

W. F. GRASSLER.
Spark-Arrester for Locomotives.

No. 218,258.

Patented Aug. 5, 1879.

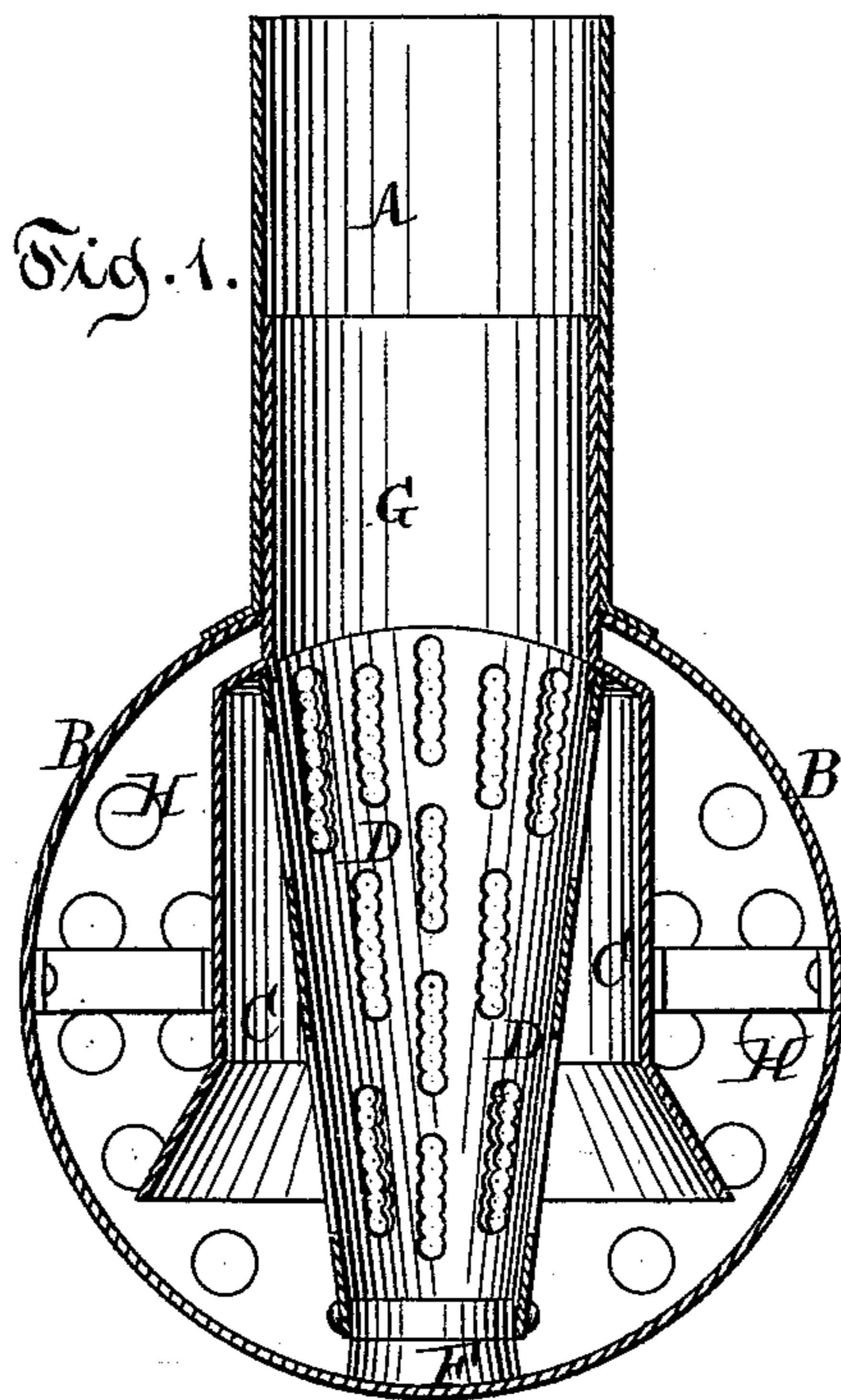


Fig. 5.

