

(No Model.)

3 Sheets—Sheet 1

I. J. HARTFORD.
SMOKE AND SPARK CONDUCTOR.

No. 442,886.

Patented Dec. 16, 1890.

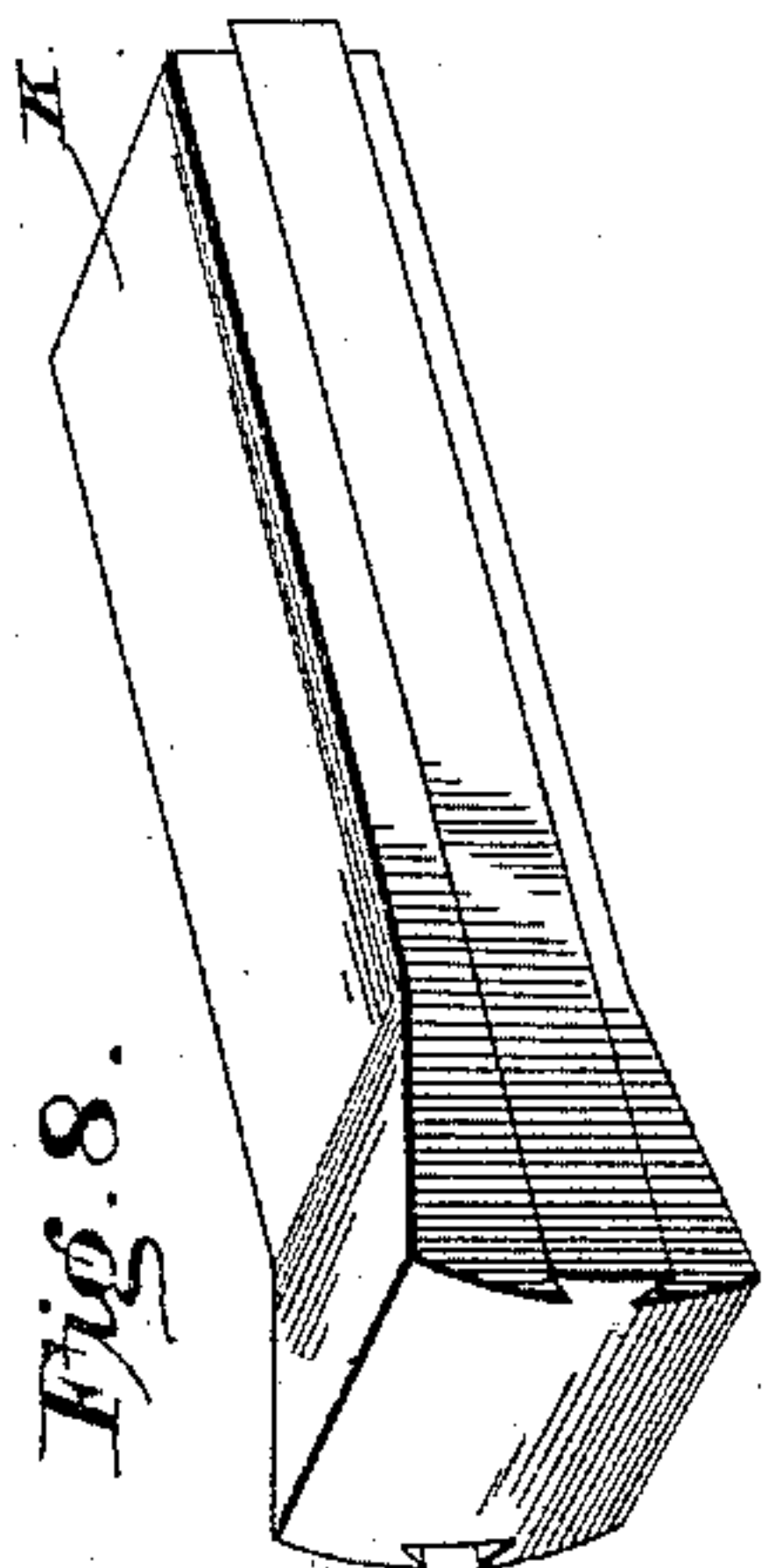


Fig. 8.

