

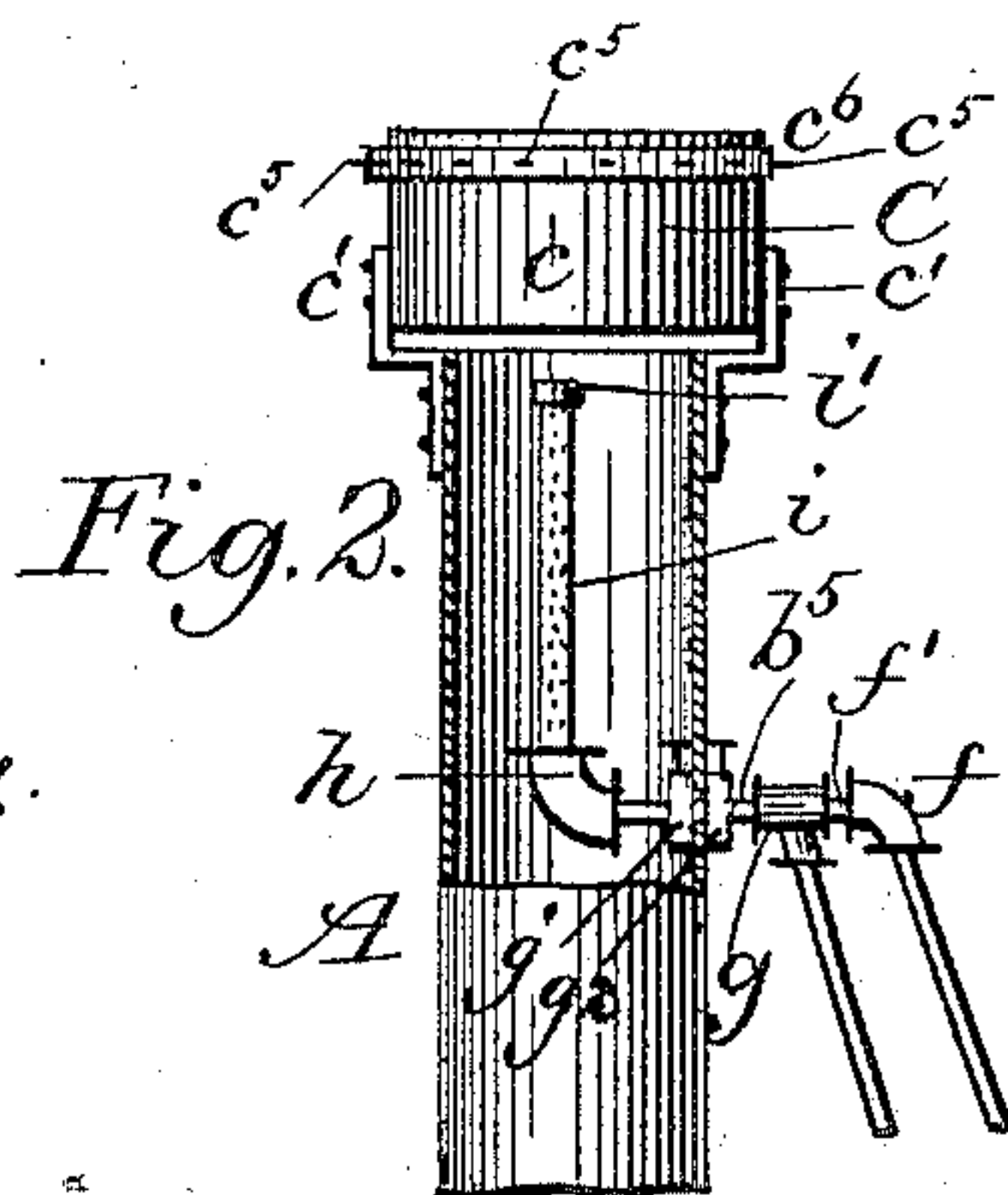
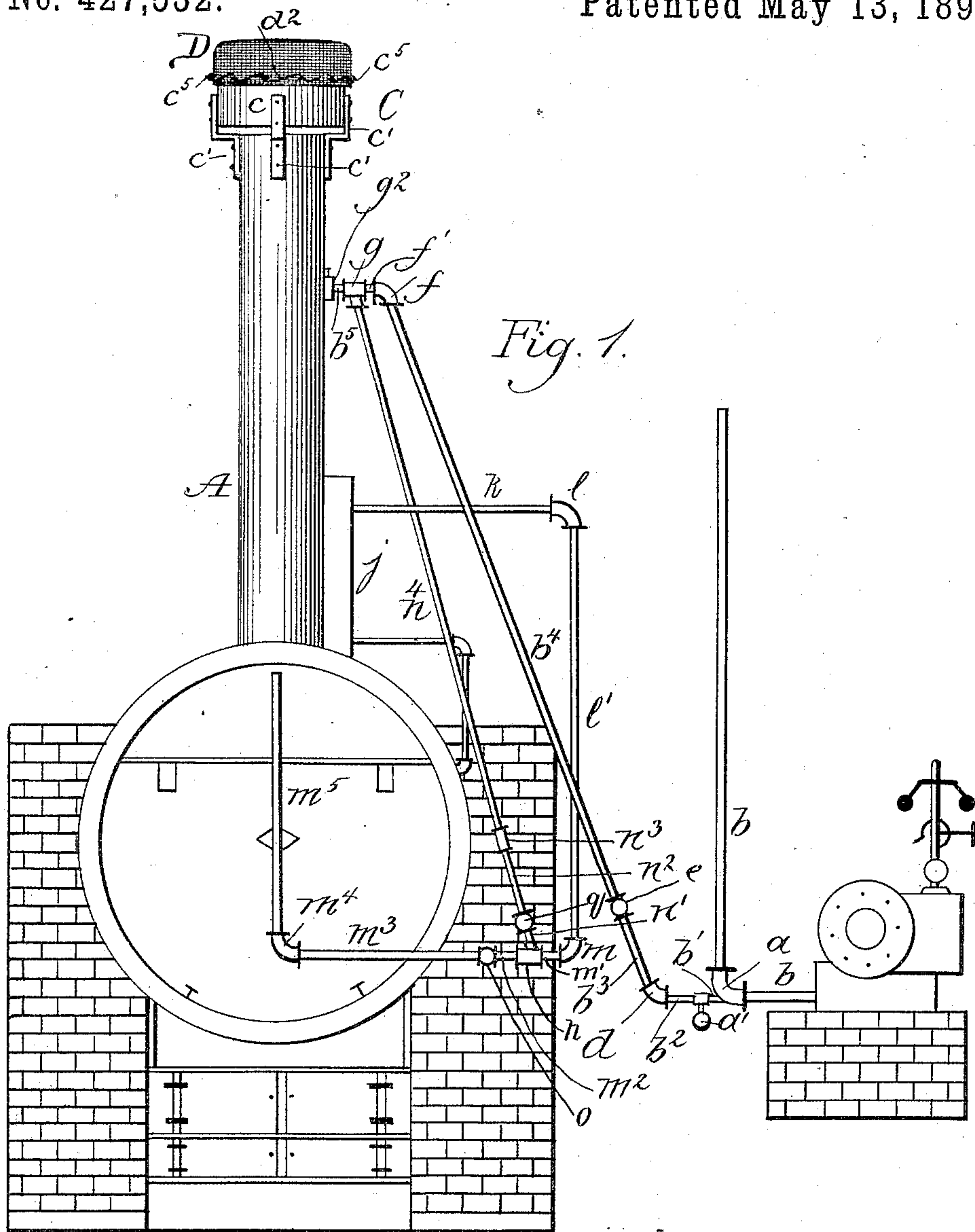
(No Model.)

