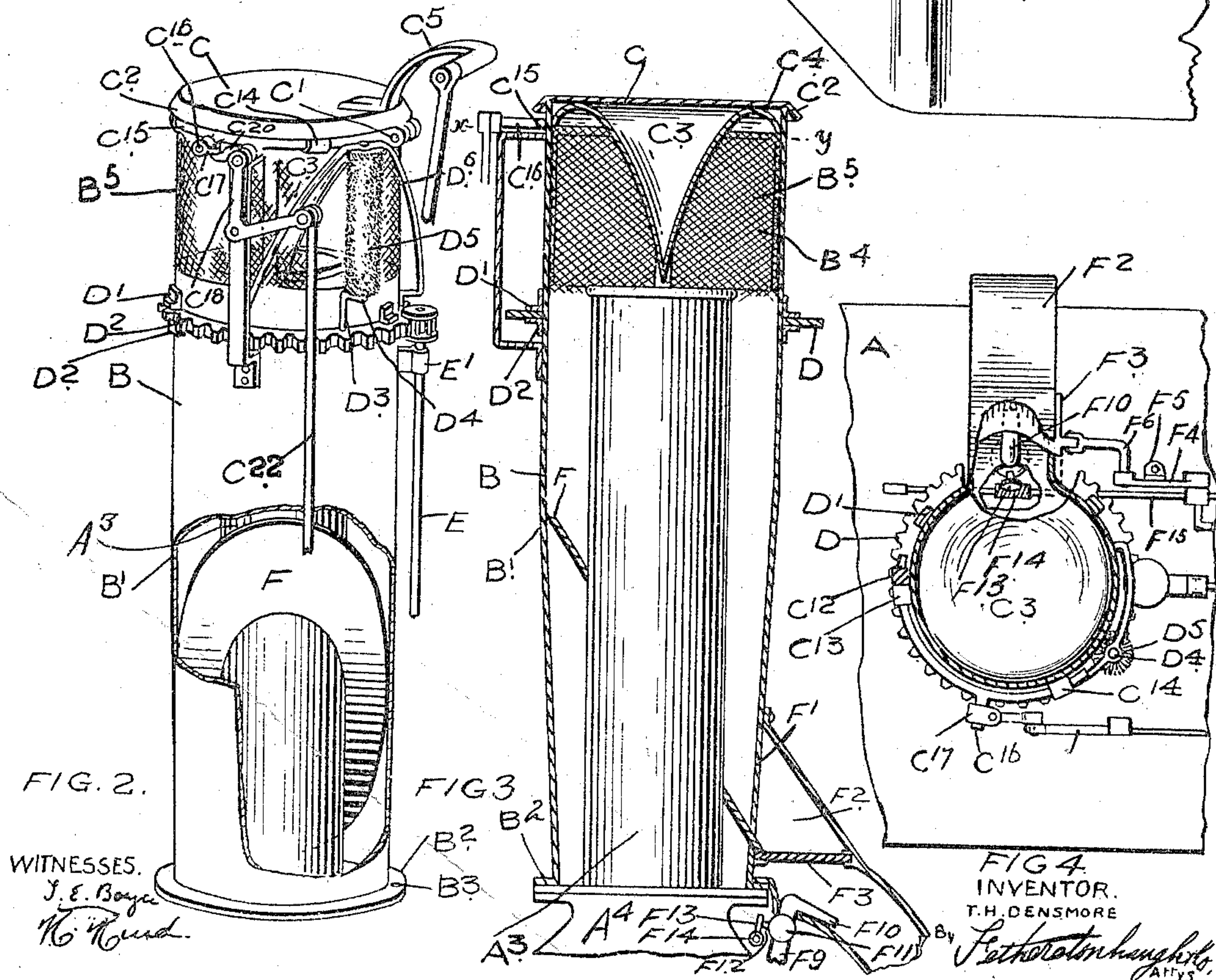