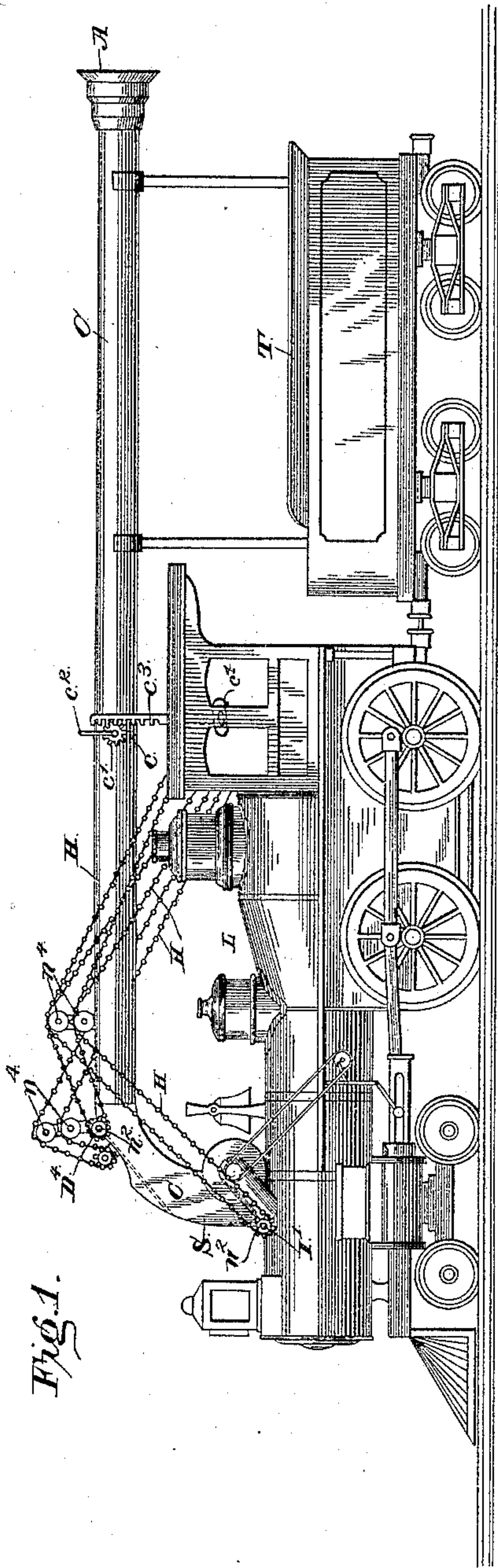


Fig. 1.