4 Sheets—Sheet 1.

A. P. AMAKER.
SPARK ARRESTER AND EXTINGUISHER.

No. 427,532.

Patented May 13, 1890.



Witnesses
W. S. Murray.
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Inventor

Adam Perry Amaker

(No Model.)

4 Sheets—Sheet 2.

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Fig. 3.

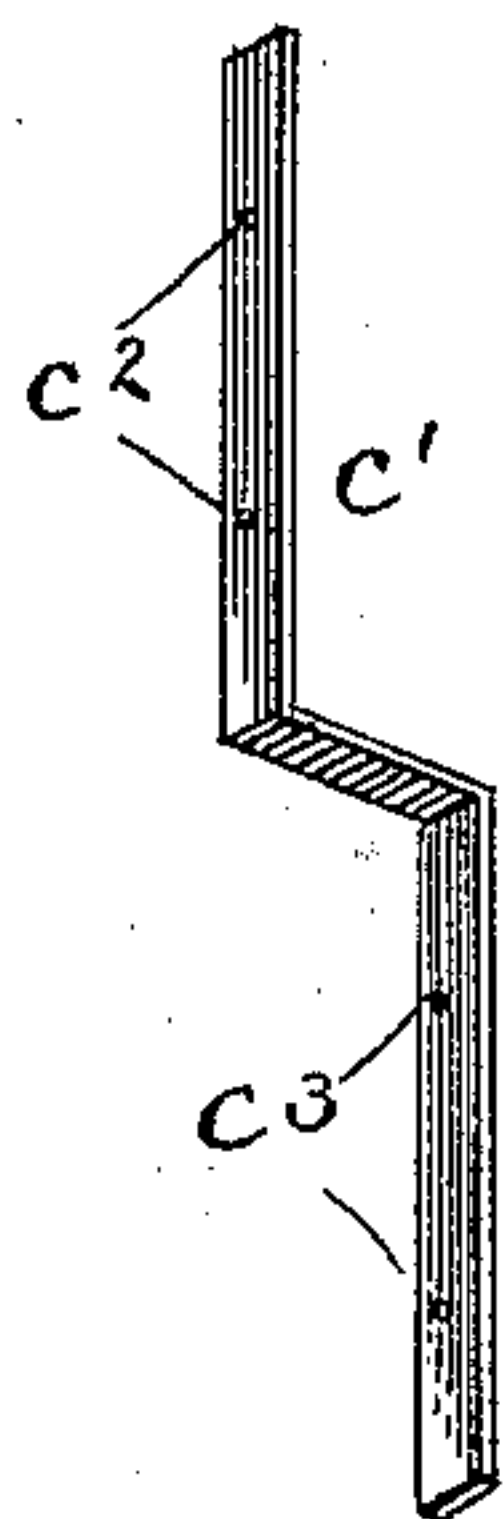


Fig. 5.

