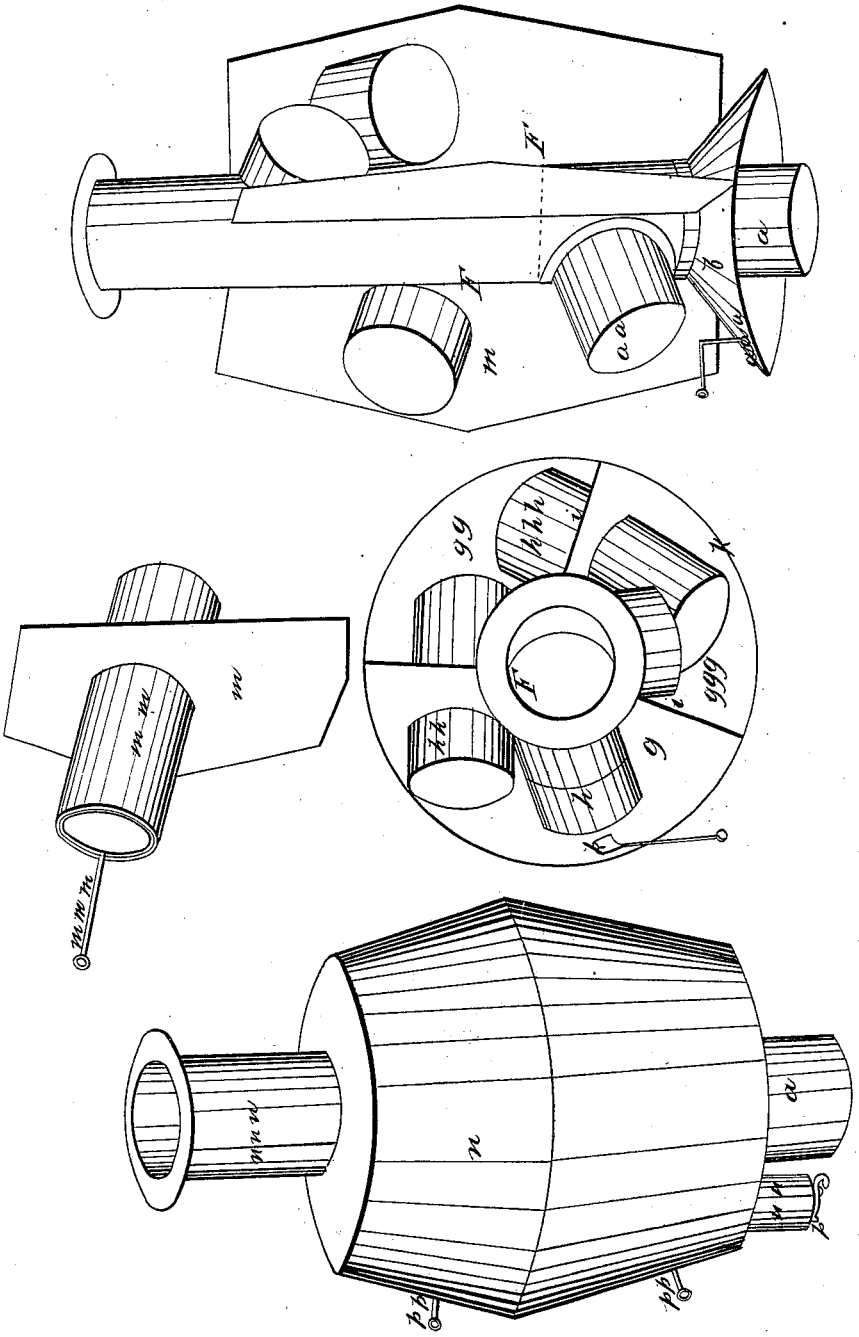
R. Fish,

Spark Arrester,

No. 1,822. Patented Oct. 14, 1840.



UNITED STATES PATENT OFFICE.

RANDAL FISH, OF NEW YORK, N. Y.