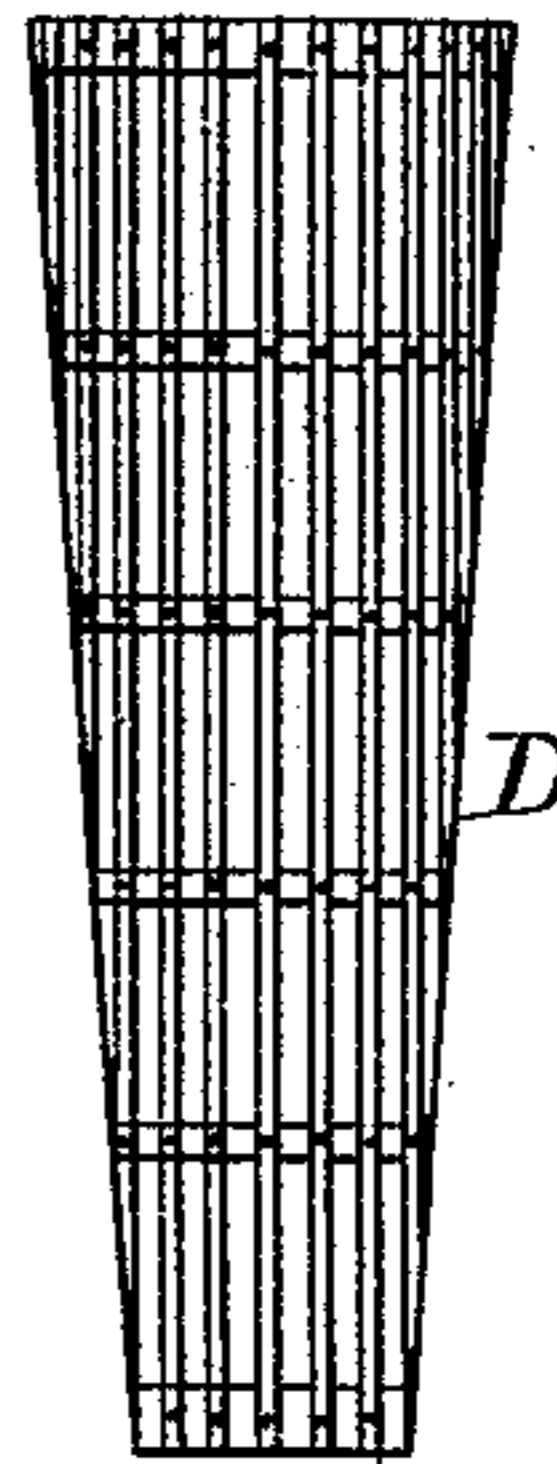


Fig. 3.