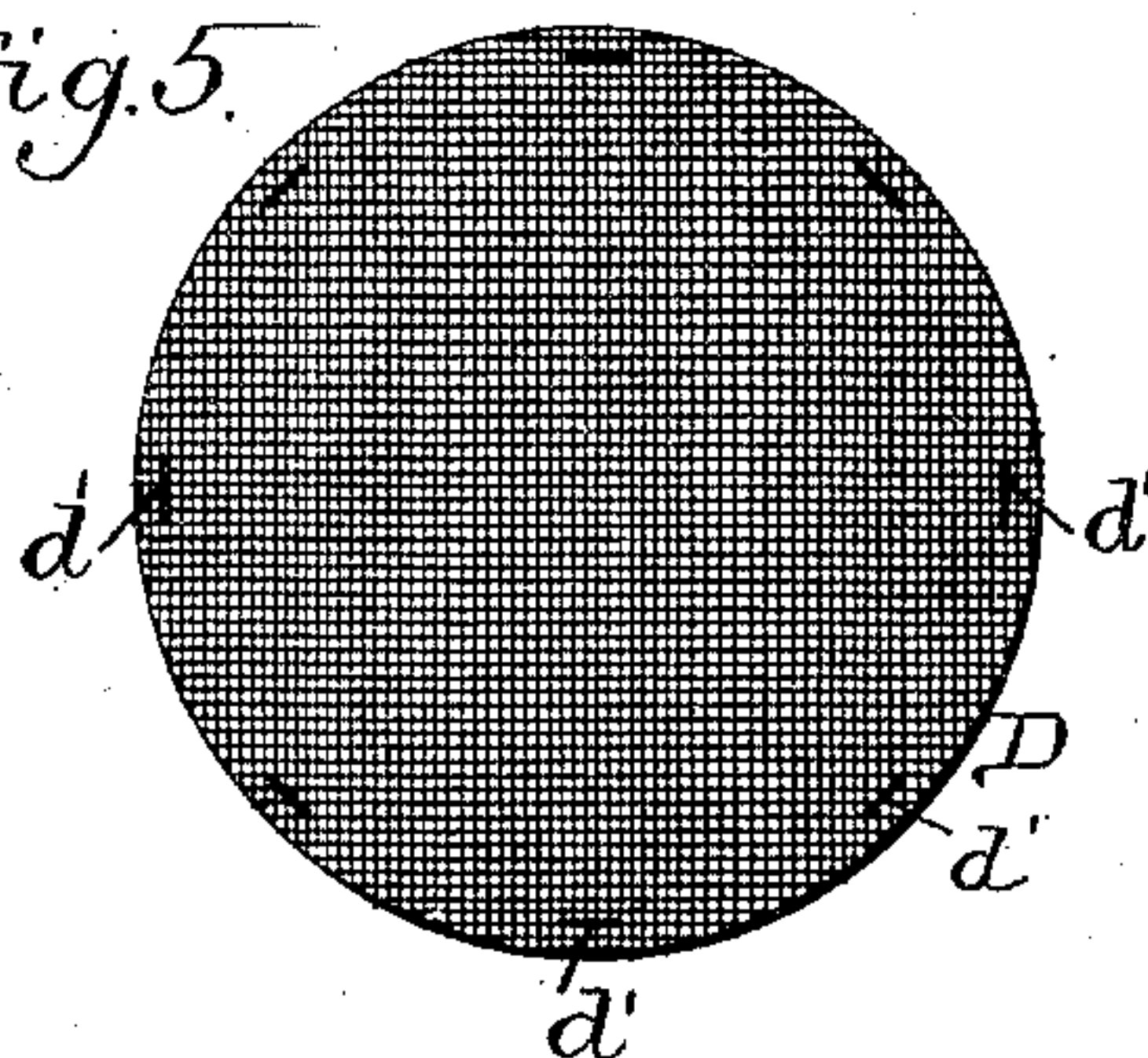


Fig. 6.