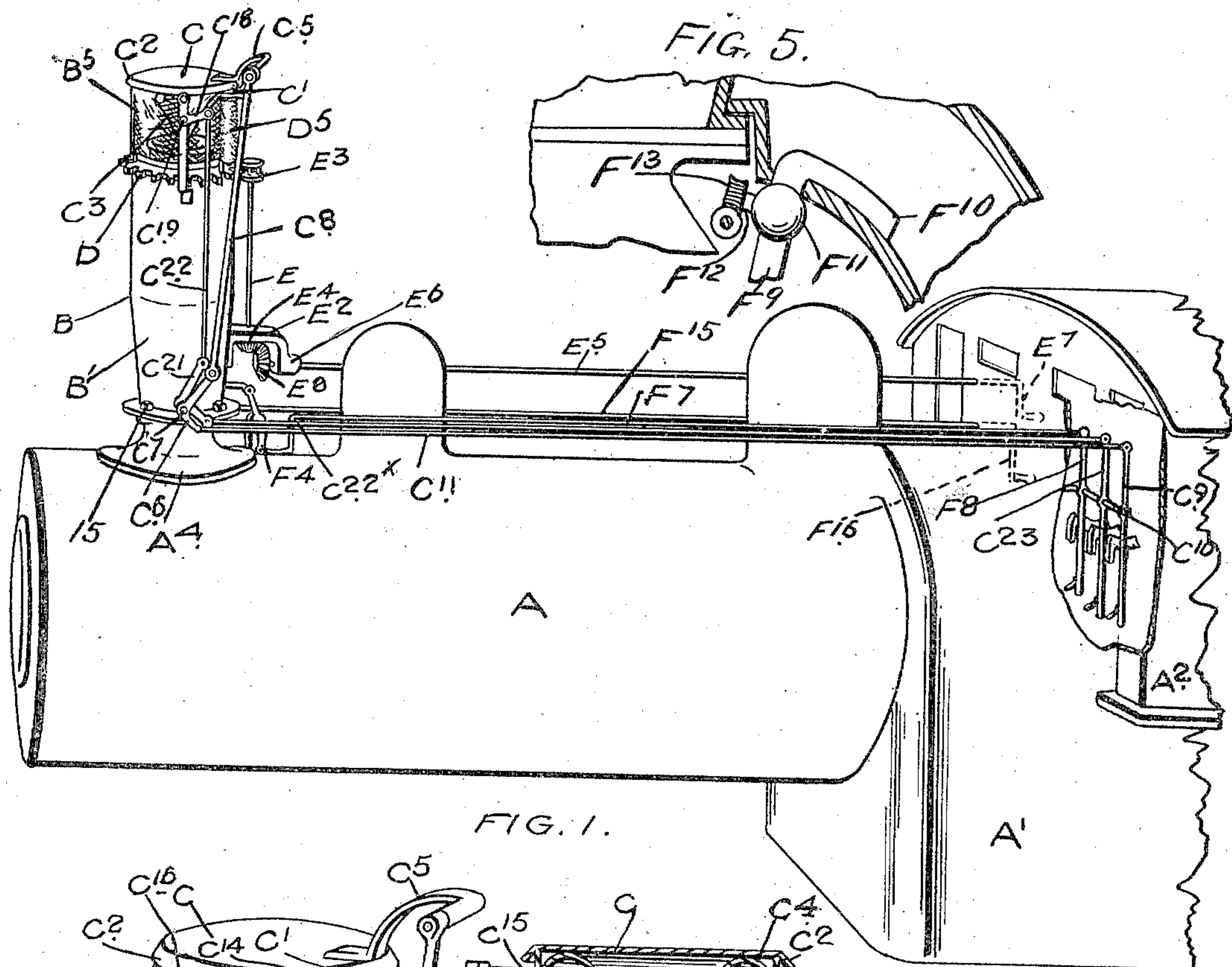