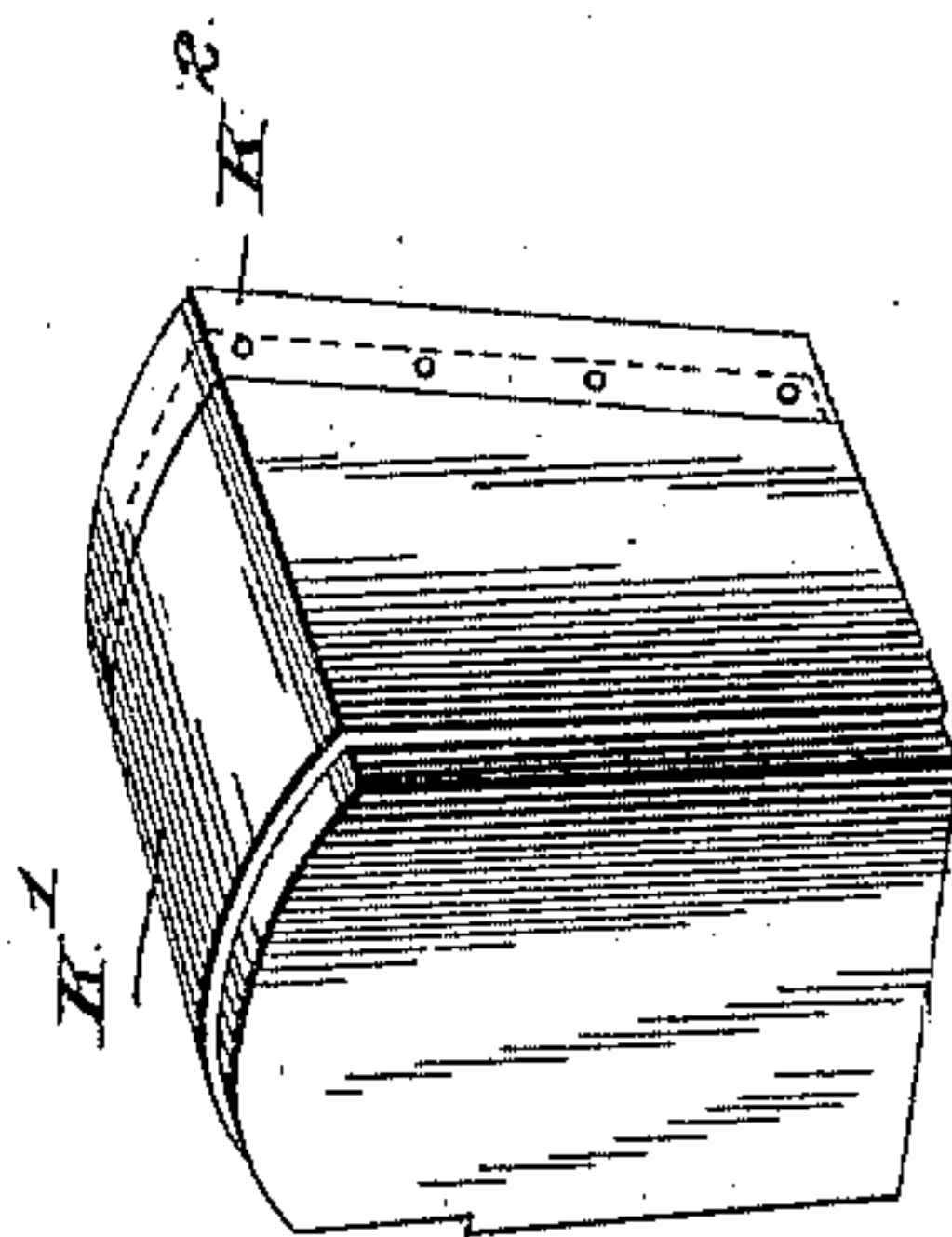


Fig. 9.

