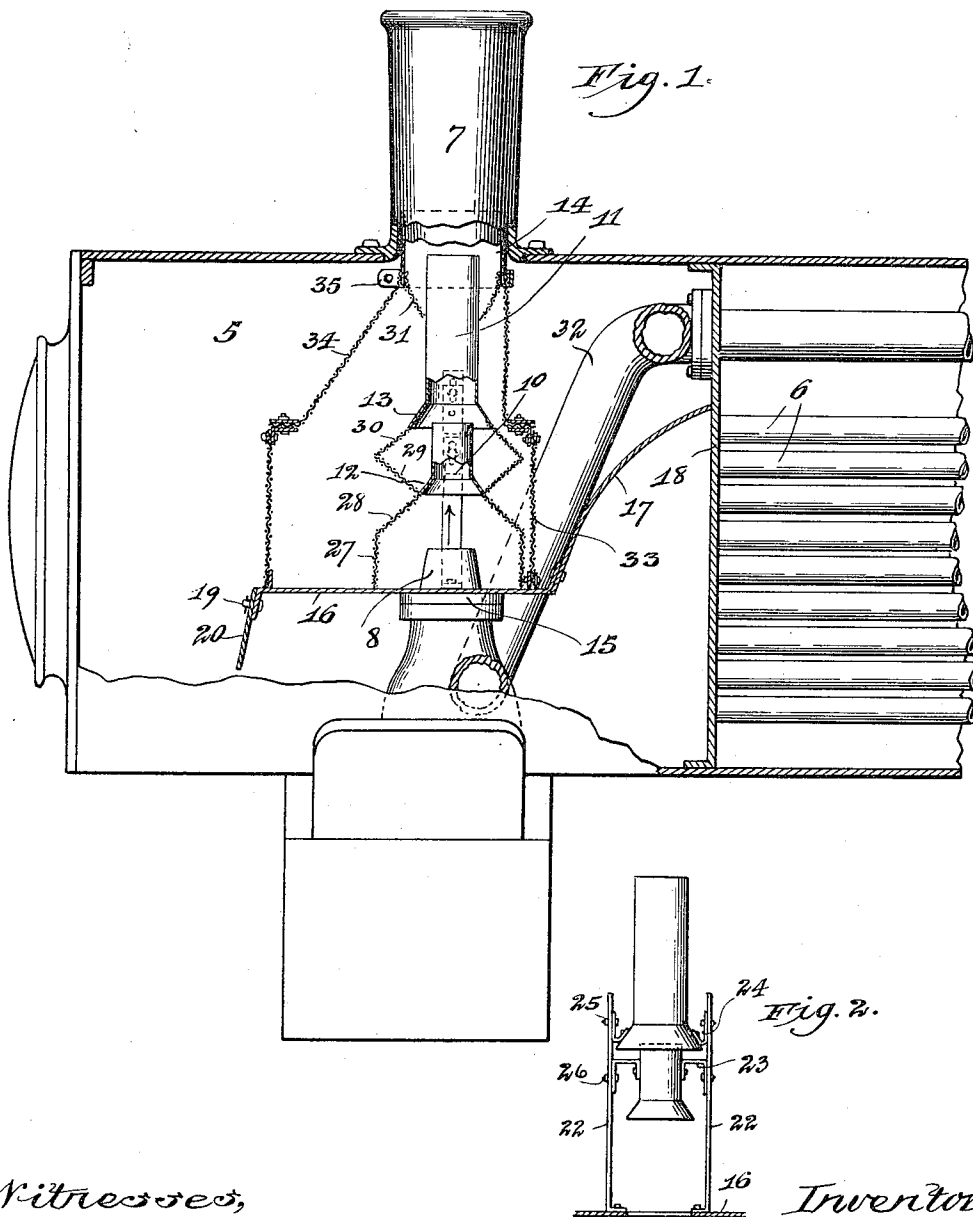


C. H. VANDONK.
LOCOMOTIVE SPARK ARRESTER.
APPLICATION FILED AUG. 14, 1914.

1,151,069.

Patented Aug. 24, 1915.
2 SHEETS—SHEET 1.



