L. N. CHISOLM.
SMOKE CONDUCTOR FOR RAILWAY TRAINS.
No. 432,862.
Patented July 22, 1890.

Inventor.
Laurens N. Chisolm.

Witnesses.
David Guest.
Lucy B. Hille.

By
James N. Norris.
Att'y.
To all whom it may concern:

Be it known that I, LAURENS N. CHISOLM, a citizen of the United States, residing at Charleston, in the county of Charleston and State of South Carolina, have invented new and useful Improvements in Smoke-Conductors for Railway-Trains, of which the following is a specification.

This invention relates to that type of smoke-conductors for vestibule and other railway-trains wherein the smoke-tubes have auxiliary draft-valves and an adjustable spark-arresting hood movable over the smoke-stack to arrest the upward flight of the sparks, embers, and other products of combustion and direct the same into the funnel-mouth of the smoke-conductor.

The objects of my invention are to provide a novel, simple, and efficient spark-arrester for obstructing the upward flight of the products of combustion from the smoke-stack; to provide novel means for supporting the spark-arrester from the rim or upper end of the smoke-stack; to provide novel and simple means for adjusting and placing the spark-arrester under perfect control of the engineer; to provide novel means for adjusting the tube-sections in a vertical plane, to place the conductor in either a horizontal or inclined plane relatively to the car-roof, and to raise or lower either end of the tube-sections, whereby each section is adapted to connect with cars of varying height; to provide novel valves and operating devices therefor to secure an auxiliary draft, and to otherwise improve and simplify this type of apparatus to render it more useful and adapt it for general and practicable application in equipping railway-trains.

To accomplish all these objects, my invention involves the features of construction, the combination or arrangement of devices, and the principles of operation hereinafter described and claimed, reference being made to the accompanying drawings, in which—

Figure 1 is a side elevation of a train to exhibit my invention on a small scale.

Figure 2 is a top plan view of the same.

Figure 3 is a detail side view on a larger scale, showing the upper end of the smoke-stack, the forward end of the smoke-conductor, and the spark-arrester mechanism.

Figure 4 is a front elevation of the same.

Figure 5 is a top plan view of portions of the car-roof and one of the tube-sections to show one of the auxiliary draft-valves.

Figure 6 is a vertical sectional view on the line a b.

Figure 7 is a side elevation of portions of a car-roof and one of the tube-sections, showing one of the hoisting mechanisms for vertically adjusting a part of the smoke-conductor.

Figure 8 is a longitudinal sectional view on the line c d.

Figure 9 is a transverse sectional view on the line e f.

In order to enable those skilled in the art to make and use my invention, I will now describe the same in detail, referring to the drawings, wherein—

The numeral 1 indicates the locomotive tube-section, which is stationary and provided with a funnel-mouth 2, resting upon or secured by a bracket to the rim 3 or upper end of the smoke-stack 4. The car tube-sections 5 diverge from the part 6 above the locomotive-tender, and the two longitudinal branches 7 run at opposite sides of the car-ventilators on the car-roof, thereby preserving the symmetrical appearance of the train and avoiding an unsightly and objectionable pipe-line above the ventilators. The respective tube-sections are flexibly connected above the car-vestibules by elastic rubber tubes 8 and 9, held in engagement by the expansive force of the rubber tubes, to provide a perfect smoke-conducting passage, the continuity of which is unbroken from end to end of the train, while the construction is such as to permit the convenient disengagement of the socket-couplings for the separation of the cars when occasion demands. A standard 10 rises from the locomotive tube-section directly in rear of the funnel-mouth and is braced to the latter, as at 12, while its upper extremity supports the rear end portion of a horizontal guide-bar 13, secured at its front end to the rim of the funnel-mouth. A spark-arrester 14, preferably composed of a horizontal flattened plate, is provided with a socket or bearing 15 to slide rectilinearly back and forth on the guide-bar, and the opposite side edges of the plate are pivotally attached, as at 16, to the
upper ends of the lever-arms 17, pivoted inter- 
mediated their ends to opposite sides of the 
smoke-stack rim 3 by the pivot-pins 18, so 
that the lever-arms support the spark-arrester 
from the upper end of the smoke-stack, and 
by their oscillatory motion serve to recipro- 
cate the spark-arrester to move it over the 
smoke-stack, and thereby obstruct the upward 
flight of the sparks, cinders, and other pro- 
ducts of combustion and direct the same into 
the funnel-mouth. The lever-arms are con- 
ected at their extremities below the pivot- 
pins 18 with a cable 19, which runs to the 
locomotive-cab, and these lever-arms connect 
above their pivot-pins with a similar cable 20, 
also running to the locomotive-cab, in such 
manner that the engineer can adjust the 
spark-arrester back and forth by manipulat- 
ing its cables, as will be quite obvious. These 
cables may be made of wire rope of small 
gage, or they may be composed of simple 
wires, rods, chains, or other devices suitable 
for the conditions required to positively move 
the spark-arrester both forward and rearward. 
The lever mechanism for adjusting the spark- 
arrester to and from a position over the 
smoke-stack is very desirable and more per- 
fet than those constructions wherein gravity 
and the vibrations of the train are depended 
upon for the backward movement of the 
spark-arrester as the train approaches or en- 
ters a depot. 