Witnesses

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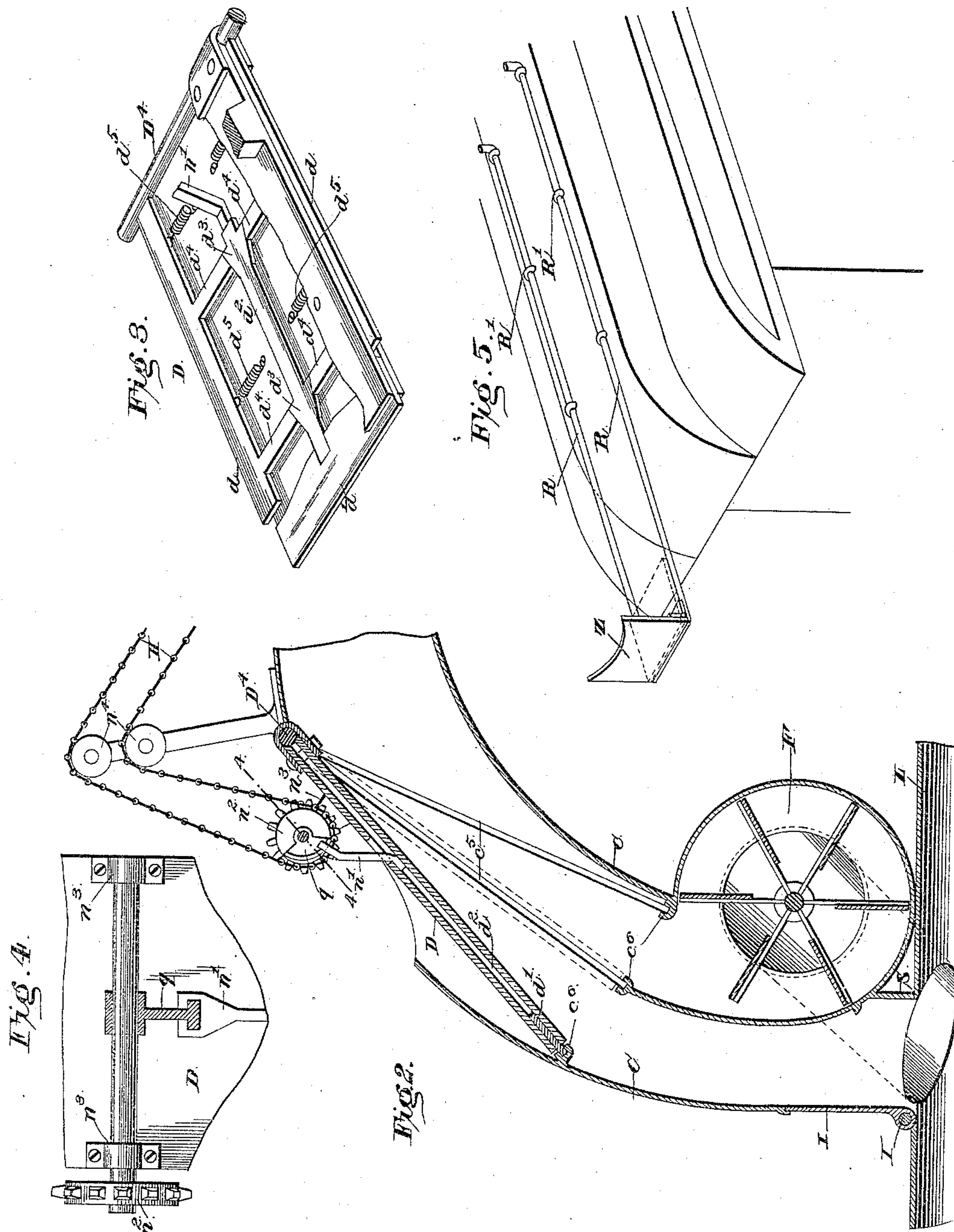