T. H. DENSMORE.  
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APPLICATION FILED MAY 21, 1909.

951,726.

Patented Mar. 8, 1910.





# UNITED STATES PATENT OFFICE.

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SPARK-ARRESTER FOR LOCOMOTIVES.

951,726.

Specification of Letters Patent.

Patented Mar. 8, 1910.

Application filed May 21, 1909. Serial No. 497,492.

*To all whom it may concern:*

Be it known that I, THOMAS H. DENSMORE, of the village of Grand Valley, in the county of Dufferin, in the Province of Ontario, Canada, have invented certain new and useful Improvements in Spark-Arresters for Locomotives, of which the following is the specification.

My invention relates to improvements in spark arresters for locomotives and other engines and the object of the invention is to devise a spark arrester of this class which may be conveniently operated from the engine cab and in which the extinguishing of the arrested sparks is assured, in which there is no liability of the engine becoming choked by soot, which may be thoroughly cleaned with a minimum amount of labor and by which the free draft of the engine is not interfered with and it consists essentially of a tubular casing extending around the engine stack and to a distance above the same having openings therein located above the stack, a tubular gauze screen extending over the openings and secured to the casing, a lid for the casing, a conical concave deflector extending therefrom into proximity to the stack, a burred brush held against the screen in such a way as to force the bristles of the brush through the interstices of the screen, means for revolving the brush around the screen operated from the cab, means for raising and means for locking the casing lid also operated from the cab and means for cleaning the deposit formed in the casing operated from the cab as hereinafter more particularly described by the following specification.

Figure 1, is a general perspective view of the major portion of a locomotive engine showing my apparatus applied thereto. Fig. 2, is an enlarged perspective detail partially broken away and in section showing the engine stack and that portion of my apparatus which is connected thereto. Fig. 3, is an enlarged cross sectional view through that portion of the apparatus shown in Fig. 2. Fig. 4, is a sectional plan view taken on line *x-y* Fig. 3. Fig. 5 is an enlarged view of part of Fig. 3.

In the drawings like letters of reference indicate corresponding parts in each figure.

A is the engine boiler, A' the front portion of the fire box and A<sup>2</sup> the front portion of the cab supported upon the fire box.

A<sup>3</sup> is the stack of the locomotive connected at its lower end to the usual casting A<sup>4</sup>.

B is a tubular casing tapered preferably toward its lower end at B' and provided at the lower end of such tapered portion with an annular flange B<sup>2</sup> provided with holes B<sup>3</sup> through which the usual bolts 15 are designed to extend to secure the casing around the stack A<sup>3</sup>. The tubular casing B extends upwardly above the stack and is provided at such upper end with openings B<sup>4</sup>.

B<sup>5</sup> is a tubular screen of wire gauze surrounding the tubular casing B above the stack and extending over the openings B<sup>4</sup> of the casing.

C is a lid for the casing hinged at C' and provided with an annular outwardly flared flange C<sup>2</sup>.

C<sup>3</sup> is a conical projection extending downwardly from the lid and secured thereto and extending into proximity with the top of the stack. The sides of the cone are formed concave and at the base of the cone the ends are turned downwardly so as to form the flange C<sup>4</sup>. By this means the sparks and smoke pass upwardly the conical projection C<sup>3</sup> forms a deflector to direct the smoke and sparks outwardly and downwardly against the screen. The sparks thereby are caught in the meshes of the screens as they are driven outwardly away from the stack.

C<sup>5</sup> is a tail piece secured to the rear of the lid C.

C<sup>6</sup> is a bell crank pivotally supported upon a stud C<sup>7</sup> located in proximity to the base of the stack.

C<sup>8</sup> is a link connecting one arm of the bell crank C<sup>6</sup> with the tail piece C<sup>5</sup>.