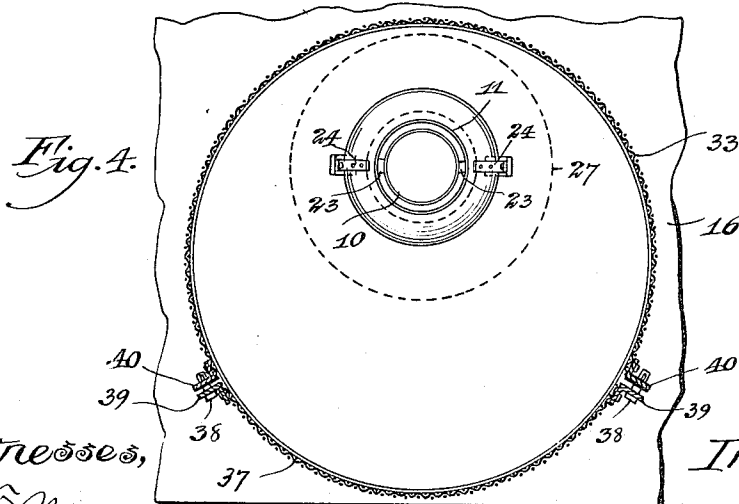
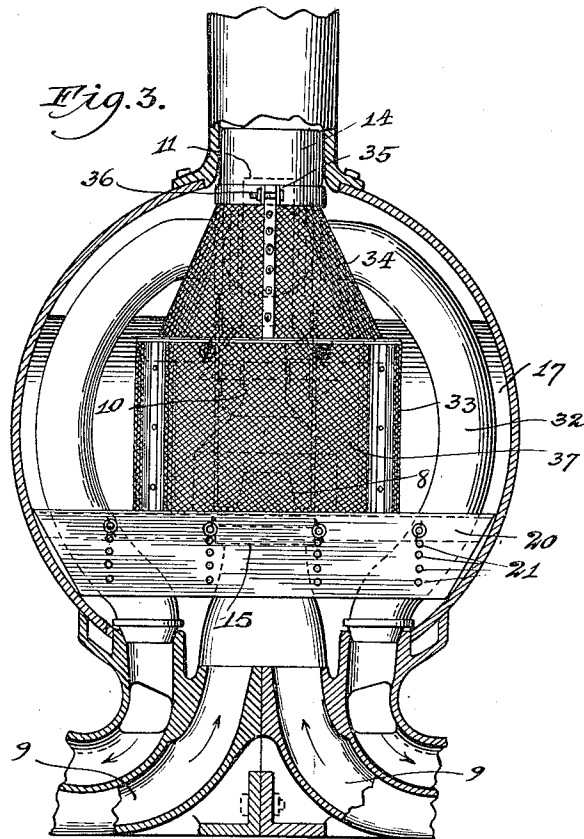
Witnesses,
J. O. Mann
C. A. Soans

Fig. 2.
Inventor,
Cornelius H. Vandonk
By Offield Towle Graves & Offield
Attys.

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UNITED STATES PATENT OFFICE.

CORNELIUS H. VANDONK, OF WELLS, MICHIGAN.

LOCOMOTIVE SPARK-ARRESTER.

1,151,069.

Specification of Letters Patent.

Patented Aug. 24, 1915.

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To all whom it may concern:

Be it known that I, CORNELIUS H. VANDONK, a citizen of the United States, residing in the city of Wells, county of Delta, and State of Michigan, have invented certain new and useful Improvements in Locomotive Spark-Arresters, of which the following is a specification.

My invention relates to improvements in locomotive spark arresters, and refers more particularly to that type of spark arresters which are located within the front extension of the fire-box so as to intercept sparks or red hot coals before they enter the smoke stack of the locomotive.

Among the salient objects of the invention are, to provide an improved type of locomotive spark arrester which may be inserted in the front smoke chamber of the locomotive in such a manner that repairs to the parts of the arrester or to any parts of the locomotive associated with the arrester may be effected without the necessity of tearing down or dismantling the entire arrester; and with a minimum of trouble and delay; to provide an improved construction so organized as to compel the exhaust gases to pass successively through a pair of screens so as effectually to strain out any sparks or coals which may be carried by the said exhaust gases; to provide an improved construction and arrangement of the screens and associated parts of the arrester so as to furnish a very large screening area whose effective opening is at least equal to and preferably much greater than the area of the locomotive stack; to provide a construction which is so placed in the front of the locomotive and beneath the stack that it does not interfere materially, if at all, with the working or functional parts of the locomotive; to provide a construction which shall be exceptionally simple and economical in construction and comparatively inexpensive and convenient to maintain in operation; and, in general, to provide an improved spark arrester of the type referred to.

My invention consists in the matters hereinafter described and more particularly pointed out in connection with the accompanying drawings, in which—

Figure 1 is a longitudinal section taken vertically through the front end of a locomotive equipped with a preferred form of my improved construction; Fig. 2 is a fragmentary elevation showing the manner in

which the draft-inducing cones and tubes are supported; Fig. 3 is an end elevation of Fig. 1 looking toward the fire-box, certain of the parts being shown in section or broken away; and Fig. 4 is an enlarged sectional plan of the bottom of the main screen of the arrester.

