(No Model.) 2 Sheets—Sheet 1.

J. R. JOHNSON.

SMOKE CONDUCTOR.

No. 450,023. Patented Apr. 7, 1891.

Fig. 1.

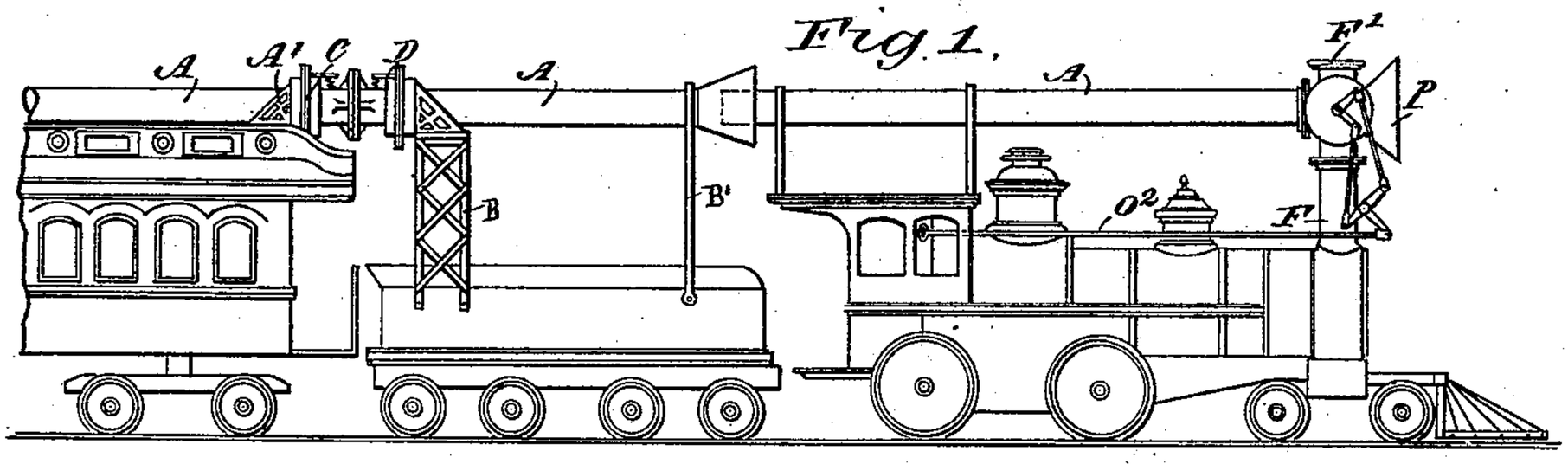


Fig 2.