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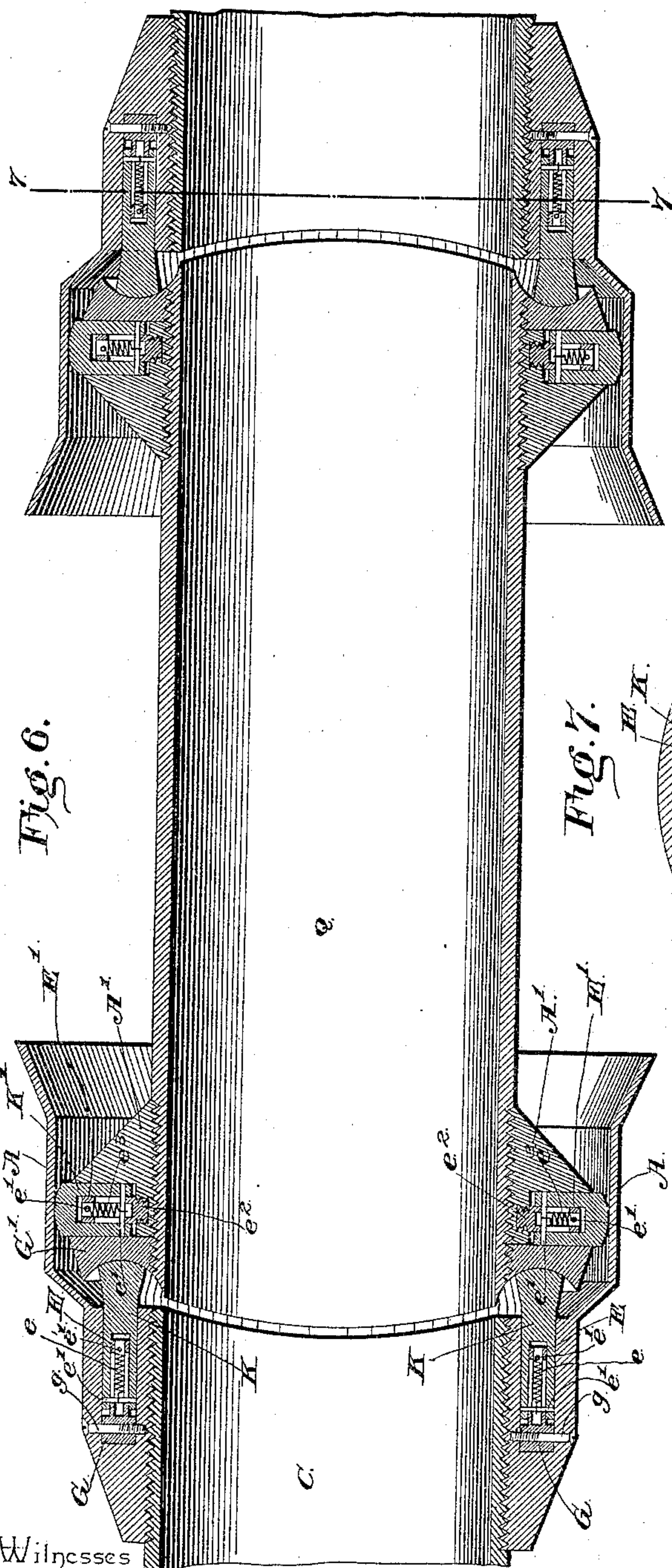
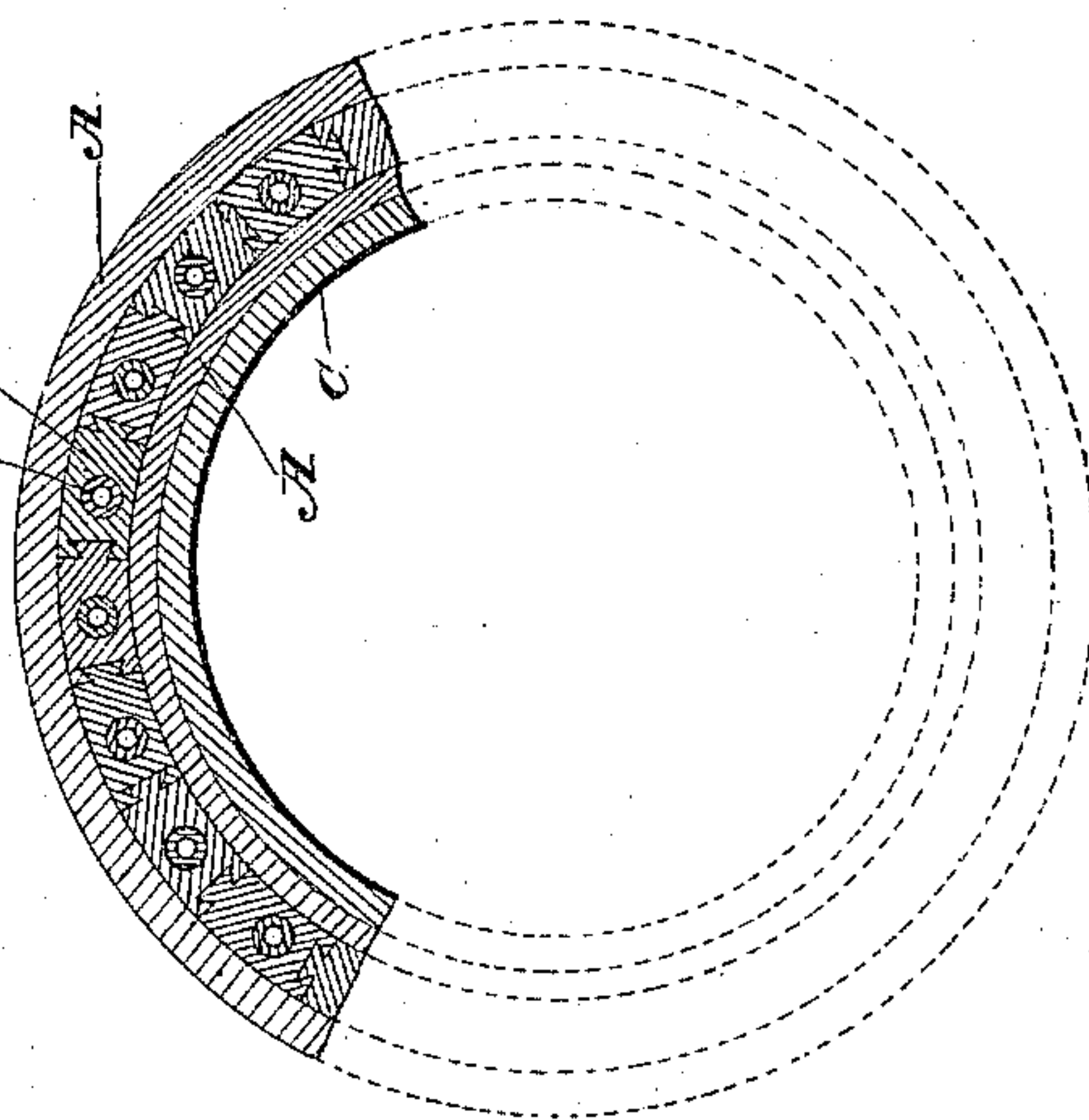