Referring to the drawings, 5 represents the smoke chamber at the front end of the locomotive into which the smoke or exhaust gases are conducted by means of the longitudinal fire tubes 6 and from the top of which they are carried off by the smoke stack 7. Vertically directly beneath the smoke stack 7 is the usual eductor nozzle 8 which communicates with the two exhaust pipes 9 from the cylinders of the locomotive. Intermediate the eductor nozzle 8 and the smoke stack 7 I interpose a pair of eductor pipes 10 and 11 which are both axially in line with the nozzle 8 and the stack 7 and suitably coned, as shown at 12 and 13, so as to cause the steam to entrain with it and carry off as large an amount of the exhaust gases as possible. It will be noticed that the pipe 10 is larger than the nozzle 8, and the pipe 11 is in its turn greater in area than the pipe 10, which is necessary on account of the increased volume of the exhaust gases entrained by each successive eductor pipe. The pipe 11 is of a length sufficient to enter the sleeve 14, which is jammed into the lower end of the smoke stack 7. Resting upon the flange 15 of the nozzle 8, embracing it, and extending horizontally across from side to side of the smoke chamber is a partition 16 which, it will be noted, extends to the front of the nozzle a considerable distance and to the rear thereof a somewhat lesser distance, where it is connected with a curved plate 17 which also extends across from side to side of the smoke chamber and rests against the front end 18 of the boiler so as to cause the gases from the tubes 6 to pass beneath the plate 16. Depending at an angle from the front edge of the horizontal partition plate 16 and secured thereto by means of adjustable nuts and bolts 19, is a baffle plate 20 which may be changed in height somewhat by means of the holes 21 in order to obtain the best results in regulating the draft of the boiler.

On referring to Fig. 2 it will be seen that the eductor pipes 10 and 11 are supported in their proper positions by a pair of upstand-

ing standards 22 to which the said pipes are connected by means of small angular brackets 23 and 24, the latter being secured to the said standards 22 by means of bolts 25 and 26 so as to make it possible to remove the pipes for repair or to adjust them so as to regulate the draft to the best advantage. In order to effect this vertical adjustment of the pipes 10 and 11, the standards 22 are slotted for the bolts 25 and 26, as shown in Fig. 1. Resting upon the plate 16 and concentrically arranged with respect to the nozzle 8, I place a cylindrical screen 27, the upper end 28 of which is conical in shape and engages the outer rim of the cone 12 of the eductor pipe 10. Between the under side of the rim of the cone 13 of the eductor pipe 11 and preferably secured to the top of the cone 28, I interpose a pair of similar conical screens 29 and 30 which are reversed with respect to each other, connected at their larger ends, and completely occupy the outer space between the two cones 12 and 13. The series of screens just described are preferably held down in place by installing the eductor pipe 11 in place subsequent to the placing of the screens in position, the cone 13, which is slightly greater in diameter than the cone 12, thus engaging the upper end of the conical screen 30 and holding the entire series in place. Between the sleeve 13 and the longitudinal upper extension of the eductor pipe 11 there is interposed an auxiliary screen 31 which is somewhat conical in general outline, the lower smaller end thereof slidably embracing the eductor pipe 11, and the upper larger end being tightly forced into the lower end of the sleeve 14.

It will be noted that the system of screens above described renders it impossible for any of the exhaust gases to pass out through the smoke stack 7 of the locomotive without first being compelled to go through the meshes of the screens, and, owing to the shape of the different parts of the screens as distinguished from screens of cylindrical form, the screening area provided is extremely large and causes practically no opposition to the flow of the exhaust gases, the total effective area of the openings through meshes of the screens greatly exceeding that of the stack. It is possible to adjust the eductor pipes 10 and 11 to a certain extent vertically without being compelled to use different sizes of screens, since the screens are of such shape that they may be collapsed or extended axially to a certain extent when adjusting said pipes.

Since it is highly desirable to insure absolutely against the egress of sparks or live coals from the smoke stack 7, I have found it to be also essential to pass the exhaust gases through a pair of successive screens before they enter the stack, and to this end I construct an outer screen around the in-

ner screens just described. An important feature of my invention is the manner in which I offset the outer screens with respect to the center line of the draft nozzle 8, so as to gain room for a screen of the desired area without interfering with the partition 17 or with the high pressure steam pipes 32 which pass down through the partition plate 16 obliquely slightly behind and at each side of the nozzle 8. Accordingly, I construct the outer screen with a cylindrical lower portion 33 which is excentrically disposed with respect to the nozzle 8 so as to bring the center of the screen well ahead of the nozzle, and between the lower end of the sleeve 14 and the top of the cylindrical portion 33 of the outer screen there is provided as upper screen portion 34 which is somewhat conical in shape with respect to its front face but has its back end almost vertical so as entirely to fill the space between the upper end of the screen 33 and the said sleeve 14 which, as before described, are eccentrically disposed with respect to each other. The upper end of the conical screen 34 is clamped to the lower end of the sleeve 14 by means of a circumferential strap 35 and bolt 36 so that if desired the entire outer screen may be removed. In order to make it possible to repair any of the inner screens or to adjust the position of the eductor pipes 10 and 11, the front of the cylindrical portion 33 of the outer screen is made with a removable door portion 37 which forms a considerable fraction of the circumference of the said screens 33 and is maintained in place by bolts 38 passing through a pair of vertically extending flanges 39 to which the said screen 37 is secured and which register with corresponding flanges 40 secured to the main portion of the outer screen 33.