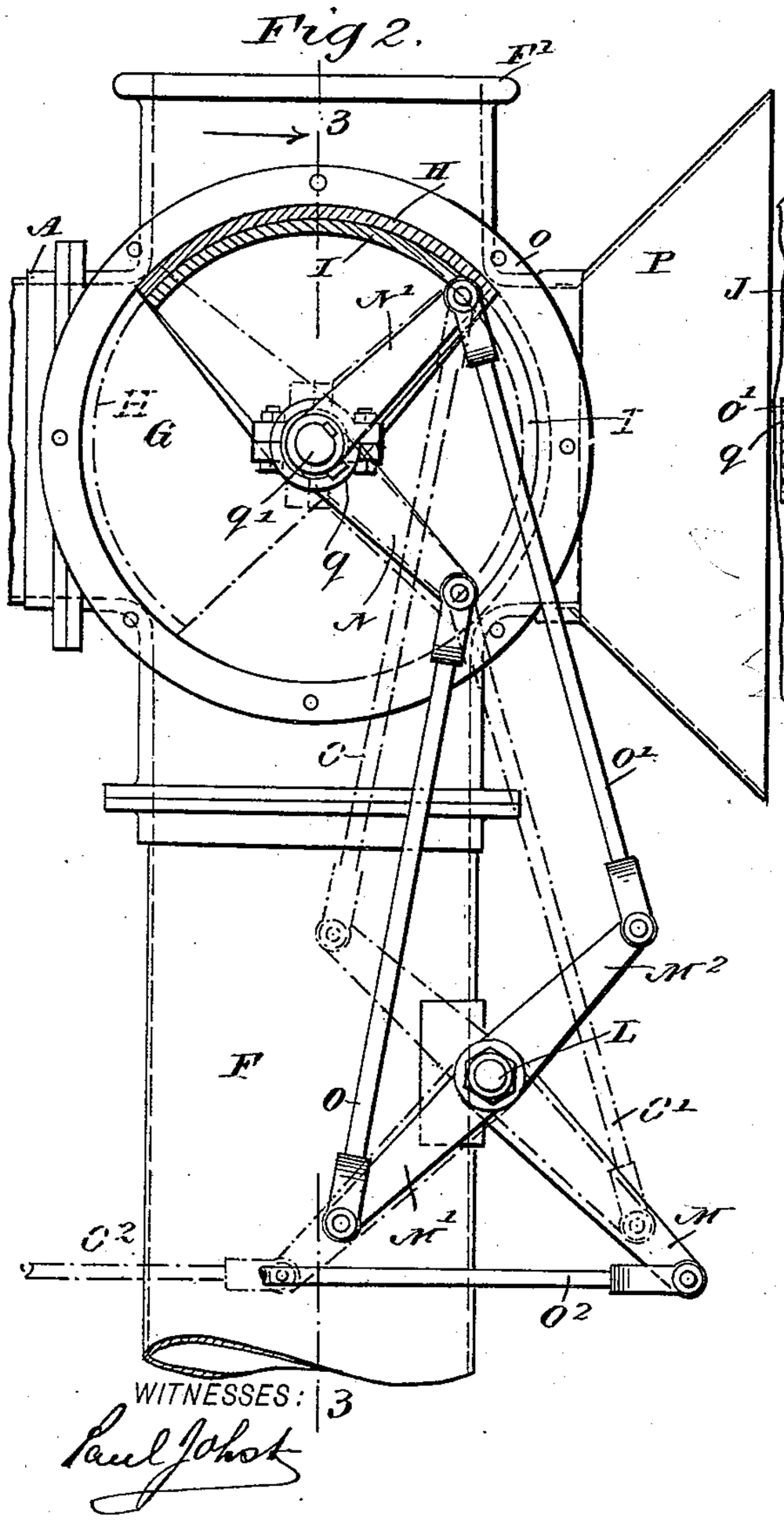