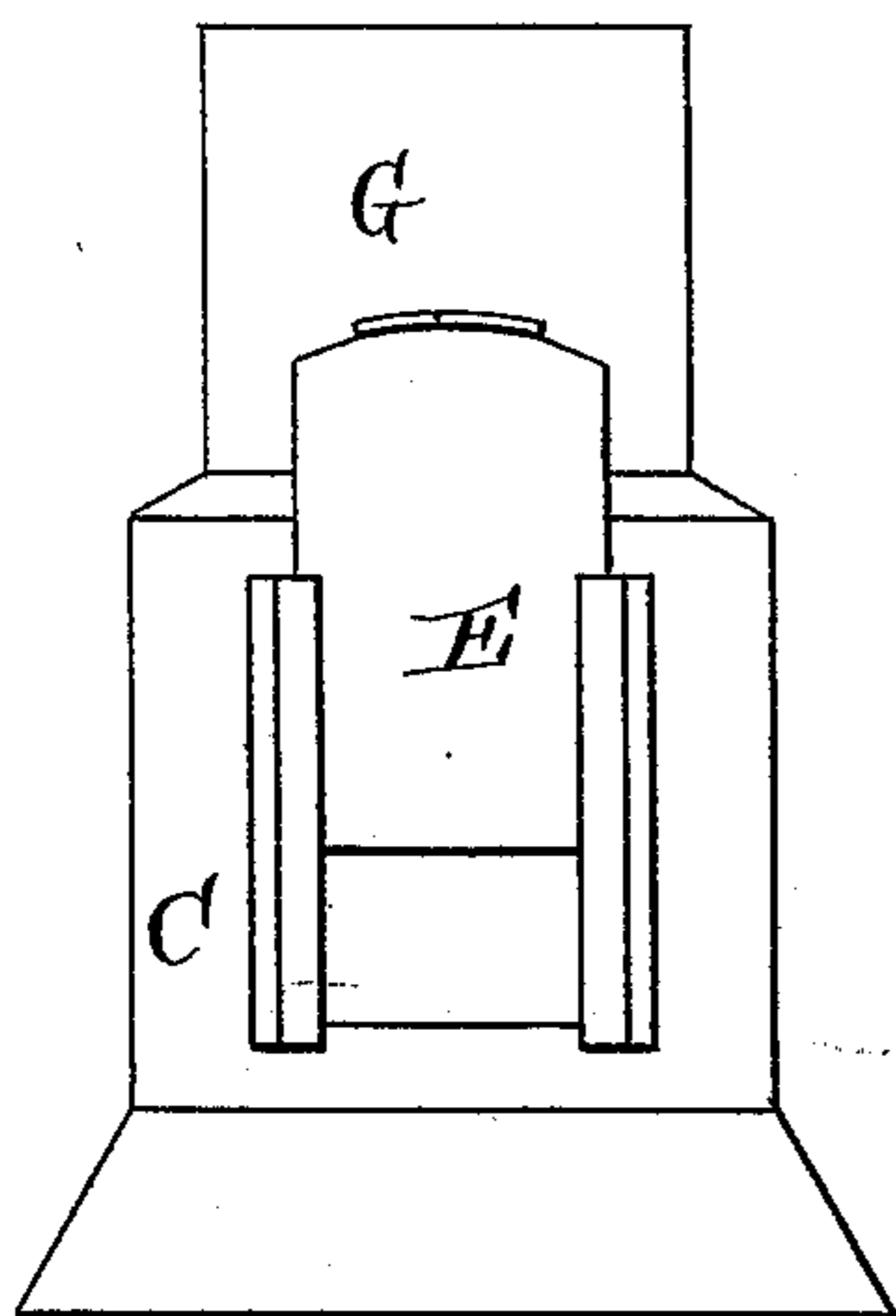


Fig. 2.