Fig. 6.

Fig. 7.



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UNITED STATES PATENT OFFICE.

ISAAC J. HARTFORD, OF KIRKSVILLE, MISSOURI.

SMOKE AND SPARK CONDUCTOR.

SPECIFICATION forming part of Letters Patent No. 442,886, dated December 16, 1890.

Application filed August 9, 1890. Serial No. 361,551. (No model.)

To all whom it may concern:

Be it known that I, ISAAC J. HARTFORD, a citizen of the United States, residing at Kirksville, in the county of Adair and State of Missouri, have invented a new and useful Smoke and Spark Conductor, of which the following is a specification.

This invention relates to a smoke and spark conductor adapted to be mounted upon a locomotive; and the object of the same is to provide means for conveying the waste products of combustion, which pass through a locomotive-chimney, rearwardly over the cars of a moving train.

To this end the invention consists of the general arrangement and specific construction of parts hereinafter more fully described, and illustrated in the drawings, in which—

Figure 1 is a side elevation of a locomotive and tender with my smoke and spark conductor carried thereby. Fig. 2 is an enlarged vertical section of the upper end of the smoke-stack and the switch and the smoke and spark conductor above it. Fig. 3 is a perspective detail of the switch-door. Fig. 4 is a section on the line 4 4 of Fig. 2. Fig. 5 is a perspective detail of the conductor-supporting device upon a car. Fig. 6 is a horizontal section through the coupling between the conducting-tubes upon two cars. Fig. 7 is a transverse section on the line 7 7 of Fig. 6. Fig. 8 is a detail perspective of one of the longitudinally-moving blocks. Fig. 9 is a similar detail of one of the laterally-moving blocks.

Referring to the said drawings, the letter L designates a locomotive of any preferred construction, and T is the tender carried thereby in the usual manner. From the smoke-stack S lead smoke and spark conducting tubes over the tender and over the cars of the train to the rear end of the latter.

F is a rotary fan driven by suitable power from the engine and located within a fan-casing built to the rear of the conductor C, as seen in Fig. 1. The openings in the casing extend from the fan-shaft to about midway of the ends of the fan-paddles, thus admitting the smoke around the shaft's center. The smoke is directed therein by side pipes extending from the smoke-stack to the ends, respectively, of the shaft's center.

I is an inlet-door pivoted in the front of the casing C. When this door is lowered, the smoke is directed into the side pipes just mentioned; but when the door is raised, as shown in Fig. 2, the smoke is permitted to pass directly upward from the smoke-stack in front of the fan-casing and into the conductor.

A switch-door D is provided, hinged at its rear end in the upper side of the conductor, and when this door is raised, as shown in Fig. 2, the smoke is permitted to pass rearwardly through the conductor. When this door stands at its intermediate position, as shown in dotted lines in Fig. 2, the smoke which is passed through the fan by the inlet-door I will be passed rearwardly through the conductor; but if the inlet-door I be raised to a vertical position, as shown in Fig. 2, and the switch-door D is at its intermediate position the smoke will pass directly from the stack upwardly and out above the locomotive. When the switch-door D is at its lowermost position, the conductor C is entirely closed, and the smoke must pass out above the locomotive whether it goes through the fan or not.

The object of passing the smoke out of the conductor either above the locomotive or at the rear end of the train, according as circumstances and conditions may render desirable, is too well known to be enlarged upon here.

The door D has side strips d , which move transversely to its body and are drawn inward by springs d^5 , and it has also an end strip d' , moving outwardly over its body. A bar d^2 is connected to the center of the end strip d' and passes upwardly over the body, being provided with cams or wedges d^3 , adapted to bear outwardly against the inner ends of arms d^4 , carried by said side pieces d , all as best seen in Fig. 3. The conductor C is provided with grooves c^5 and with strips c^6 , having similar grooves standing across the conductor, there being three sets of grooves so arranged in the sides of the conductor and in the cross-strips that they shall stand opposite the side and end pieces of the door D when the latter is in its raised, its lowered, or its intermediate position. The bar d^2 is operated by an arm n' , extending through a slot in the upper wall of the door D and its upper end engaging a cam q , mounted on the

shaft of a sprocket-wheel n^2 , which is journaled in suitable standards n^3 , rising from the door D near its hinged upper edge.