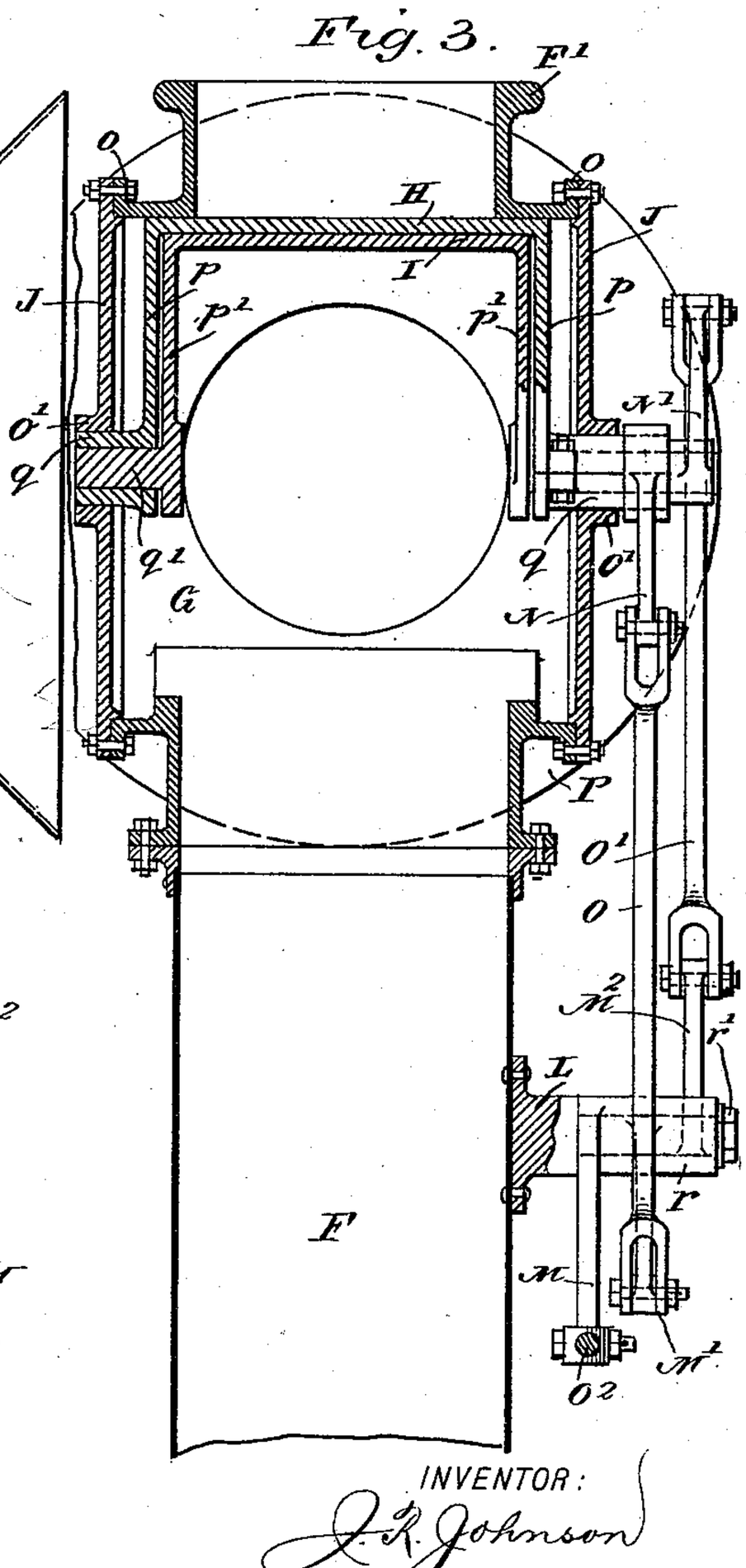