SPARK-ARRESTER.

Specification of Letters Patent No. 1,822, dated October 14, 1840.

To all whom it may concern:

Be it known that I, RANDAL FISH, of the city, county, and State of New York, have invented a new and Improved Mode of Preventing Sparks from Escaping from Chimneys or Smoke-Pipes of Steam-Engines, or other Chimneys, of which the following is a full and exact description.

The nature of my invention consists in providing enlargements or chambers; the latter varying in number from one to six or more according to circumstances; a moderate draft will require a larger number of chambers to stop the sparks than a stronger draft will. This enlargement for the chambers I construct of a cylindric form, upon some portion of the chimney or smoke pipe where the sparks are to be stopped. When more than one chamber is required I divide this cylinder or drum into two or more chambers, by vertical partitions running from the center of the cylinder, or, when the smoke pipe is continued through the cylinder, from the periphery of said pipe to the periphery of the outside cylinder. Through these partitions I pass detached pieces of smoke pipe, of the same size as the original smoke pipe or chimney on which the spark extinguisher is placed, or said detached pieces may be successively a little increased in diameter as they proceed. The detached pieces pass through the partitions in a declining position, at an angle of about 45 degrees from a horizontal line, the lower end of each pipe passing under the upper end of the other detached piece in the same chamber, and the ends of the pieces in the same chamber projecting by each other. The chambers are disconnected one from the other, except by the detached pieces passing through the partitions. The draft and smoke are taken from the original smoke pipe in to the first chamber about one foot above the bottom of the chambers by an opening in the original pipe, in this opening a curved pipe is placed turning downward. A few inches above the opening in the original pipe, from which opening the smoke is let into the first chamber, there is to be a partition in said pipe to turn the draft from it into the first chamber. That partition of the first chamber which adjoins the last chamber, has no opening in it, the smoke being received into it from the original smoke pipe. The smoke, by means of the detached pieces of pipe, is conducted successively through the chambers, and when it arrives at the last chamber, it is again let into the original smoke pipe, by means of an opening in said pipe at the upper extremity of the chamber; or, when the original smoke pipe is not continued through the cylinder, the smoke may be discharged from the top of the last chamber by means of a short vertical pipe. In locomotives, where so great strength is not required as in steamboat chimneys, instead of continuing the original smoke pipe through the cylinder, I cause the smoke pipe leading from the furnace, to pass through the bottom of the cylinder into the first chamber, and there discharge the smoke, which passing through the chambers is discharged by the short vertical pipe above mentioned.

At the bottom of the cylinder there is to be a reservoir to receive the sparks which fall. I have described the chambers as unconnected except by the short detached pipes, but as there is a small space between the bottoms of the partitions and the bottom of the cylinder, there is, of course, a small open space common to all the chambers by means of which the sparks can be collected and discharged into a reservoir. I attach the reservoir to the bottom of the cylinder, where is to be an opening of about three inches diameter, though I do not limit myself to any particular dimensions. The opening may be closed at pleasure by a slide valve which is governed by a rod or stout wire projecting through the side of the cylinder or by a faucet. The form and size of the reservoir are not material, but I use a vessel of a cylindrical form and containing about 30 quarts for a locomotive engine. At the bottom of the reservoir there is to be a slide valve, or faucet, to let out the sparks when ever thought proper. The bottom of the cylinder or drum is convex on the inside, by which means the periphery is lower than the center.

To clean the detached pipes passing through the partitions, I place in each of them an iron ring fitted to the size of the pipe, which ring is movable back and forth by an iron rod attached to it and projecting

through the side of the cylinder. The draft in passing through the chambers will be changed from a rapid to a moderate current alternately, the draft being less rapid in the chambers than in the pipes. By this means the fluids of the smoke and steam will be partially condensed, and the sparks fall by their own gravity to the bottom of the chambers, toward which, also, they are driven by the rapid current from the pipes where they will remain until they are let out of the reservoir. I calculate that by this process, the chimney need not be more than two thirds the usual height.