C<sup>9</sup> is a suitable co-acting lever and quadrant pivotally supported on a fulcrum bar C<sup>10</sup> located in the cab of the engine. The upper end of the lever C<sup>9</sup> is connected by a link C<sup>11</sup> to the lower arm of the bell crank lever C<sup>6</sup>.

To lock the lid C in place I provide the following mechanism: C<sup>12</sup> is a loop depending from the lid and to the opposite side of the lid to that on which the hinge is secured. C<sup>13</sup> is a loop secured to the casing B and being near to the end of the loop C<sup>12</sup>. C<sup>14</sup> is a loop also secured to the casing B. C<sup>15</sup> is a segmental bar extending through the loops C<sup>12</sup>, C<sup>13</sup>, C<sup>14</sup>. C<sup>16</sup> is a stud extending



outwardly from the segmental bar  $C^{14}$  on which is secured a vertical bearing  $C^{17}$ .  $C^{18}$  is a bell crank secured to the stud  $C^{19}$  secured to the casing B.  $C^{20}$  is a link connecting one arm of the bell crank to the vertical bearing  $C^{17}$ , such link being provided at one end with a vertical portion extending into the vertical bearing  $C^{17}$  and at the other end with the horizontal hinge pin connecting such end with the bell crank.  $C^{21}$  is a bell crank mounted on the stud  $C^7$  hereinbefore described. The upper arm of the bell crank  $C^{21}$  is connected by a link rod  $C^{22}$  to the lower arm of the bell crank  $C^{18}$ . The lower arm of the bell crank  $C^{21}$  is connected by a link rod  $C^{22x}$  to a lever  $C^{23}$  also mounted on the fulcrum bar  $C^{10}$  located in the engine cab. By operating the lever  $C^{23}$  the segmental locking bar  $C^{15}$  is moved circumferentially so that the end extending from the loop  $C^{12}$  passes therefrom into the loop  $C^{13}$  thereby unlocking the lid C and allowing the same to be raised by the operating lever  $C^9$ . It will therefore be seen that when the locomotive reaches a stretch of country in which it is unnecessary to arrest the sparks the lever  $C^9$  may be operated to open the lid C thereby allowing of a direct upward draft of the engine.

To clean the screen to prevent its becoming choked by dead sparks I provide the following mechanism: D is an annular gearing secured around the tubular casing B by brackets  $D^1$  and  $D^2$  located above and below the gearing D. By this construction the gearing D is free to revolve around the tubular casing B.  $D^3$  is an arm extending upwardly from the gear ring and provided with an off-set  $D^4$  on which is loosely journaled a brush  $D^5$  formed preferably of stiff wire bristles designed to be held in contact with the screen so as to pass through the interstices thereof. The upper end of the arm  $D^3$  is suitably braced by the rods  $D^6$  extending from the top of the arm  $D^3$  to each side thereof and connected at their lower ends to a suitable portion of the gear ring D. E is a vertical spindle journaled at its upper end in a bracket  $E^1$  secured to the casing B and at its lower end in a bracket  $E^2$  also secured to the casing. The upper end of the spindle is provided with a lantern pinion  $E^3$  and the lower end of the spindle is provided with a bevel gear  $E^4$ .  $E^5$  is a spindle journaled at one end in the portion  $E^6$  of the bracket  $E^2$ . The opposite end of the spindle  $E^5$  is provided with a crank handle  $E^7$ . F is a diaphragm located inside of the tubular casing B and surrounding the stack, such diaphragm extending across between the stack and the inner wall of the casing B.  $F^1$  is an opening formed in the side of the casing B in proximity to the lower end thereof.  $F^2$  is a duct extending from such opening around the side of the boiler of the engine. It will