Fig. 3.



WITNESSES: 3

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(No Model.) 2 Sheets—Sheet 2.

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Fig. 4.

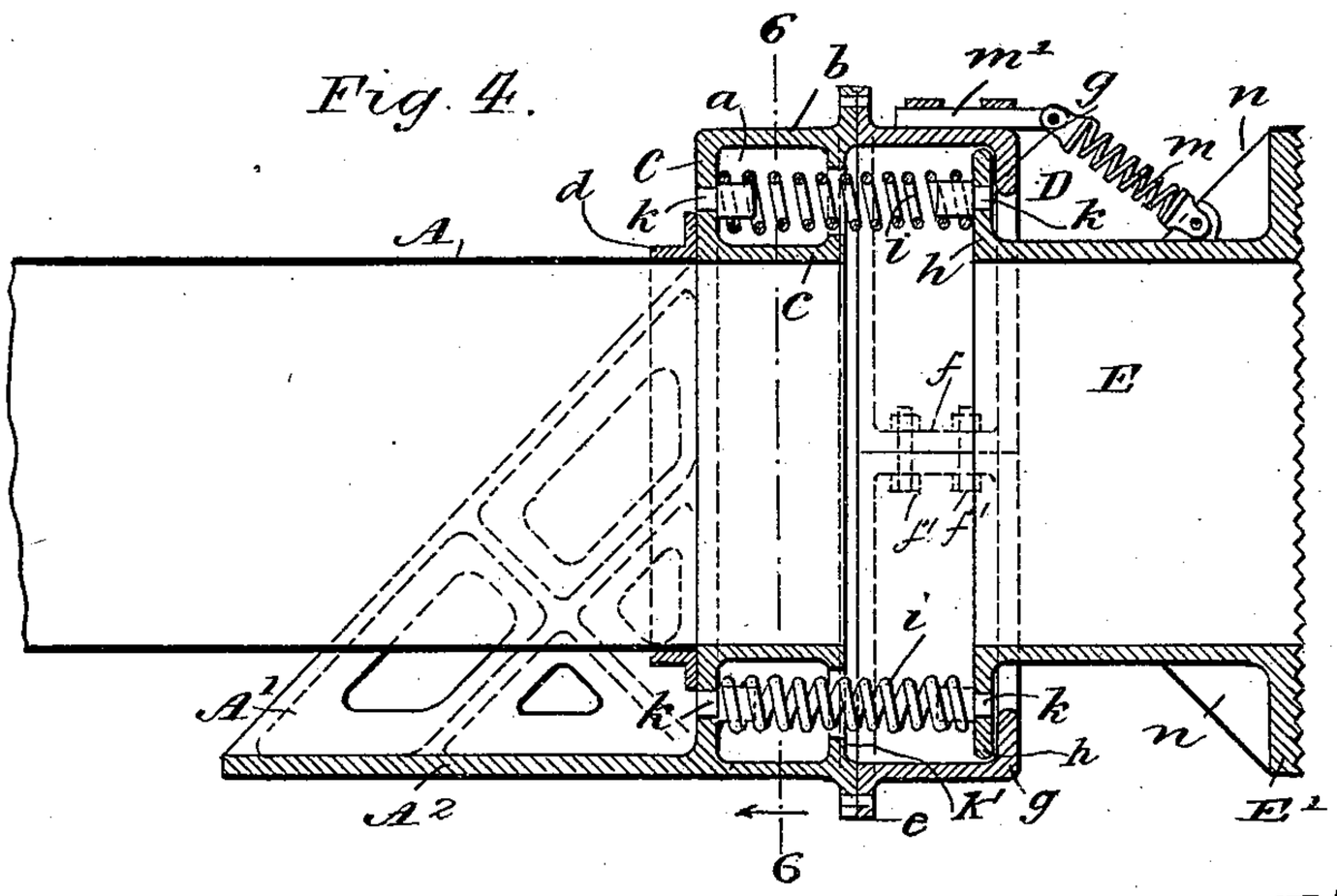


Fig. 5.