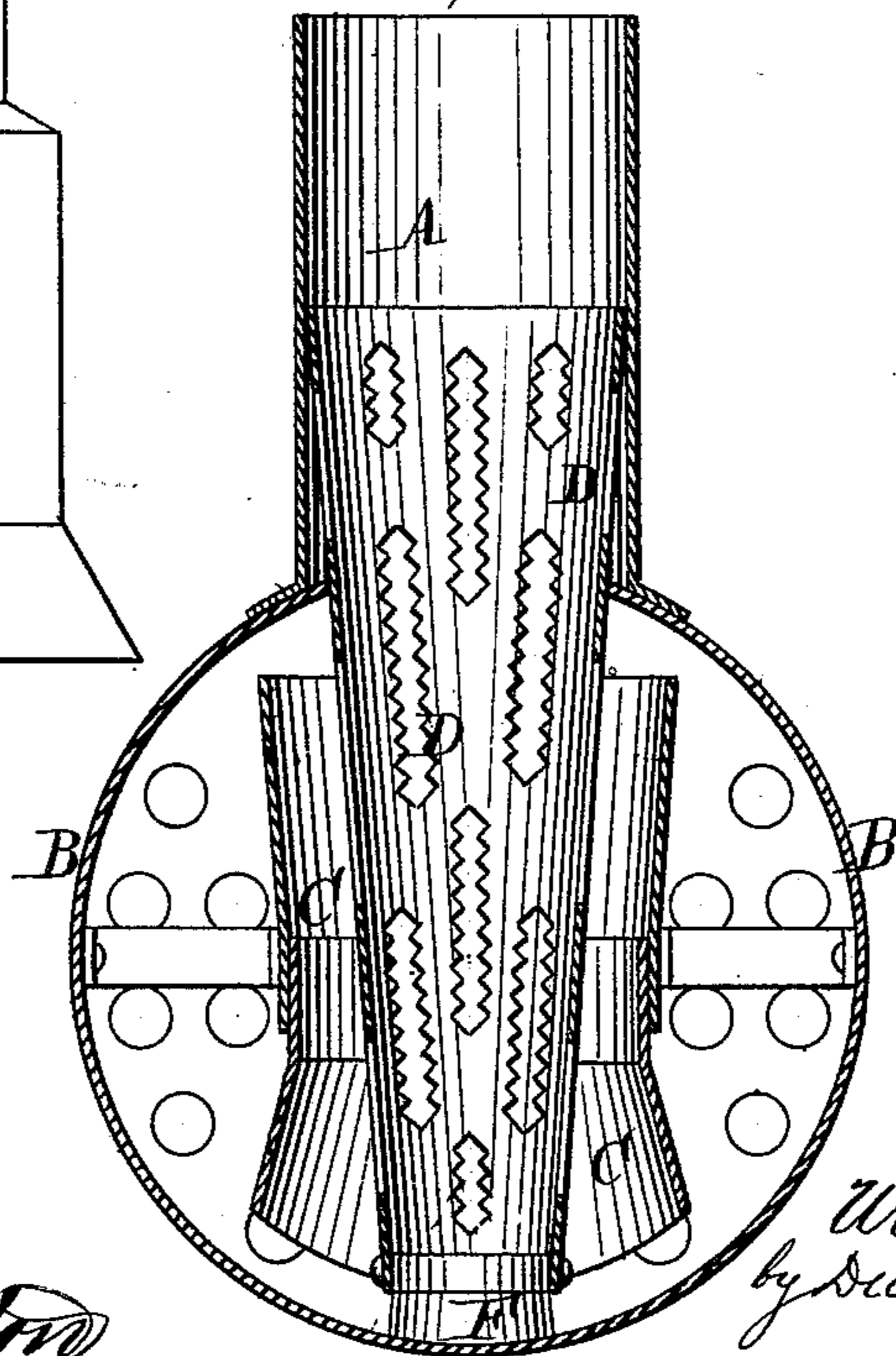
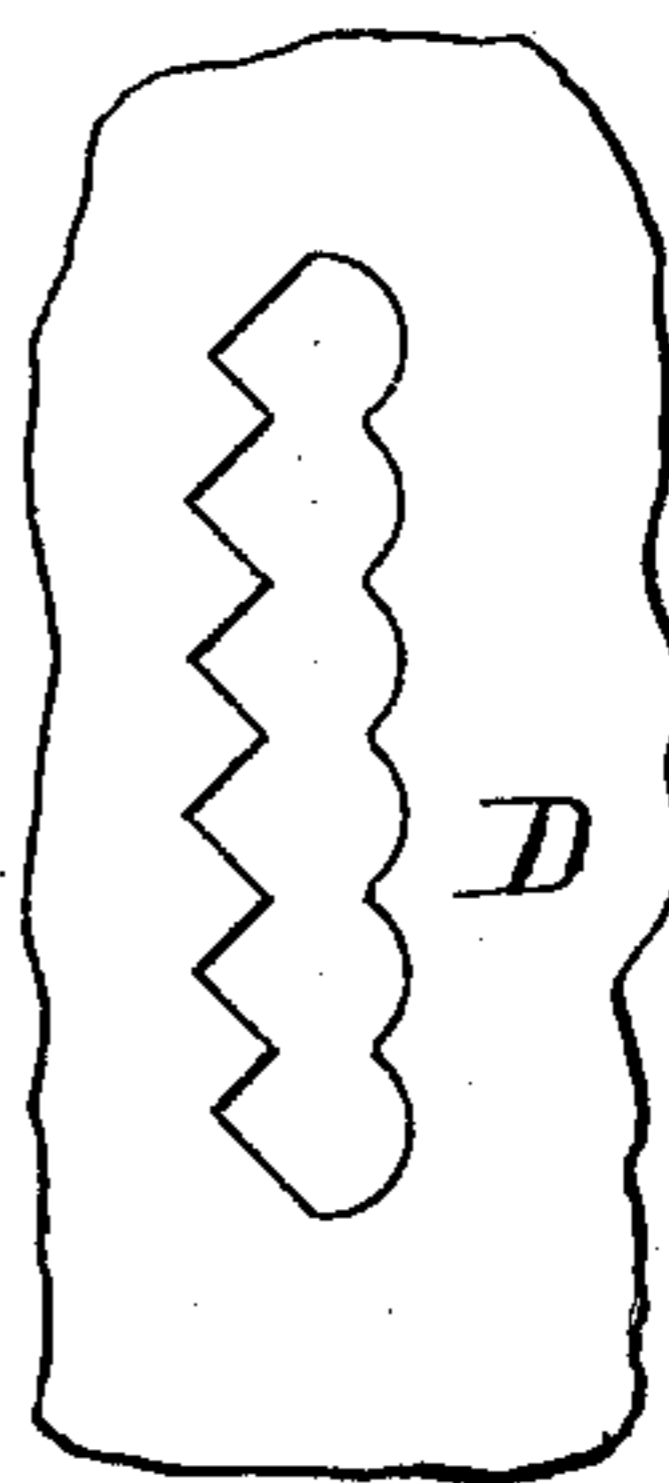