To enable others skilled in the art to make and use my invention, I will proceed further to describe its construction and operation.

The cylinder is to be about three times the diameter of the original chimney or smoke pipe, and the height the same as the diameter. The bottom of the cylinder should be watertight, to retain the water that may be condensed from the smoke and steam, or which may be put there for the purpose of conducting the sparks to the reservoir as well as extinguishing the same. When the original pipe is continued through the cylinder, there should be a short pipe to conduct the smoke into the first chamber declining down by straight or curved pipe, as before mentioned. If it be found necessary to have more chambers to stop the sparks, I add one or more cylinders upon the top of the first, divided into chambers as before described and where the exhaust steam is not thrown into the smoke pipe there should be a small quantity of water kept in the bottom of the chambers, the better to secure the sparks from rising and to prevent them from taking fire and burning in the chambers when a quantity has been collected. For this reason it will be found best always to keep a small quantity of water in the bottom of the chambers.

The accompanying drawing to which I now refer represents the spark extinguisher and retainer as before described. The interior and exterior parts of the same are represented as follows viz.

Drawing *a* represents the side view of the smoke pipe or chimney on which the spark extinguisher is to be placed.

a a represents the opening of the original smoke pipe and a curved pipe leading into the first chamber.

b represents the side view of the bottom of the cylinder or chambers.

a, *a*, *a* represents the slide valve in the bottom of chambers which is to open and shut the opening that is made in the bottom of the chambers to let off the sparks into the reservoir.

d represents the outlines of the cylinder.

e f represents the interior of the spark extinguisher divided into the chambers having the top off showing the partitions of the chamber with the pieces of smoke pipe in them and bottom of the chambers.

g represents the first chamber *g g* the second and *g g g* the third chamber.

h represents the smoke pipe leading into the first chamber.

h h represents one of the detached pieces of pipe passing through one of the partitions into the second chamber.

h h h represents a second piece of pipe passing through one of the partitions from the second chamber to the third.

i represents the partitions between the chambers.

k represents the periphery of the cylinder or drum.

k k represents the opening into the reservoir through the bottom of the chamber and the slide valve that opens and shuts the same.

m represents one of the partitions with one of the pieces of pipe passing through it.

m m represents the last named piece of pipe.

m m m represents a rod of iron attached to a ring fitted to the shape and size of the pieces of smoke pipe which by being moved back and forth will clean the pipe.

n represents the exterior part of the spark extinguisher.

n n represents the reservoir attached to the bottom of the spark extinguisher.

p represents a slide valve at the bottom of the reservoir for the purpose of letting off the sparks.

p p represents a rod which is attached to a slide valve which is to open and shut the opening in the bottom of the cylinder or chambers.

p p p represents the rod passing through the cylinder which is attached to the ring in the detached piece of pipe for the purpose of cleaning it.

n n n represents the smoke pipe at the top of the spark extinguisher the dotted line represents the partition in the smoke pipe to turn the draft into the first chamber.

F F represents the side view of the interior of the spark extinguisher.

What I claim as my invention and desire to secure by Letters Patent is

The construction of cylinders or drums in the pipe or chimney of locomotives, stoves and in the manner herein set forth viz. by constructing said cylinders or drums with a reservoir at the bottom and dividing them into separate vertical divisions or partitions and conducting the draft through an opening in the vertical pipe *a* into one of said divisions thence by means of separate pipes connecting one division with the other alternately into each division and then into the vertical pipe, *n n n* through an opening in

the upper extremity of said pipe between which and the lower extremity there is a partition the whole being constructed arranged and operating as herein set forth it is obvious that the form and size of the apparatus or the parts of it may be indefinitely varied, but I claim all such variation of the same as may be substantially the same in principal in some cases one drum or chamber is sufficient without a division of the cylinder.

RANDAL FISH.

Witnesses:
THOS. J. SOMMERS,
JOHN W. BAILEY.