It will be noticed that the combined area of the outer screens 33 and 34 is much greater than the area of the stack 7 even after due allowance has been made for the ineffective area of the screen caused by the presence of the meshes in the metal, while at the same time this outer screen does not interfere with any of the piping or other parts within the smoke box 5. In addition, the shape of the said outer screen is such that it may be of simple and economical construction and can be installed with great ease and rapidity in the ordinary locomotive fire box. The same also may be said about the inner screens previously described. The door 37 is of such shape and area and so organized that it may be removed very quickly if it becomes necessary to gain access to the interior of the outer screen for the purpose of repairing the inner screens, adjusting the eductor pipes, removing dirt, or for any other purpose.

It will be manifest to those skilled in the art that certain details of my construction

may be modified somewhat without departing from the spirit of the invention, and therefore I do not wish to be limited to the precise details shown and described, except as specified in the appended claims.

I claim—

1. In a locomotive, the combination of a stack, an exhaust steam nozzle, a conduit extending from the nozzle to the stack and provided with a screened opening therein for the admission of fire gases to said conduit, a portion of said conduit constituting an eductor pipe for regulating the draft, and an outer chamber surrounding said conduit extending from the bottom of the latter to the stack and provided with a screen for admitting fire gases to its interior.

2. In a steam locomotive, the combination of a smoke chamber communicating at one side with the boiler flues and having a stack opening at the top, an upwardly projecting exhaust steam nozzle beneath the stack opening, a substantially horizontal diaphragm surrounding the nozzle and having a rear extension connected to the boiler end and adapted to conduct the smoke from the flues forwardly beneath said diaphragm, a foraminated inclosure of relatively large size surrounding said nozzle and extending from the diaphragm to the stack, and an inner foraminated inclosure adapted to form a conduit for the steam and the smoke passing through the foraminations in said inner and outer inclosures and entrained by the exhaust steam.

3. In a locomotive, the combination of a stack, an exhaust steam nozzle, a continuous conduit extending from the nozzle to the stack and provided with a plurality of annular screen openings therein for the admission of fire gases to said conduit, successive separated portions of said conduit being suitably shaped to constitute eductor pipes for regulating the draft, the screening areas of said conduit being situated axially on either side of said eductor pipe portions, and an outer chamber surrounding said conduit extending from the bottom of the latter continuously to the stack and provided with a screen for admitting fire gases to its interior.

4. In a locomotive, the combination of a stack, an exhaust steam nozzle, a continuous conduit extending from the nozzle to the

stack and provided with a plurality of annular screened openings therein for the admission of fire gases to said conduit, successive separated portions of said conduit being suitably shaped to constitute eductor pipes for regulating the draft, the screening areas of said conduit being situated axially on either side of said eductor pipe portions, and an outer chamber surrounding said conduit extending from the bottom of the latter continuously to the stack and provided with a screen for admitting fire gases to its exterior, a portion of the wall of said chamber being adapted to be readily removable to gain access to the interior of said chamber.

5. In a locomotive, the combination of the stack, the exhaust steam nozzle located directly beneath the stack, and a vertical conduit extending from the nozzle to the stack and provided with a plurality of annular screened areas therein for the admission of fire gases to the interior of said conduit, successive separate portions of said conduit being suitably shaped into cylindrical upper portions, with flaring lower portions, for the purpose of regulating the draft, said eductor portions being capable of axial adjustment with reference to said nozzle.

6. In a locomotive, the combination of the stack, the exhaust steam nozzle located directly beneath the stack, a vertical conduit extending from the nozzle to the stack and provided with a plurality of annular screened areas therein for the admission of fire gases to the interior of said conduit, successive separate portions of said conduit being suitably shaped into cylindrical upper portions, with flaring lower portions, for the purpose of regulating the draft, said eductor portions being capable of axial adjustment with reference to said nozzle, and an outer chamber surrounding said conduit extending from the bottom of the latter continuously to the stack and provided with an annular cylindrical screen for admitting fire gases to its interior, a section of said cylindrical screen being adapted to be readily removable to permit access to the interior of said chamber and to said conduit.

CORNELIUS H. VANDONK.

Witnesses:

C. W. KATES,

E. W. WEEKING.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."