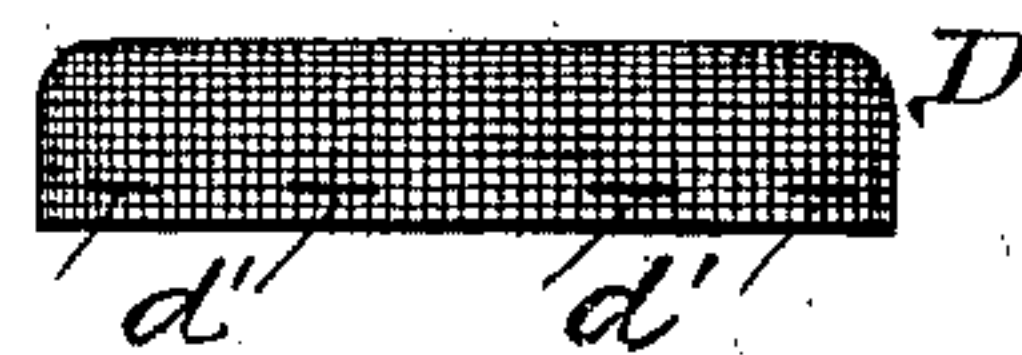
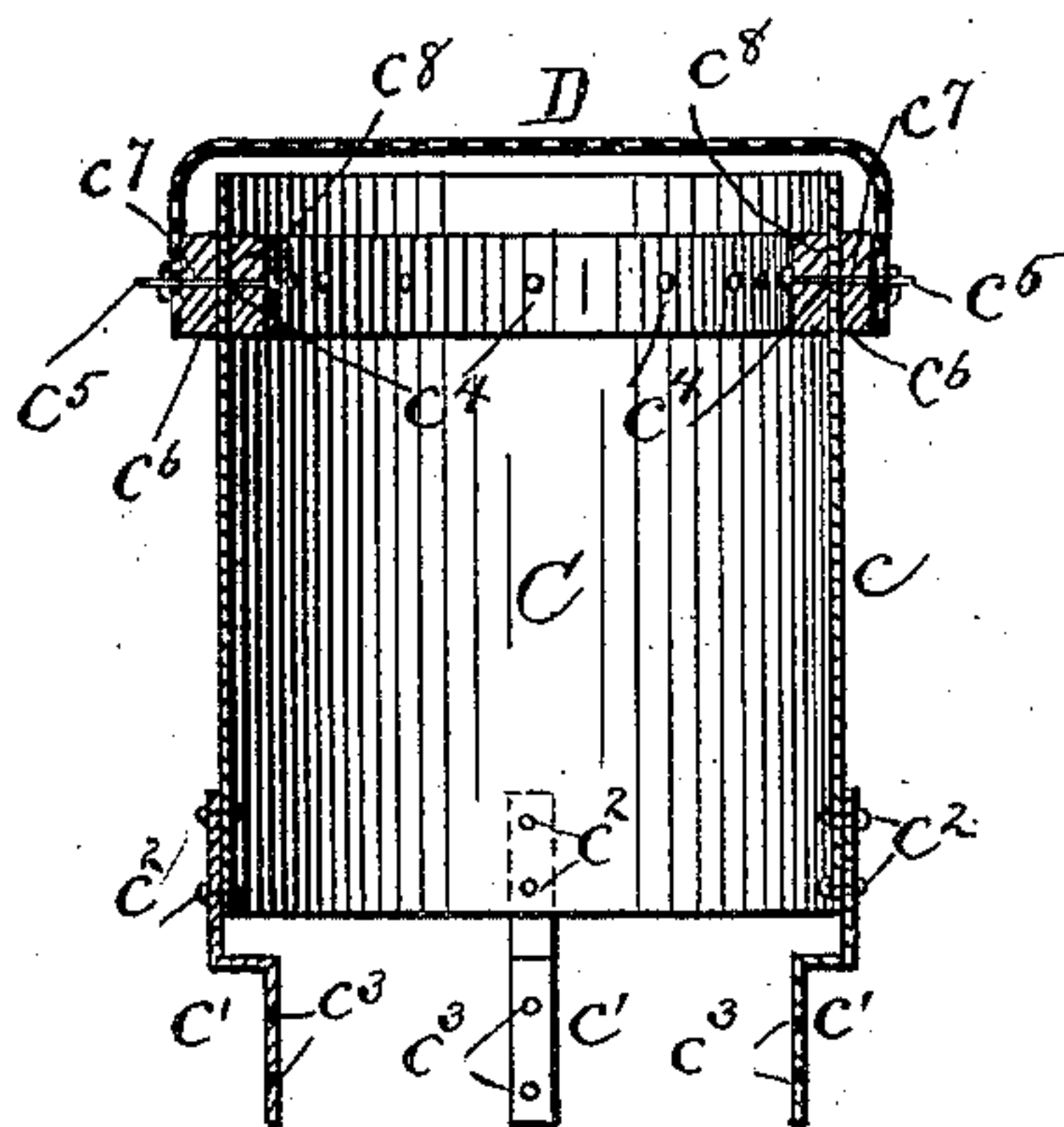