be seen on referring to Fig. 3 that the diaphragm F is disposed in an inclined position so as to carry the deposit formed inside the casing into the duct  $F^2$ .  $F^3$  is a slide valve located in the duct  $F^2$  and designed to normally close the same.  $F^4$  is a bell crank pivotally supported in a suitable bracket  $F^5$  and connected at one end by the link  $F^6$  to the slide valve  $F^3$ .  $F^7$  is a rod connecting the operating end of the bell crank with a lever  $F^8$  also fulcrumed on the bar  $C^{10}$  located in the engine cab.  $F^9$  is a steam pipe leading from the boiler of the engine and extending into the passageway  $F^2$  below the valve  $F^3$ . The end of the pipe is provided with a nozzle  $F^{10}$  directed downwardly in a direction parallel with the passage  $F^2$ .  $F^{11}$  is a globe valve provided with a suitable spindle  $F^{12}$  on which is secured a worm gearing  $F^{13}$ .  $F^{14}$  is a worm located on the spindle  $F^{15}$  which extends backwardly through the stack into the engine cab at which end the top is provided with a crank handle  $F^{16}$ .

When it is desired to clean the stack I rotate the crank handle  $E^7$  thereby through the spindle  $E^5$ , gears  $E^4$  and  $E^3$  spindle E and lantern gear  $E^3$ , the ring gear D is rotated carrying the brush  $D^5$  with it around the screen  $B^4$ . As the brush  $D^5$  is carried around the screen the stiff bristles of the brush are forced through the choked interstices of the screen so as to force the dirt therefrom. The dirt cleaned from the screen falls down inside the tubular casing B between the stack and the inner wall of the tubular casing and onto the inclined diaphragm F which directs the deposit downwardly into a position over the valve  $F^3$ . When a suitable place has been reached to deposit the dirt collected in the tubular casing B I operate the lever  $F^8$  so as to tilt the bell crank  $F^4$  on its pivot to thereby withdraw the valve  $F^3$  so as to open the passageway  $F^2$  to allow the dirt contained in the tubular casing B to pass therethrough. To aid in carrying the dirt through the passageway  $F^2$  and also to insure of all the sparks being extinguished in such dirt, I operate the crank handle  $F^{16}$  so as to rotate the rod  $F^{15}$  by means of the worm  $F^{14}$  and worm gear  $F^{13}$  thereby opening the valve  $F^{11}$  so as to allow of a jet of steam passing from the nozzle  $F^{10}$  through the passageway  $F^2$  toward the exit opening thereby carrying the dirt with it.

From this description it will be seen that I have devised a very simple form of spark arrester which will be always under the control of the engineer stationed in the engine cab and which may be readily cleaned at any time during the run and from which there is no danger of any unextinguished sparks passing therefrom.

What I claim as my invention is:

1. In a device of the class described, the



combination with a tubular casing and a stack inclosed by said casing, of a hinged lid for the upper end of the casing and a wire gauze screen located in the casing, loops secured to the casing and lid and being in proximity to each other, a segmental bar slidably held within the loops and means for slidably operating such bar from the engine cab as and for the purpose specified.

2. In a device of the class described, the combination with the engine casing and hinged lid therefor and a stack inclosed by said casing, of a screen located in the casing, loops extending from the walls of the casing in proximity to the lid and a loop extending from the lid in proximity to the loops extending from the casing, a segmental bar slidably held within the loops, a bell crank suitably pivoted on a suitable portion of the casing, and connected with the segmental bar and a link and lever mechanism for operating such bell crank as and for the purpose specified.

3. In a device of the class described, the combination with the tubular casing pro-

vided with peripheral openings, and a tubular screen extending over such openings, of a vertically disposed roller brush rotatable on a vertical axle and having bristles extending into the interstices of the screen and means for carrying the axle of the brush around the outside of the screen operated from the engine cab as and for the purpose specified.

4. In a device of the class described, the combination with the tubular casing provided with peripheral openings, and a tubular screen extending over such openings, of an annular gear ring revolubly supported and surrounding the casing, a vertically disposed roller brush supported by the gear ring and held in contact with the screen and suitable operating gears for rotating such gear ring operated from the engine cab as and for the purpose specified.

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Witnesses:

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