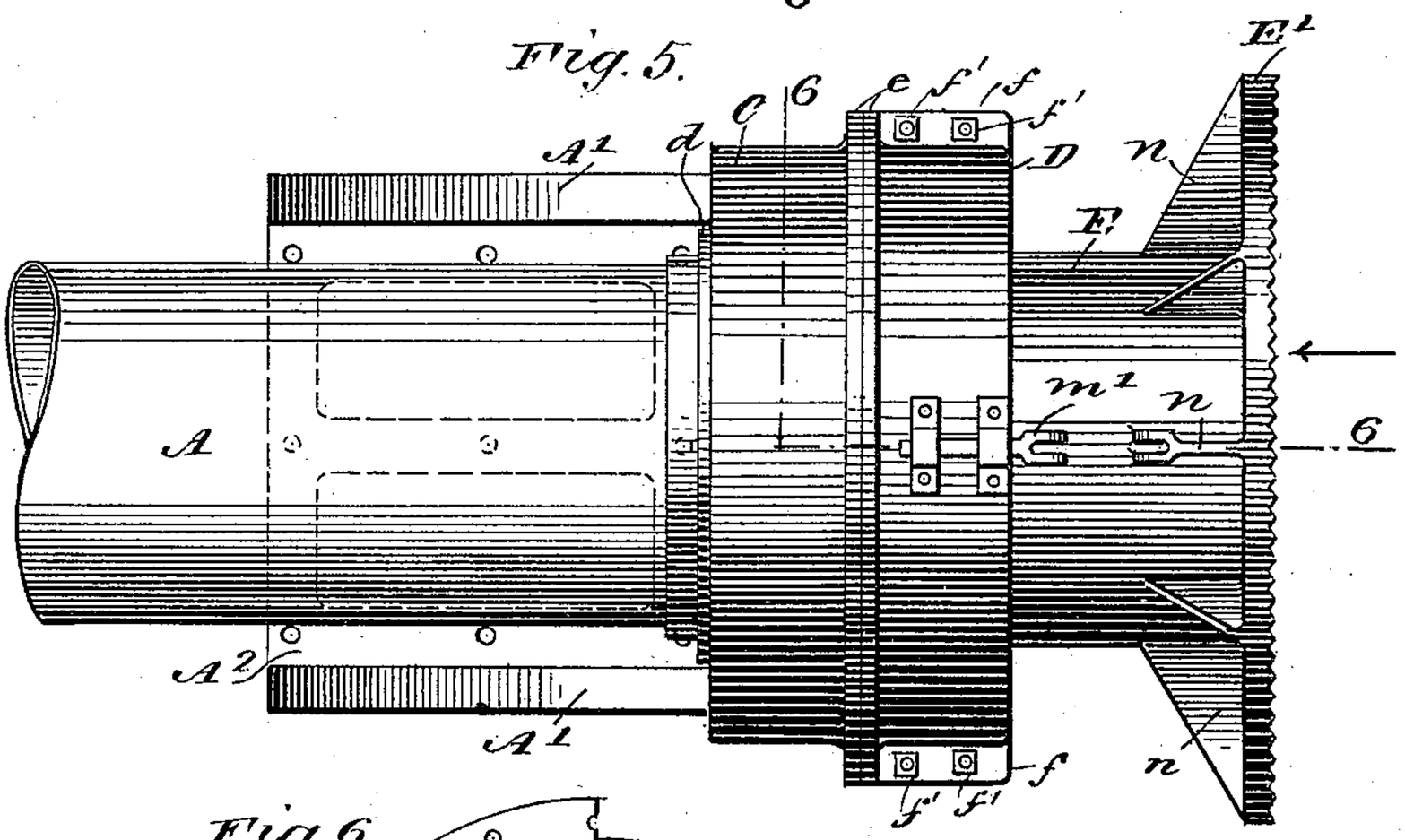
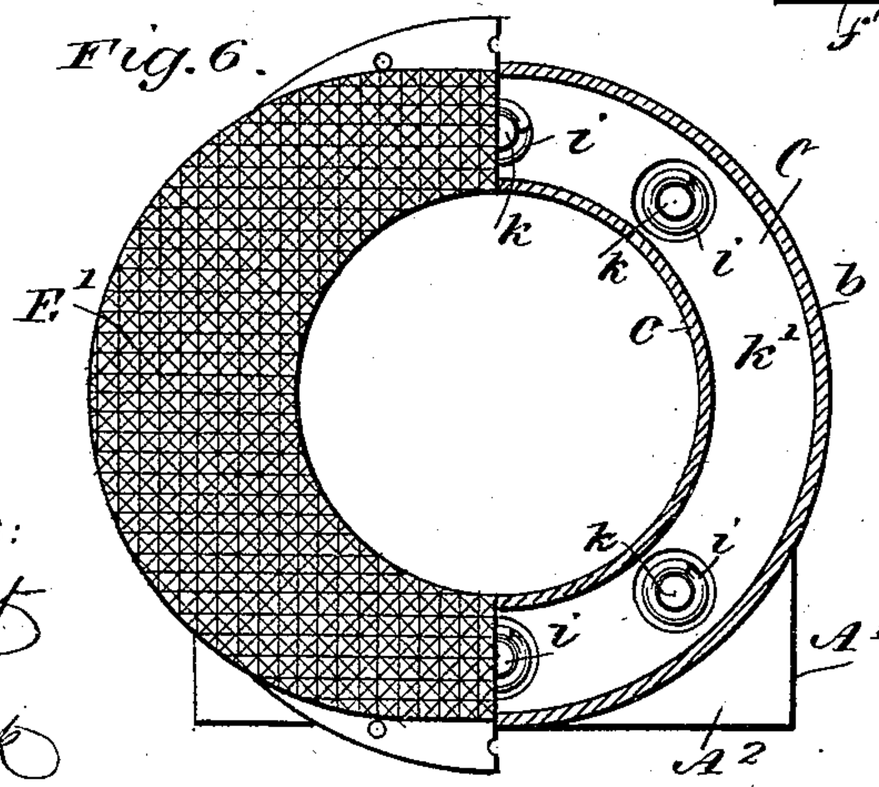


Fig. 6.



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UNITED STATES PATENT OFFICE.

JAMES R. JOHNSON, OF CHARLESTON, SOUTH CAROLINA.

SMOKE-CONDUCTOR.

