

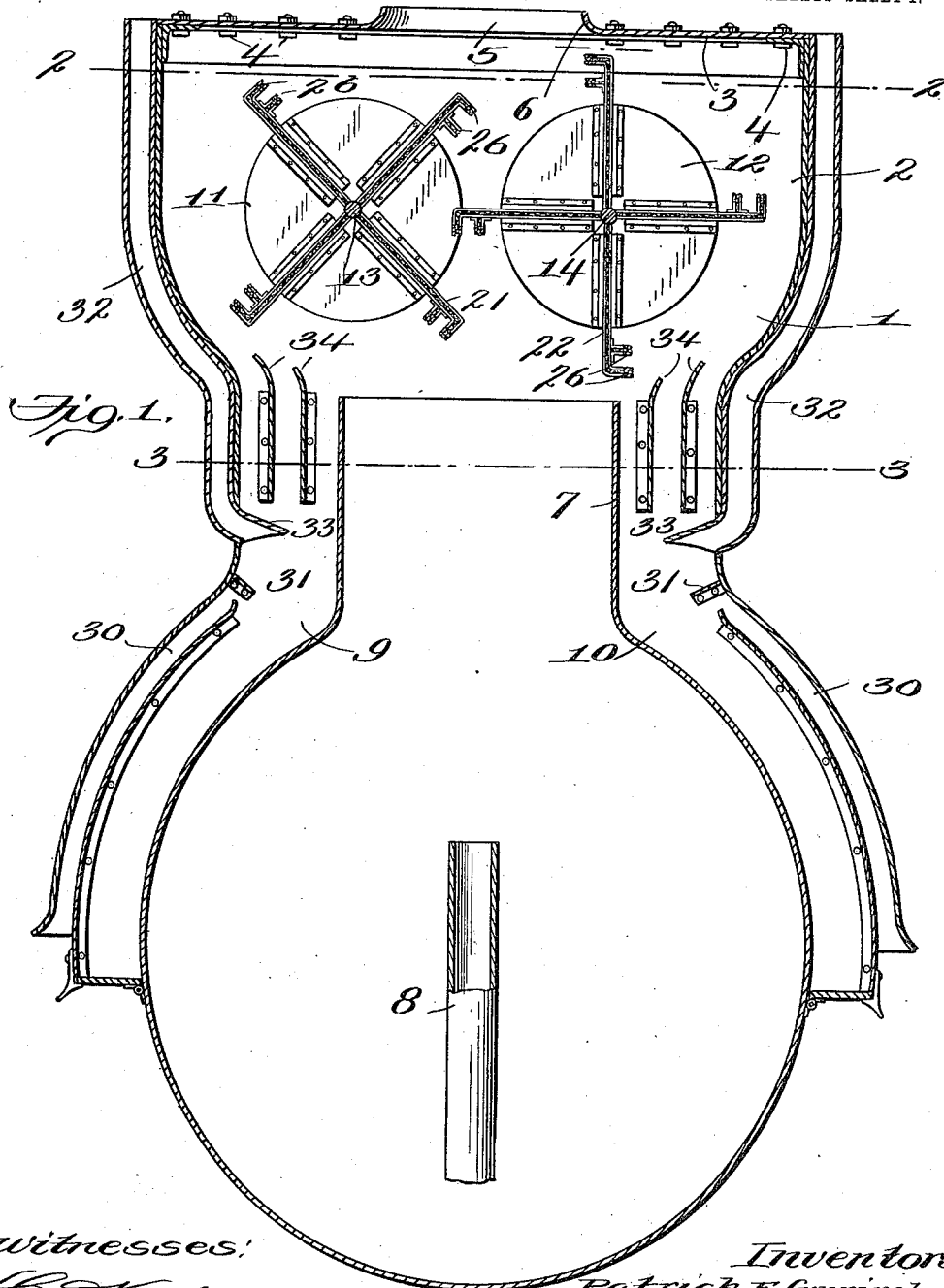
P. E. CUNNINGHAM & R. REID.
SPARK ARRESTER.

APPLICATION FILED FEB. 5, 1912.

1,041,436.

Patented Oct. 15, 1912.

3 SHEETS-SHEET 1.



Witnesses:

[Signature]
[Signature]

Inventors

Patrick E. Cunningham
Reginald Reid

by

[Signature]
att'y.