Fig. 4.



Witnesses.
Henry P. Wells
For Clark & Abbot

Inventor.
William F. Grassler
by Hull Wells & Hull
his atty-

UNITED STATES PATENT OFFICE.

WILLIAM F. GRASSLER, OF MUNCY, PENNSYLVANIA, ASSIGNOR OF THREE-EIGHTHS HIS RIGHT TO A. SWAN BROWN, OF NEW YORK, N. Y.

IMPROVEMENT IN SPARK-ARRESTERS FOR LOCOMOTIVES.

Specification forming part of Letters Patent No. **218,258**, dated August 5, 1879; application filed July 17, 1879.

To all whom it may concern:

Be it known that I, WILLIAM F. GRASSLER, of Muncy, in the county of Lycoming and State of Pennsylvania, have invented a new and useful Improvement in Spark-Arresters for Locomotives, of which the following is a specification, reference being had to the accompanying drawings.

From the first invention of the railway-locomotive, dust and cinders have been a great source of discomfort to railway-passengers, and a serious injury to the interior fittings of passenger-coaches. Furthermore, ignited sparks from engines have and do often give rise to disastrous conflagrations on the lines of such roads. Cinders and sparks are altogether, and dust is mainly, due to the blast of the exhaust-steam, which, escaping into the smoke box and stack under great pressure, creates a powerful current through the boiler-tubes, sucking up the smaller particles of fuel from the fire, and driving them through the tubes and out of the smoke-stack into the air. These fall upon the trains and adjacent country, and give rise to the dangers and annoyances aforesaid. Many devices have been tried to overcome these. Usually the outer opening of the stack is covered with wire-gauze, protected on its under side by a smaller cast-iron plate to receive the first blow of the sparks; but in this method it is necessary to have the wire-gauze so coarse as to act very imperfectly, and, besides, the cast-iron plate impedes the freedom of the exhaust, and more or less back-pressure in the cylinders and imperfect combustion result.

Again, the exhaust has been discharged into a wire-gauze tube, or into a pipe with circular perforations, with the idea of straining, as it were, the products of combustion, and thus eliminating the larger particles; but this method has been found to produce more evil than good, for the holes or gauze soon become clogged and the draft impaired, and frequent stoppage and opening of the smoke-box and cleaning of the pipe become necessary to steam at all. These difficulties have led to the general disuse of the latter method and employment of the first, though it is admitted to be imperfect and objectionable.

My invention is intended to overcome these difficulties.

Figure 1 is a perpendicular transverse section of the smoke-box of a locomotive-boiler and of my invention as intended for use of hard coal. Fig. 2 is a similar section of the boiler and of my invention when soft coal is to be used. Fig. 3 is the form of lifting or petticoat pipe used with hard coal. Fig. 4 represents one of the openings in the spark-arrester D, showing the edges of the slots roughened or notched in two different ways, either of which may be used. Fig. 5 is one form of construction of spark-arrester D.

A represents the smoke-stack of a locomotive. B represents the shell of a boiler; C, the lifting or petticoat pipe. D represents a pipe through which the exhaust is discharged into the smoke-stack, and which I name and shall hereinafter designate as the "spark-arrester."

E is a door in the hard-coal lifting or petticoat pipe, to render the exhaust-nozzles and adjacent parts accessible without removing the lifting-pipe. F are the exhaust-nozzles from the cylinders. H are the boiler-tubes.