SPECIFICATION forming part of Letters Patent No. 450,023, dated April 7, 1891.

Application filed November 28, 1890. Serial No. 372,871. (No model.)

To all whom it may concern:

Be it known that I, JAMES R. JOHNSON, of Charleston, in the county of Charleston and State of South Carolina, have invented a new and useful Smoke-Conductor, of which the following is a full, clear, and exact description.

This invention relates to an improved smoke-conductor for railway-trains, and has for its objects to provide a simple practical device of the type named which will be automatic in adjustment where coupled between the cars of a train, retain connection whether on curves or straight track, and that may be regulated in service from the cab of the locomotive.

To these ends my invention consists in the construction and combination of parts, as is hereinafter described and claimed.

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

Figure 1 is a side elevation of a locomotive, its tender, and a portion of a car, showing the smoke-conductor applied. Fig. 2 is an enlarged detached side elevation, partly broken away and in section, of the smoke-stack of the locomotive and a portion of the smoke-conveying device connected therewith. Fig. 3 is a central vertical section of the same, taken on the line 3 3 in Fig. 2, looking in the direction of the arrow in said figure. Fig. 4 is a central longitudinal section of the smoke-conductor and one of the devices employed for connecting its sections. Fig. 5 is a plan view of the same; and Fig. 6 is a front view of the same, partly broken away and in section, on the lines 6 6 in Figs. 4 and 5.

The smoke-conductor is made of sheet metal in tubular sections A, which are so proportioned to the length of the cars, tender, and locomotive on which they are mounted as to permit their ends to project beyond the ends of the cars, where they are connected by coupling devices, hereinafter more particularly described, and are thus joined to form a continuous conduit from end to end of the train. The sections A are mounted in the direction of the length of the train a proper distance above the cars, tender, and locomotive, so as to lie in the same horizontal plane, on bracket-frames A′ and standards B B′, which may be of any preferred form that will afford a neat and substantial support for the several sections.

The devices employed for coupling the sections between the cars and tender are alike at each junction, and, as shown in Figs. 4, 5, and 6, consist of two cylindrical shells C and D, of corresponding diameter, an annular space *a*, intervening the outer wall *b* of the shell C and its inner concentric wall *c*, which latter aligns with the forward ends of the sections.

The bracket-frames A′ provided for the support of the sections A carried by the cars and the rear end of the section carried by the tender are preferably made integral with the shells C and D, and consist of two corresponding diagonally-ranging flanges rising from a horizontal base-plate A^2, which is an extension of the shells C and D, said sections being secured to the vertical outer faces of the shells by angle-iron rings *d*, bolted or riveted to said shells and sections. The shell D is preferably composed of two equal portions joined by securing together their side flanges *f* by bolts or rivets *f′*, said shell and the shell C being joined by bolting or riveting together their vertical flanges *e*, all as shown in Figs. 4 and 5. The front wall of the shell D is circularly apertured centrally and of such proportionate diameter as to produce an inwardly-projecting flange *g*, that is parallel with the end wall of the shell C when the shells C and D are secured together.

A joint-sleeve E is provided for a rocking connection of the ends of opposing sections A, which sleeves are of similar form, and each consists of a short cylinder of a diameter equal to that of the sections A interiorly considered and flanged radially, as at *h*, on the end which is inserted in the shell D. The periphery of the flange *h* is rounded, as shown in Fig. 4, to permit a rocking movement of the sleeve, the diameter of the aperture in the end of the shell D being considerably greater than that of the sleeve E, whereby a universal vibration of the said sleeve for a limited distance is permitted.

As a preferred means for retaining the sleeve E forwardly projected and permitting it to rock, spiral springs *i* are located at proper intervals within the annular space *a* of the

shell C and in the shell D, said springs having an engagement at their ends with studs *k*, projecting from the end walls of the shells C D, and the springs extend through suitable holes made in the inner wall *k'* of the shell C, so that by their tensional strength and resilience they are adapted to normally hold the radial flange *h* against the flange *g*, any pressure on the outer end of the joint-sleeve E causing the sleeve to yield inwardly and to the greatest degree at the point where the pressure is strongest. Upon the upper side of the joint-sleeve E the end of a retractile spring *m* is fastened, which spring is extended toward the edge of the shell D and is attached to a bracket-plate *m'* mounted on said shell, the spring *m* by its contraction serving to assist the return of the joint-sleeve to a plane coincident with that of the conductor-section whereon it is located, a proper adjustment of the spring *m* being permitted by its manner of connection with the shell and sleeve, as represented in Figs. 4 and 5.