P. E. CUNNINGHAM & R. REID.

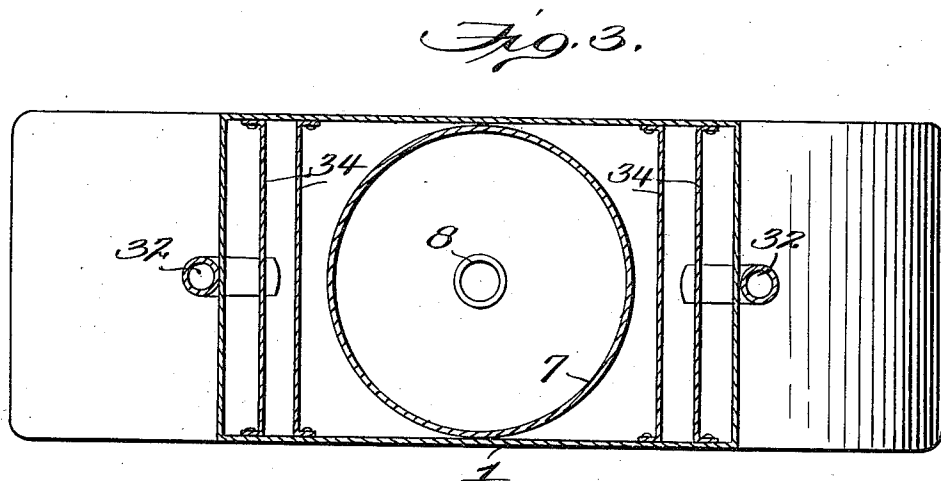
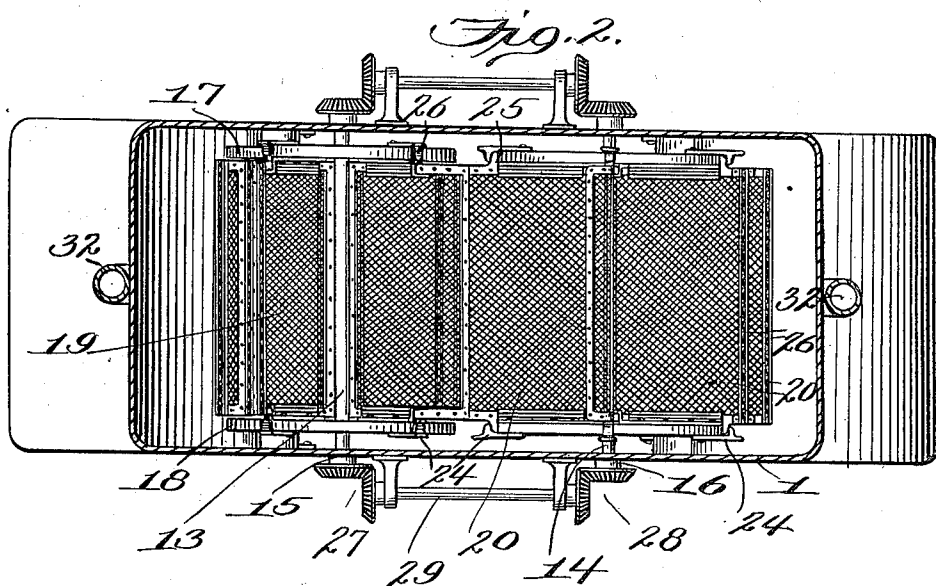
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3 SHEETS-SHEET 2.



Witnesses:

E. H. Miller
F. B. Cooper

Inventors

Patrick E. Cunningham
by *Reginald Reid*

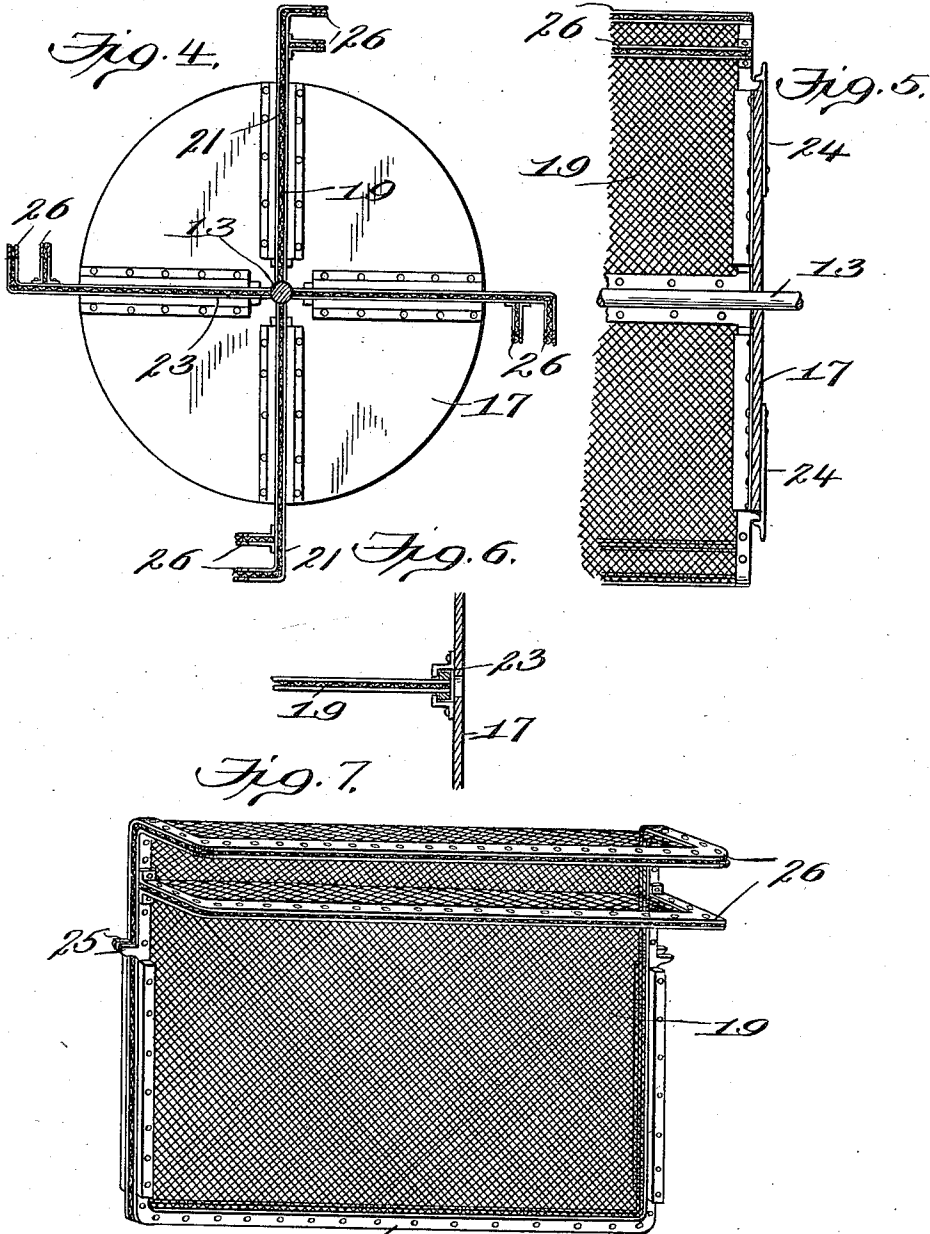
Amos L. Norris
Atty.

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3 SHEETS-SHEET 3.



Witnesses:
G. H. Mesler
J. B. Keeler

21

Inventors
Patrick E. Cunningham
Reginald Reid
by *James L. Norris*
Atty.

UNITED STATES PATENT OFFICE.

PATRICK EDWARD CUNNINGHAM AND REGINALD REID, OF CHIDLOWS WELL, WESTERN AUSTRALIA, AUSTRALIA, ASSIGNORS OF ONE-HALF TO VALENTINE MURE FITZ HUGH, OF KERKININ, AUSTRALIA.

SPARK-ARRESTER.

1,041,436.

Specification of Letters Patent.

Patented Oct. 15, 1912.

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To all whom it may concern:

Be it known that we, PATRICK EDWARD CUNNINGHAM and REGINALD REID, subjects of the King of Great Britain, residing at Chidlow's Well, Western Australia, Commonwealth of Australia, have invented certain new and useful Improvements in Spark-Arresters, of which the following is a specification.

The present invention relates to improvements in spark arresters and more especially to those applicable to locomotives and other steam engines for the purpose of preventing the discharge of burning or glowing sparks or cinders due to the strong draft induced by the discharge of the exhaust steam through the stack, and the primary object of the present invention is to provide an improved apparatus of this character whereby the escape or discharge of such burning or glowing sparks and cinders is effectually prevented without, however, impairing or otherwise interfering with the draft of the products of combustion, spark-arresting members being employed which, according to the present invention, have foraminous blades of mesh or screen material which permit the waste gases to pass therethrough without being retarded or obstructed, although the sparks, cinders and the like will be caught by the mesh or screen material, and these members are movable in a direction to carry the intercepted sparks and cinders away from the line of draft and into a position to discharge them into suitable spark and cinder-collecting chambers. The foraminous blades of the spark-arresting members are disposed in interengaging relation so as to prevent the escape or discharge of the waste products of combustion except through such blades, and these blades are movable by the draft and in the direction of movement of the draft but at a considerably lower speed, liability of damage to the spark-arresting apparatus due to the strength of the induced draft being thereby minimized or eliminated.