At the point where the locomotive tube- 
section joins the shank or part 5 of the di- 
verging or duplex smoke-conductor I arrange 
two opposite air-inlet hoods 21 to aid in pro- 
ducing the auxiliary draft, and the diverging 
tube-sections, which join the shank or part 6 
above the locomotive tender, are provided 
with similar air-inlet hoods 22 and 23. The 
hoods are not necessarily adjustable or adapted 
to be opened and closed, in that the draft 
through the locomotive and tender tube-sec- 
tions must always be rearward from the 
smoke-stack. The tube-sections running be- 
side the car-ventilators are provided at each 
end portion with an air-draft valve 24, com- 
prising a shell conforming transversely to the 
general shape of the tube and mounted at one 
end on upper and lower vertically-arranged 
pivots 25, located at the median line of the 
tube, Figs. 5 and 6. A vertical shaft 28 is 
connected with the valve at the lowermost 
pivot in line therewith and extends loosely 
through and has a bearing in the car-roof at 
the vestibule or end of the car, where the 
shaft is furnished with a crank-handle 29, so 
that a trainman can operate the valve from 
the car-platform to secure the auxiliary draft. 
The object of this draft is to facilitate the 
rearward flow of the products of combustion, 
and also to cool the latter, and thereby avoid 
undue heating of and consequent injury to 
the elastic connections between the tube-sec- 
tions. 

In smoke-conductors for railway cars it is 
desirable to adjust the tube-sections verti- 

cally in relation to the car-roof to place the 
line of tubes in a horizontal or in an inclined 
plane to descend gradually from front to rear, 
and it is also desirable to adjust the height 
of the tube-sections at their ends relatively 
to the car-roof to adapt the parts to cars which 
 vary in height without employing long elastic 
connections. To accomplish these objects, I 
provide a simple but effective hoisting mech- 
anism at each end of every tube-section on a 
car, whereby one or both ends of the tube can 
be raised or lowered from the vestibule or car- 
platform. The mechanisms, as here shown, 
each comprises a transverse rock-shaft 30, 
journaled in a bearing 31 on the car-roof be- 
neath the end portion of a tube-section, Figs. 
7 and 9, and rigidly attached at its ends to 
arms 32, which are pivotally connected at 
their forward ends 33 to the lower extremities 
of links 34, having their upper extremities 
 pivotally connected with lugs or bearings 35 
at the opposite sides of the tube-section. A 
lever 36 is rigidly secured to the rock-shaft, 
so that by oscillating the lever the shaft is 
rocked and the end of the tube-section is 
raised or lowered. 

To oscillate the lever, I provide a cable 37, 
attached to the upper end thereof and pass- 
ing around a sheave or pulley 38, journaled 
in or on the car-roof in relation to an orifice 
39, through which the cable passes to be 
convenient for the trainman or brakeman. By 
this means the entire conductor can be placed 
either in an inclined or horizontal plane, 
while either end of a tube-section can be 
vertically adjusted, as may be desirable or 
as occasion demands, while the tube-sections at 
one side of the car-ventilators can be ad- 
justed, any or all, independent of those at 
the opposite side of the car-ventilators. 