Operating-chains II lead from the cab of the locomotive over grooved pulleys n^1 to the sprocket-wheel n^2 , whereby the strips may be disengaged from the grooves in the conductor. Other chains lead over a sprocket-wheel n^2 , keyed on the pivot-shaft D^1 of the door D, whereby this door may be raised and lowered after the strips have been drawn inwardly, and still another chain II leads over an idle-pulley n^4 , mounted upon the conductor, to a sprocket-wheel n^2 , keyed on the end of the pivot-shaft I' of the inlet-door I. The engineer within the cab by operating the chains or cords II can set the doors I and D at any desired position.

A damper c is arranged within the conductor, preferably above the cab, and on the end of the damper-shaft is a gear-wheel c' and a vane c^2 . A rack c^3 extends upwardly through the top of the cab and has a handle at its lower end, whereby the engineer can raise or lower the rack, and thereby turn the damper to any desired position, such position being indicated by the vane in a manner which will be readily understood.

The coupling which I prefer to use at points where the conductors upon the cars connect with each other is of the construction best seen in Fig. 6.

A is a flanged ring secured upon the conductor C and extending beyond the end thereof, and within this ring upon screws g is detachably seated a ring G, carrying pins E, each of which projects into a block K, having a rounded front end. A coiled expansive spring e is located within each pin and locked on pins e' at each end, one extending through the pin and the other through the ring G, as shown in the drawings. By this construction of parts it will be understood that the segmental ring composed of the blocks K is pressed forwardly, each block yielding independently to whatever force may oppose its forward movement. The blocks are loosely dovetailed into each other along their meeting faces, as shown in Fig. 7.

The letter Q designates a connecting-tube of the same size as the conductor C, upon each end of which tube is screwed a ring A' of the cross-section shown in Fig. 6. Within this ring is arranged a number of sector-blocks K' , having rounded outer ends. Pins E' are arranged within the sector-blocks and connected by screws e^2 at their inner ends to the ring A' . Coiled springs e^3 are located within the pins and locked on pins e' at each end, whereby the blocks K' are pressed normally outwardly. Secured to one edge of each block is a narrow flange K^2 , which slides against the edge of the adjacent block and closes the intervening crack between the two blocks when the latter are distended. When the blocks are pressed inwardly, their beveled faces will of course strike each other. A solid

ring G' is screwed onto the outer end of the ring A' and holds the blocks K' against longitudinal displacement, and the outer face of this retaining-ring G' is grooved annularly, so as to closely fit the rounded front ends of the blocks K, above described.

When the conductors of two cars are to be connected, the connecting-tube Q is brought into place and is forced into the flanged ring A of one conductor C before the cars are brought together. This movement presses the blocks K' inwardly, and when the retaining-ring G' strikes the blocks K the latter are pressed to the rear a short distance. The approaching car automatically couples its conductor C to the other end of the connecting-tube Q in the same manner, and all the blocks K are borne inwardly against the expansive force of the springs e . When so coupled, if the cars separate slightly, the springs e expand and hold the blocks K tightly against the retaining-rings G' , and when the cars rise and fall, as over switches and rough places in the road, or when they turn curves, the connecting-tube Q will be deflected slightly from exact alignment with one or both of the conductors C. This movement will allow the blocks K at one side of the conductor to be pressed outwardly, while the others are depressed, as will be understood, and the blocks K' are always pressed outwardly against the inner face of the flanged ring A. In this manner a double packing is formed at each point of connection between the connecting-tube Q and one end of one of the conductors C, which packing is composed entirely of blocks and springs. The smoke, cinders, and sparks will therefore have no exit from the complete conductor through its leakage at its couplings, and yet no rubber or other inflammable or fusible packing is used at any point.