Contact-plates E', of increased diameter as compared with the diameter of the joint-sleeves E, whereon they are formed or affixed, are located on the forward edges of the joint-sleeves, so that when the two sleeves are made to impinge said plates will receive the shock, which is cushioned by the springs *i*. Preferably the contact-plates E' are made laterally elliptical to increase the surface of contact on the plates in horizontal radial lines, so as to maintain contact between the ends of the conductor-sections when they assume an angular position with regard to each other on sharp curves of a railroad, each plate E' being strengthened by the strut braces or webs *n*. To prevent slipping of the contact-plates upon each other, the outer faces are roughened by diamond check-work indentations, as represented on the half-plate shown in Fig. 6.

The connection formed between the conductor-sections, that extend over the locomotive and tender, as shown in Fig. 1, consists of a conical or "bell end" on one pipe, wherein the other pipe centers its plain end, as indicated by dotted lines.

The stack F of the locomotive is peculiarly formed to adapt it to coact with the smoke-conductor and afford means to control the inflow of air at the front end of said conductor after passing through the top case of the stack, thereby carrying the products of combustion, such as sulphurous gas, smoke, and cinders, back through the conductor-pipe to discharge it at the rear end of the same, the novel construction of parts being represented in Figs. 2 and 3.

In the side elevation of the stack F shown in Fig. 2 the interior of the head-case G is exposed by a removal of one side bonnet and cutting a limb away from each of the contained draft-regulating valves H I.

The head-case G is preferably made in the form of a cylindrical shell transversely located, having its circular wall perforated and intersected by the vertical cylindrical stack F, which is of less diameter than the case, and projects above it a proper distance, as shown at F' in Figs. 1, 2, and 3.

Upon the flanged ends of the head-case G the bonnets J are fitted and secured removably by bolts, said bonnets being of similar form and circular in contour to mate the flanges *o* of the head-case, and each provided with an outwardly-projecting centrally-perforated hub *o'*, that when in position is axially coincident with the bore of the cylindrical head-case, which latter should be true on its inner surface to permit the close, free, revoluble contact and movement of interior parts.

As will be seen, the draft-regulating valves H I are segments of cylindrical shells that are concentric, the valve-gate H having a curvature that will afford to its outer face a close sliding contact with the interior surface of the head-case G, the other valve-gate I engaging loosely the inner surface of the gate H when both are adjusted to produce such a contact of parts.

Upon the ends of the valve-gates H I quadrantal limbs *p p'* are respectively formed. The limbs *p*, that are radials of the arched valve H, have equal length and terminate in outwardly-projecting hubs *q*, that are axially apertured, of a proper size to receive the solid cylindrical hubs *q'*, formed on the ends of the quadrantal limbs *p'* on the other valve-gate I, the hubs on the limbs *p* having a rocking engagement with the hubs *o'* of the bonnets J.

Upon one side of the stack F, preferably toward the right hand, a bracketed journal-stud L is secured to project outwardly a proper distance to receive and loosely support three rock-arms M M' M² aside of each other, which arms are prevented from displacement by a washer and nut *r'*, that engage the outer end of their common hub *r*, whereon said arms are affixed to project differently.

On the same side of the stack F from which the stud L projects the hubs *q q'* of the valve-gates H I on that side are outwardly extended, and on these hub-extensions the crank-arms N N', of equal length, are firmly attached to project at a right angle to each other, the inner arm N being mounted on the hub projection *q* of the limb *p*, that is on the outer valve-gate H, the other arm N' engaging the farther-extended solid hub *q'*, being thus adapted when vibrated to rock the inner gate I.