Fig. 4.



Fig. 7.



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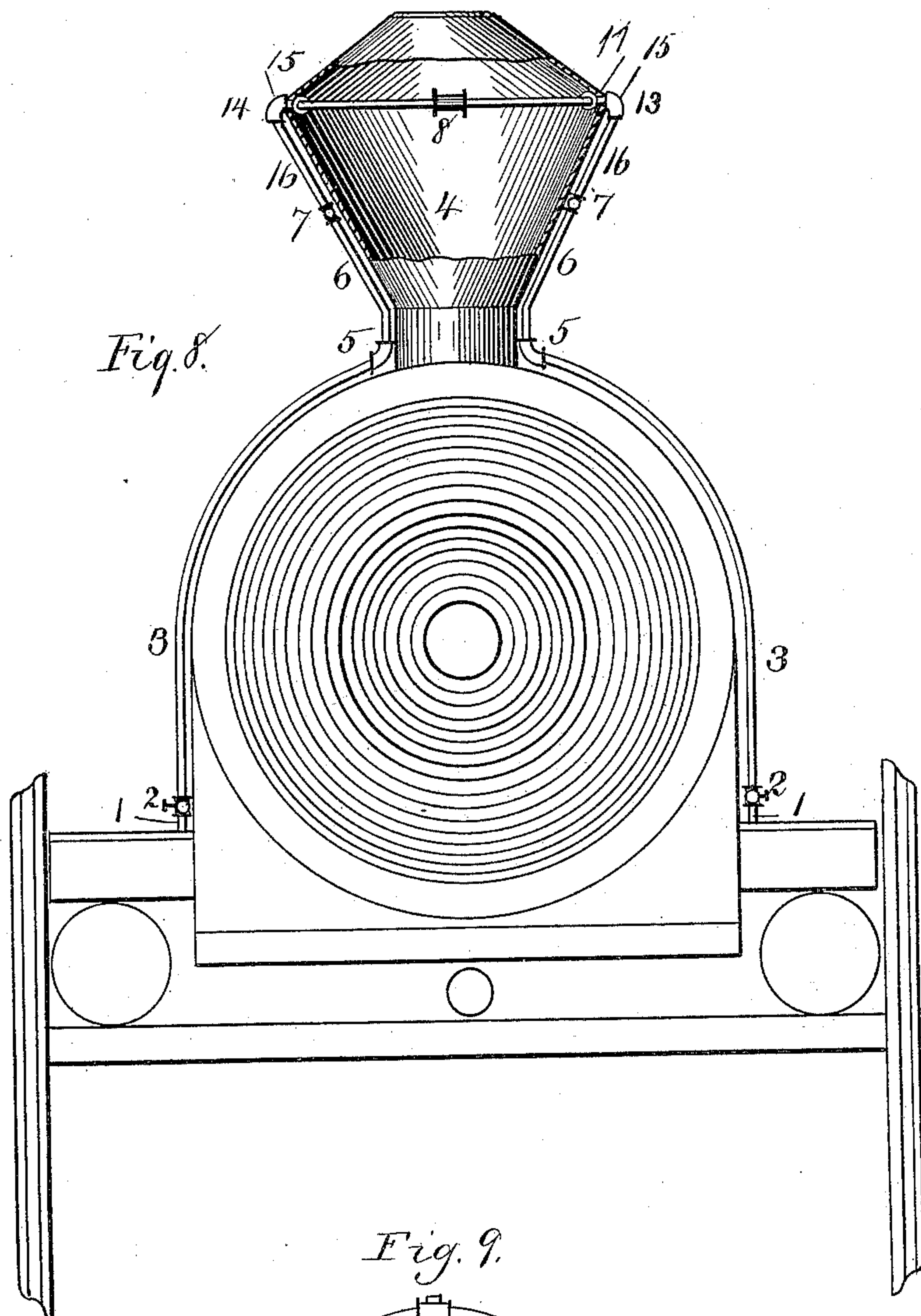
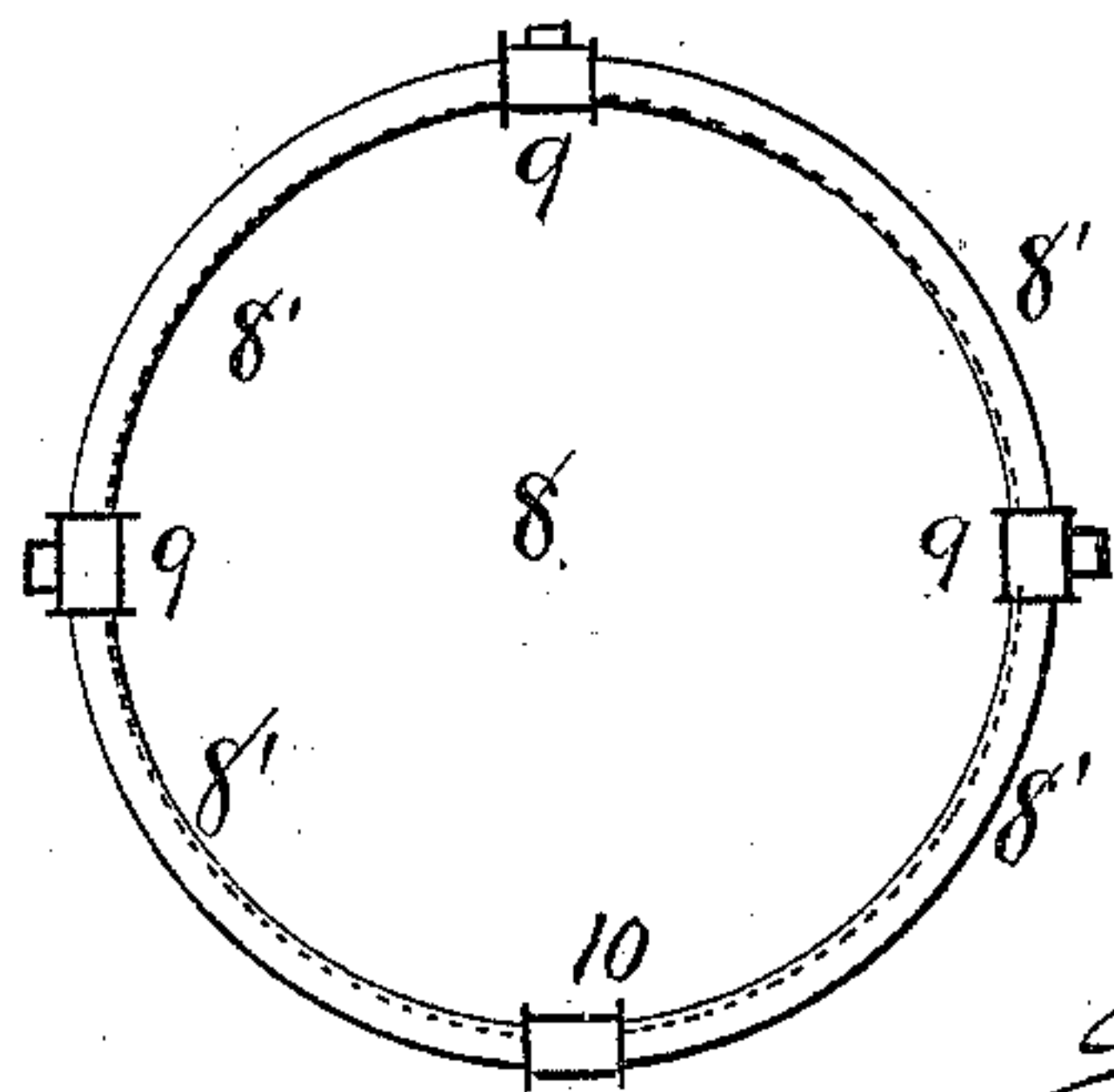