The spark-arrester D is made of iron or steel plate, about No. 14 in thickness, marked to size and punched with apertures about from four to six inches long and three-eighths of an inch wide while flat, and then rolled and riveted so as to form a tube about five or six feet long, in shape like the frustum of a cone. The apertures aforesaid may be made smooth, and will then work well; but I prefer, particularly with hard coal, to notch the edges like saw-teeth, or roughen or tooth them, as shown in Fig. 4. The tube may be made cylindrical; but it will not work quite so well.

The smaller end of the spark-arrester should fit closely over and be secured with bolts to the exhaust-nozzles, while its upper and larger end fits tightly within the smoke-stack if soft coal is used, and within the extension of the stack into the smoke-box (shown at G in Fig. 3) if hard coal is the fuel.

The slots should be about three-sixteenths of an inch apart; and it is my practice to break the joints.

The spark-arrester may be cast, or it may

be built up of metal bars riveted or otherwise secured to rings, as shown in Fig. 5. Indeed, it makes no difference how or of what it is made, so long as it fills the following conditions: First, it should be quite rigid—*i. e.*, not yielding before the impact of the sparks and cinders; second, the apertures should be perpendicular, and as numerous and close together as possible, but not so numerous or close as to impair the rigidity aforesaid; third, under the same limitations, the apertures should be as long as possible, and narrow enough to exclude anything not very small—say, three-sixteenths of an inch wide.

If soft coal is the fuel, I surround the spark-arrester with any of the ordinary forms of lifting-pipe C, Fig. 2, placed and secured in the usual manner, but provided with a door on its front side, so as to make the nozzle and spark-arrester accessible without removing the lifting-pipe.

If hard coal is to be the fuel, a shorter spark-arrester—say, about two or three feet long—will answer, and, being cheaper to make, is used. In that case I extend the smoke-stack within the smoke-box, as shown in Fig. 1, or at G, Fig. 3, and connect the lifting-pipe C closely to this extension. I place a door, E, Fig. 3, in this lifting-pipe, to render the nozzles and spark-arrester accessible without disturbing the lifting-pipe, as in the soft-coal lifting-pipe.

The form of lifting-pipe that I have used is shown in Fig. 3; but any form will answer, provided its top is united to the extension of the smoke-stack within the smoke-box.

My device operates as follows: The exhaust is delivered into the spark-arrester, creating a partial vacuum in the smoke box, and the air consequently rushes through the grate-bars, fire, and tubes to supply its place. Borne on the current are the usual sparks and cinders. They strike within the smoke-box, fall, are seized by the current incited by the exhaust, and drawn between the lifting-pipe and the spark-arrester and dashed against its surface, and cut by the teeth or projections of the apertures until fine enough to pass through the same. When within the spark-arrester they are either cooled or are extinguished by

the exhaust-steam. At any rate, at night, when in operation, no ignited body has been seen to issue from the smoke-stack.

The use of the same engine with and without this device over the same route and under the like conditions has shown that the free exhaust for the steam relieves the cylinders of back-pressure—if not perfectly, at all events to a very great degree over the ordinary methods in use—and that the unimpeded flow of the products of combustion into the spark-arrester, and thence into the air, gives a much cleaner consumption of the fuel, its smoke, and gases in the fire-box, and that from these and perhaps other causes this device effects a very important saving of fuel.

Having thus described my invention and its method of operation, what I claim as new, and desire to patent, is—

1. The spark-arrester D, consisting of a tube, as described, with numerous perpendicular long and narrow apertures, the edges of said apertures being roughened or notched, or like saw-teeth.

2. The spark-arrester D, constructed as aforesaid, with the apertures, as aforesaid, either roughened on the edges or smooth, in combination with the exhaust-nozzles and smoke-stack of a locomotive.

3. The spark-arrester D, consisting of a tube provided with numerous long and narrow apertures arranged in a staggering manner, substantially as shown and described.

4. In a spark-arrester, the combination of the pipe D, provided with numerous long and narrow apertures, with the lifting-pipe C, having a door in it, arranged substantially as shown and specified.

5. The spark-arrester D, consisting of a tube provided with long and narrow apertures, and of a frame-work of metal bars secured to rings, substantially as shown and described.

In testimony that I claim the foregoing improvement in spark-arresters for locomotives, as above described, I have hereunto set my hand this 16th day of July, 1879.

WILLIAM F. GRASSLER.

Witnesses:

HENRY P. WELLS,
JOS. CLARK ALSTON.