I am aware that it has been proposed to 
employ auxiliary draft-valves in a smoke- 
conductor for railway-trains, and also that it 
has been proposed to divide a smoke-con- 
ductor along opposite sides of the cars; but 
these have never come into practicable op- 
eration, owing to the existence of serious ob- 
jections in their mechanical construction 
which render them inefficient and undesirable. 

It will be understood by those familiar with 
this type of apparatus that the auxiliary air- 
draft valves on the tube-sections of the cars 
should be so relatively disposed or arranged 
that a draft-valve at either end of a tube-sec- 
tion will be effective in the movement of the 
train in one of two directions. 

Having thus described my invention, what 
I claim is—

1. The combination, with a smoke-conductor 
having a funnel-mouth, of a guide-bar, a spark- 
arrester having a sliding connection with the 
guide-bar, and lever mechanism for positively 
moving the spark-arrester on the guide-bar to 
and from a position over the smoke-stack of a 
train-locomotive, substantially as described. 
2. The combination, with a smoke-conductor 
having a funnel-mouth, of a horizontal guide-
bar over the funnel-mouth, a spark-arrester having a sliding bearing on the guide-bar, and lever mechanism pivotally connected to the smoke-stack of a train-locomotive and supporting the spark-arrester and serving to positively move the latter to and from a position over the smoke-stack, substantially as described.

3. The combination, with a smoke-conductor having a funnel-mouth, of an adjustable spark-arrester, a guide for the spark-arrester, oscillating lever-arms pivoted to the smoke-stack and supporting the spark-arrester therefrom, and cables for connecting the levers with the locomotive-cab to oscillate the levers and positively move the spark-arrester to and from a position over the smoke-stack, substantially as described.

4. The combination, with a smoke-conductor having a funnel-mouth, of an adjustable spark-arrester, oscillating levers pivoted intermediate their ends on the smoke-stack and supporting the spark-arrester therefrom, and cables connecting the levers above and below their pivots with the locomotive-cab to positively move the spark-arrester to and from a position over the smoke-stack, substantially as described.

5. The combination, with the tube-section of a smoke-conductor, of an auxiliary draft-valve pivoted to the tube by a vertical pivot, and a vertical shaft located in line with said pivot extended through and having a bearing in the car-roof at the vestibule or end of the car and provided with a handle for operating the valve from the car-platform, substantially as described.

6. The combination, with a vertically-adjustable tube-section forming a part of a smoke-conductor, of an auxiliary air-draft valve mounted on a vertical pivot, and a vertically-movable shaft connected with the valve extending through and rising and falling in an orifice in the roof of the car at the vestibule or end of the car and provided with a handle for operating the valve from the car-platform, substantially as described.

7. The combination, with a vertically-movable smoke-conductor for a railway-car, of a hoisting mechanism supporting the conductor from the car-roof, substantially as described.

8. The combination, with a smoke-conductor composed of a series of flexibly-connected tube-sections, of hoisting devices for independently raising and lowering either end of the tube-sections, substantially as described.

9. The combination, with the smoke-conductor tube-section of a railway-car, of hoisting devices supporting each end of the tube-section from the car-roof to raise and lower either end of the tube-section, substantially as described.

10. The combination, with the smoke-conductor tube-section of a railway-car, of a rockshaft having arms, links connecting the arms with the tube-section, and means for rocking the shaft to raise and lower the tube-section, substantially as described.

11. The combination, with the smoke-conductor tube-section of a railway-car, of a rockshaft having arms, links connecting the arms with the tube-section, a lever for rocking the shaft, and a cable for oscillating the lever, substantially as described.

12. The combination, with the smoke-conductor tube-section of a railway-car, of a rockshaft journaled in a bearing on the car-roof and having arms, links for connecting the arms to the tube-section and supporting the latter, a lever on the rock-shaft, a sheave or pulley on the car-roof, and a cable connected with the lever passing round the pulley and extending through the car-roof, substantially as described.

In testimony whereof I have affixed my signature in presence of two witnesses.

LAURENS N. CHISOLM.

Witnesses:

EUGENE P. JEROY,
O. E. JOHNSON, JR.