In Fig. 5 are shown the supporting devices which I preferably employ for holding the outer end of one of the connecting-tubes Q in proper position before the approaching car engages with it to support it. This device comprises two rods R, sliding through eyes R' on the top of the car, and hinged to the outer ends of these rods is a bracket Z, adapted to be folded rearwardly upon the rods R to the position shown in dotted lines. This device is drawn out, as shown in this figure, when it will be understood that the bracket supports the outer end of the connecting-tube Q, and when the approaching conductor C strikes and couples with the tube it trips the bracket Z and pushes it with its two carrying-rods to the rear and out of the way.

Having thus described my invention, what I claim is—

1. In a smoke and spark conductor, the combination, with the smoke and spark conducting tube mounted upon the top of a car, the connecting-tube, and means for coupling them, of rods moving longitudinally in eyes on the top of the car and a hinged bracket supported by the outer ends of said rods beneath

said connecting-tube and adapted to be folded inwardly, as set forth.

2. In a smoke and spark conductor, the combination, with the conductor C, the flanged ring A, secured to the end thereof, the ring G within said flanged ring, carrying pins E, the blocks K, having rounded front ends and into holes in the rear ends of which the pins E extend, and expansive springs *e* within said pins, of the connecting-tube Q, having retaining-rings G at its ends, adapted to pass into said flanged rings, the outer faces of the retaining-rings having annular grooves, within which the rounded ends of said blocks K are seated, substantially as described.

3. In a smoke and spark conductor, the combination, with the conductor C and the flanged ring A, secured to and projecting beyond the end thereof, of the connecting-tube Q, having a solid ring A' screwed upon each end, sector blocks K', seated within said ring and pressed normally outward, a flange K², secured to one edge of said block and sliding against the edge of the adjacent block, and a retaining-ring G', screwed into the outer end of the ring A', the whole combined and operating substantially as set forth.

4. In a smoke and spark conductor, the combination, with the smoke-stack, the conductor leading upwardly and rearwardly therefrom, the fan-case mounted at the rear side of the conductor, and the rotary fan within said case, of the inlet-door I, mounted in the front of the conductor and adapted to give draft to the fire and to direct the sparks through said fan-case or permit their passage directly through the conductor, and means for operating said door, substantially as described.

5. In a smoke and spark conductor, the combination, with the smoke-stack, the conductor leading upwardly and rearwardly therefrom, the fan-case mounted at the rear side of the conductor, and the rotary fan within said case, of the inlet-door I, adapted to pass the smoke directly through the conductor or through the fan, the switch-door D, adapted to pass the smoke out of the conductor or rearwardly through the conductor, and means for operating said doors, substantially as described.

6. In a smoke and spark conductor, the

combination, with the smoke-stack and the conductor leading upwardly and rearwardly therefrom and having an opening at its top and grooves *c*⁵ in its body, of a hinged door D, mounted in the conductor, side and end strips in said door, means for turning the door on its hinges to close said opening and open the conductor or to close the conductor and uncover the opening, and means for distending said strips and seating them in said grooves, as and for the purpose set forth.

7. In a smoke and spark conductor, the combination, with the casing C and the strips *c*⁶ across the same, both being provided with grooves *c*⁵, of the hinged door D, the side strips *d* and the end strip *d'*, loosely mounted in the body thereof, the bar *d*², connected to the center of said end strip and having wedges *d*³, the arms *d*⁴, carried by the side pieces and their inner ends standing adjacent said wedges, means for swinging the door on its hinges, and means for operating said bar to distend said strips and seat them in said grooves, substantially as described.

8. In a smoke and spark conductor, the combination, with the casing C, the door D, hinged therein, extensible side and end strips on said door, for the purpose set forth, and a bar *d*², for distending said strips, of a cam *q*, mounted on a shaft and journaled in standards *n*³, an arm *n'*, connected to said bar *d*² and engaging said cam, means for turning said shaft, and means for swinging the door on its hinges, each and all substantially as described.

9. In a smoke and spark conductor, the combination, with the smoke-stack and the conductor leading upwardly and rearwardly therefrom over the locomotive-cab, of the damper *c* in said conductor, the vane *c*² on the shaft of said damper, the gear *c'*, also on said shaft, and the rack *c*³, engaging said gear, extending downwardly into the cab, and provided with a handle *c*⁴, all as and for the purpose hereinbefore set forth.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in presence of two witnesses.

ISAAC J. HARTFORD.

Witnesses:

THEODORE BRIGHAM,
J. D. MARKEY.