Further objects of the invention are to provide improved means for ventilating or exhausting the steam which may pass with the sparks into the spark-collecting chamber, and to provide means for discharging the accumulated cinders.

To these and other ends, the invention

consists in certain improvements, and combinations and arrangements of parts, all as will be hereinafter more fully described, the novel features being pointed out particularly in the claims at the end of the specification.

In the accompanying drawing:—Figure 1 represents a central vertical section of a spark-arresting apparatus constructed in accordance with the present invention; Fig. 2 represents a horizontal section of the apparatus taken on the line 2—2 of Fig. 1; Fig. 3 represents a transverse section of the apparatus on the line 3—3 of Fig. 1; Figs. 4 to 7 inclusive are detail views of the construction of the foraminous bladed members.

Similar parts are designated by the same reference characters in the several views.

In the accompanying drawing, spark-arresting apparatus is shown which is especially adapted for use upon railway locomotives, it comprising a casing 1 the lower portion of which may fit upon or into the smoke box of the locomotive, and the upper portion 2 of the casing is preferably enlarged to accommodate the spark-arresting devices and this upper portion of the casing is adapted to project above the smoke box of the locomotive. The top of the casing is closed by a cover 3 which may be removably secured in position by bolts or equivalent devices 4, and this cover is formed with a discharge opening 5 through which the waste gases escape. This discharge opening in the cover may be surrounded with a flange 6, as shown, for the attachment of a stack if found desirable or necessary. The casing incloses a tube 7 which is open at the bottom to receive the products of combustion from the smoke box, and 8 designates the steam exhaust pipe or nozzle whereby a strong draft is induced through the tube 7 and draws the gases from the locomotive furnace through the boiler tubes and the smoke box thereof. Spark and cinder-collecting chambers or passages 9 and 10 are formed within the casing 1 and at opposite sides of the draft tube 7. This draft tube extends only part way of the height of the casing 1, thereby leaving an enlarged chamber above it to accommodate the spark-arresting devices. These spark-arresting devices according to the present invention embody a pair of members 11

and 12 which are revoluble in reverse directions on parallel axes and have interengaging foraminous blades of mesh or screen material which are disposed above the discharge end of the draft tube 7. These members in the present instance embody shafts 13 and 14 which are journaled in bearing 15 and 16 in the walls of the casing 1, and each shaft supports a pair of disks 17 and 18 which are disposed immediately within the side walls of the casing and are fixed on the respective shafts. The spark-arresting member 11 carries a set of foraminous blades 19 while the member 12 carries a similar set of foraminous blades 20, these blades in both instances being composed of screen or mesh material of a gage that will permit the waste gases to pass through them but will intercept and catch the sparks, cinders and other solid substances. These blades are preferably arranged radially of the axes of the respective members and are secured rigidly in proper form by the frames 21 and 22 which are removably inserted in radial channels 23 provided at the inner faces of the respective disks 17 and 18 and may be retained therein by the spring catches 24 which cooperate with lugs 25 on the frames of the blades, removal of the blades for cleaning being thereby facilitated. During operation of the apparatus these members revolve, and to prevent the sparks, cinders or other solid matter from being thrown from the blades by centrifugal force, the outer edges of the blades 19 and 20 are formed with rearwardly directed flanges 26 which form pockets to catch and hold the sparks and cinders until they have reached the discharging point. The blades of the two members are arranged in interengaging relation at all times, the interengaging blades being disposed in alinement and above the draft tube 7, the blades at the outer sides of these members being beyond and free from the draft of the tube 7 so that this draft acts only on the interengaging blades of the members and thereby causes these members to revolve with certainty. To maintain the interengaging relation between the blades of the two members, a suitable operative connection is used, the shafts 13 and 14 of such members in the present instance being connected by pairs of bevel gears 27 and 28 and shafts 29, these shafts and the bevel gearing being located exteriorly of the casing to avoid the cinders.

In order to ventilate the casing, that is to say, to permit a free discharge of such excess exhaust steam as may enter the spark-collecting chambers therein, a pair of conduits 30 is provided which conduits lead from the opposite sides of the interior of the casing at a point about midway of the height thereof and in a direction downwardly, the

lower ends of these conduits being open to the atmosphere to permit the free exit of the steam and the entrances to these conduits are protected by guards 31 which prevent the entrance of sparks or cinders into these exhaust steam escape conduits. An additional pair of steam escape conduits 32 in the form of pipes may be used which lead from the interior of the casing at points about midway of the height thereof, and these conduits or pipes discharge at the top of the casing. Guards 33 may also be arranged at the entrances to these conduits or pipes 32 to prevent the entrance of sparks. Also, in order to prevent the sparks and cinders discharged centrifugally from the revoluble spark-arresting members returning to the discharge tube 7, a suitable number of vanes 34 curved toward the exterior of the casing may be placed within the casing at opposite sides of this tube to catch the discharged cinders and sparks and direct them into the proper collecting chambers.