Fig. 8.

Fig. 9.



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By his attorney
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(No Model.)

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Fig. 10

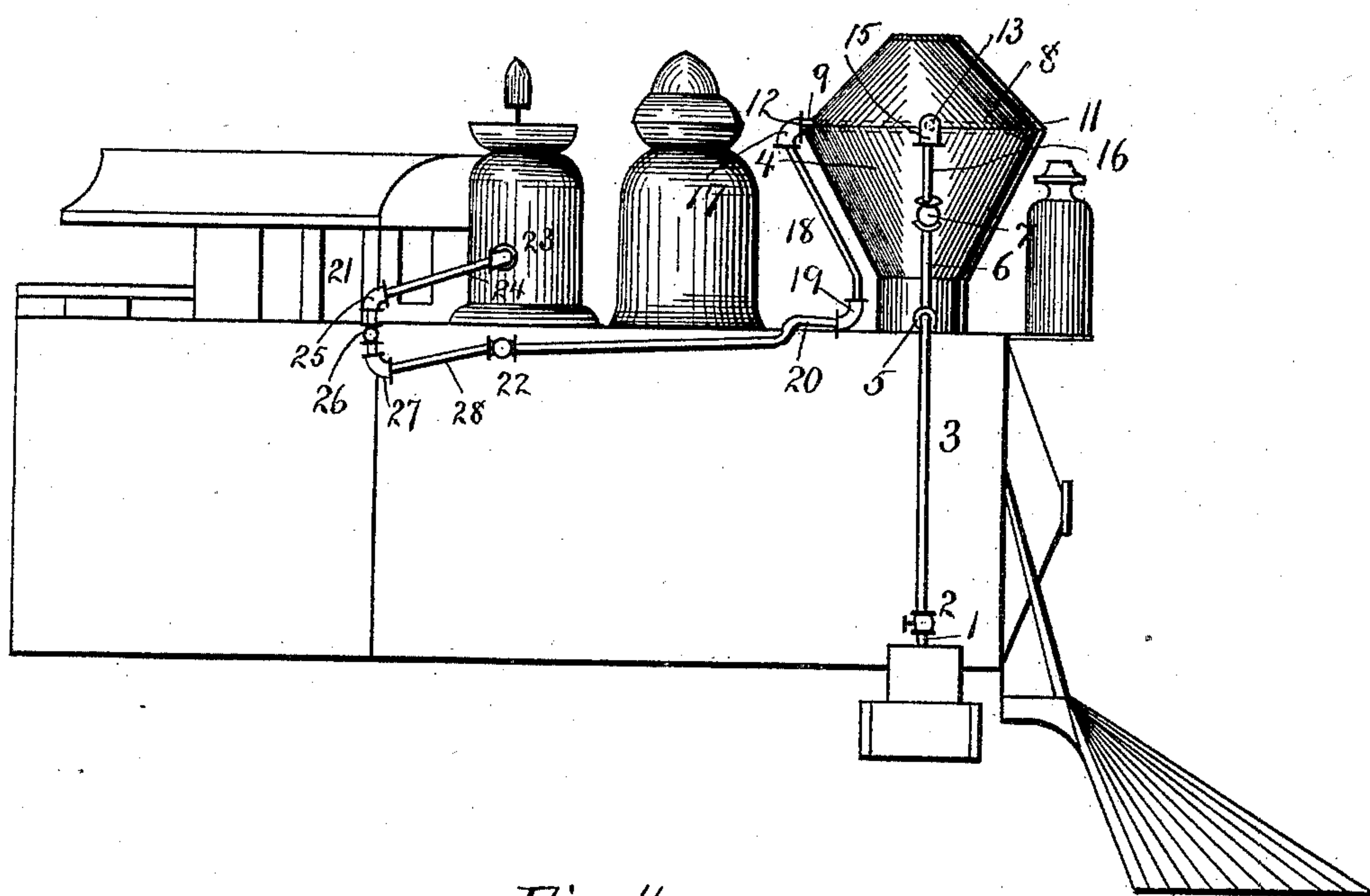
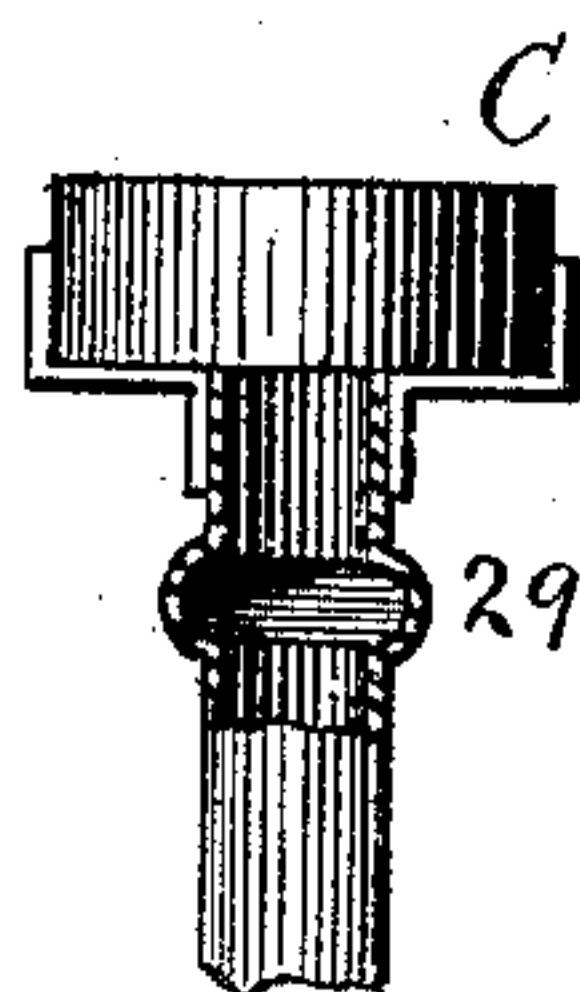