The provision of the valve-gates H I is for the purpose of changing the direction of draft in the stack F so that it may be made vertically continuous or be diverted at a right angle and put in direct connection with the horizontal conductor-tubes A when the train is in motion. To this end the rock-arms M' M² are made to lie in the same longitudinal plane and the arm M located at right angles thereto below the arms just mentioned.

To arrange the gates for service, they are placed together as shown in Fig. 2, which will close the top F′ of the stack F. Then the cranks N N′ will occupy the relative positions shown in Fig. 2, the inner arm N being inclined downwardly at an angle of ninety degrees from the upwardly-ranging arm N′. The rock-arms M′ and M² are now inclined so that they will lie at an angle of forty-five degrees from a horizontal plane. The crank-arm N is now connected to the arm M′ and the other crank N′ to the rock-arm M² by the loose rods O O′, the downwardly-inclined rock-arm M having a pivotal connection with a horizontal pusher-rod O², which is designed to be extended for such a length as to be manipulated from within the cab of the locomotive, as represented in Fig. 1.

In operation the rocking movement of the valve-gates H I, effected by pulling upon the rod O², will cause them to occupy the position shown by dotted lines in Fig. 2, whereby the outer gate H will be located across the rear side of the head-case G and the other gate I directly opposite and across the throat in front, which is near to the flaring mouth-piece P of the head-case, the position just described being adapted to convert the stack F into a vertical draft-flue, which is necessary when the locomotive is being fired up and not in motion. As soon as the train is made up and in motion the valve-gates H I are thrown into the position shown by full lines in Fig. 2, which will thus permit the air to enter the mouth-piece P, and by its force, induced by a progressive movement of the train, cause all sparks, gas, and smoke that are thrown off by the fire to pass rearward and be expelled at the rear end of the last car of the train.

The form of construction provided for the conductor-section couplings between the cars of a train insures a close connection when in service, the elastic connection permitting the parts to yield in any direction sufficiently to maintain an engagement of the contact-plates E′ whether the cars are moving on a straight track or are running on a sharp curve, the yielding of the contact-plates also enabling the coupling together of cars that are of slightly-different heights.

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

1. In a smoke-conductor for railway-trains, the combination, with a cylindrical smoke-stack, a cylindrical head-case thereon having a funnel-shaped mouth-piece projected forwardly at a right angle to the vertical stack, and a conductor-tube aligning with the mouth-piece, of two segmental cylindrical valve-gates located in the head-case and adapted to rock on concentric journals which engage the bonnets of the head-case, and mechanism for simultaneously moving the valves in opposite directions, substantially as described.

2. In a smoke-conductor for railway-trains, the combination, with the stack of the locomotive and a series of tubular sections forming a continuous conduit communicating with said stack and supported in direction of the length of the train, of a cylindrical head-case on said stack having a forwardly-projecting funnel-shaped mouth, two segmental cylindric valve-gates in said head-case which are adapted to rock on their journals that engage bonnets of the head-case and be slid together or be moved to opposite sides of the head-case, and mechanism connected with the valve-gates and adapted to be manipulated from the cab of the locomotive, which will simultaneously move the valve-gates, substantially as set forth.

3. In a smoke-conductor for railway-trains, comprising a series of aligning tubular sections, the combination, with the opposing ends of said sections and aligning cylindrical shells, each having a bracket-frame formed thereon, of a cylindrical joint-sleeve loosely engaging the front end of the outer shell, a contact-plate on the outer end of said joint-sleeve, having a roughened front face, a series of spiral springs in the shells and bearing on a radial flange on the inner end of said sleeve, and a contractile spring connecting the outer shell and said sleeve on their exterior, substantially as set forth.

4. A smoke-conductor for railway-trains, consisting, essentially, of aligning tubular sections stably supported on and above each car and the tender and locomotive of the train, a coupling device on the end of each conductor-section having a composite shell provided with a supporting-bracket frame, a joint-sleeve in each composite shell loosely retained and forwardly projected by a series of spiral springs, a rough-faced contact-plate on the outer end of each joint-sleeve, and a pair of draft-controlling valve-gates in the upper portion of the locomotive-stack adapted to rock toward or from each other when manipulated from the cab of the locomotive, substantially as shown and described.

JAMES R. JOHNSON.

Witnesses:
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THOS. S. SINKLER.