In operation, the induced draft of the products of combustion is directed by the draft tube 7 against the interengaging foraminous blades of the revoluble spark-arresting members, the blades at the outer sides of these members being free from the influence of such draft. The waste gases moving at high velocity will pass through the foraminous blades of the members and will discharge through the opening 5 in the cap. The foraminous nature of the blades, however, will cause them to intercept the sparks, cinders and other solid particles which are partially consumed, and as the members are caused to revolve in the directions indicated by the arrows, due to the impinging of the gas thereon, such intercepted sparks and cinders will be carried into positions to enter the spark and cinder-collecting passages or chambers 9 and 10. By using foraminous material as the intercepting medium which moves in the direction of motion of the discharging gases and conveys the sparks and cinders to suitable collecting passages or chambers, the obstruction offered by the spark-arresting means to the draft is reduced to a minimum. As the spark arresting members revolve the sparks and cinders collected by the foraminous blades 19 and 20 and held thereagainst by the draft through said blades are caused by centrifugal action to move toward the outer edges of said blades where they are caught and held by the flanges 26 at the outer edges of the blades until such flanges reach their discharging point over the spark and cinder-collecting chambers or passages 9 and 10. There is therefore no liability of the foraminous blades becoming clogged, the present invention being eminently superior to the use of a single stationary screen

which impairs the draft and becomes clogged so as to require frequent cleaning. Moreover, by providing a pair of revoluble spark-arresting members having foraminous blades in interengaging relation, the bladed members may move at a speed lower than that of the exhaust steam, the steam and products of combustion passing through the interstices of the blades while the sparks and cinders will be caught by the blades and held thereby until discharged into the spark and cinder-collecting chambers, and there will be no possibility of sparks escaping from the stack as the interengaging relation of the blades prevents the passage of the products of combustion around or past the peripheral ends of the blades and hence the sparks and cinders will be intercepted with certainty by the foraminous blades, and when the exhaust steam is not operating to forcibly expel the products of combustion, the draft of the furnace or boiler will not be impaired or retarded as these gases may rise and pass through the foraminous blades even though the latter be at a standstill.

What is claimed is:—

1. A spark arrester for locomotive and other steam engines, comprising in combination a casing adapted to receive and discharge the products of combustion, and spark-arresting members having foraminous interengaging blades arranged in the path of the products of combustion and operative to permit passage of gases therethrough and to intercept and hold the sparks, said members being movable to discharge the sparks collected thereby.

2. A spark arrester comprising in combination a casing containing means for directing the products of combustion therethrough, and spark-arresting members having foraminous blades interengaging at a point directly above said directing means and operative to permit passage of gases therethrough and to intercept and retain the sparks, said blades being movable under the influence of the draft from a position in the path of the draft to a position out of such path to discharge the sparks therefrom.

3. A spark arrester comprising in combination a tube adapted to discharge the products of combustion, and a pair of oppositely mounted revoluble spark-arresting members arranged in the path of the products of combustion, said members having interengaging foraminous blades to permit the passage therethrough of the gases and to arrest the sparks.

4. A spark arrester comprising in combination a discharge tube for the products of combustion, a pair of oppositely mounted revoluble members having foraminous blades arranged in interengaging relation directly above the outlet of said tube, and means operatively connecting said members to insure rotation thereof in unison.

5. A spark arrester comprising in combination a discharge tube for the products of combustion, an outer casing forming spark-collecting chambers, and a pair of oppositely mounted revoluble spark-arresting members above the discharge of said tube and having foraminous blades interengaging at a point directly above the outlet of said tube, said foraminous blades being operative to permit passage therethrough of the gases and to intercept and discharge the sparks into said collecting chambers.

6. A spark arrester comprising a discharge tube for the products of combustion, an outer casing forming spark-collecting chambers, means contained in said casing for intercepting the sparks discharged from said tube and directing the same into the spark-collecting chambers, exhaust steam conduits leading downwardly from said spark-collecting chambers and discharging at the bottom of said casing, exhaust steam conduits leading upwardly from such chambers, and guards arranged in said chambers at the entrances to the respective conduits.

In testimony whereof we have hereunto set our hands in presence of two subscribing witnesses.

PATRICK EDWARD CUNNINGHAM.
REGINALD REID.

Witnesses:

U. W. BURKE,
RICHARD SPARROW.