Fig. 11.



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UNITED STATES PATENT OFFICE.

ADAM PERRY AMAKER, OF ST. MATTHEW'S, SOUTH CAROLINA.

SPARK ARRESTER AND EXTINGUISHER.

SPECIFICATION forming part of Letters Patent No. 427,532, dated May 13, 1890.

Application filed November 13, 1889. Serial No. 330,240. (No model.)

To all whom it may concern:

Be it known that I, ADAM PERRY AMAKER, a citizen of the United States, residing at St. Matthew's, in the county of Orangeburg and State of South Carolina, have invented certain new and useful Improvements in Spark-Extinguishers; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

The object of my invention is to prevent the escape of sparks from the smoke-stack of boilers by extinguishing them within and near the top of the smoke-stack without obstructing the draft of the stack on the boiler, and can be applied to all engines and boilers—stationary, portable, and locomotive—and to all steam plants, with or without engines, for whatever purpose used. The principle is to spray the sparks with the steam vapor where it will do the most good, as far away from the heat of the furnace as possible, which said point is necessarily within and at the top of the stack.

It consists of the simplest possible device of the easiest construction, requiring only pipes, valves, elbows, and couplings, which is more fully described and explained by letters and figures.

In the accompanying drawings, Figure 1 is an elevation of my invention applied to a stationary steam-engine. Fig. 2 is a detail view, part of the stack being cut away, showing the upper part and spray of my invention. Figs. 3, 4, 5, 6, and 7 are detail views. Fig. 8 is a front elevation of my invention applied to a locomotive-engine. Fig. 9 is a plan view of the annular spray. Fig. 10 is a side elevation of my invention attached to a locomotive-engine and is a side view of Fig. 8. Fig. 11 is a detail view.

Referring to Fig. 1, drill a hole in elbow *a* of exhaust-pipe *b* near bottom and opposite the port in the cylinder. Screw in a piece of pipe *b'* three inches long. On the free end of this pipe screw a one-and-one-half-inch

globe-valve *a'*. On the free end of globe-valve *a'* screw a piece of pipe *b²* two feet long. On the free end of this last pipe screw elbow *d*. In free end of elbow *d* screw a piece of pipe *b³* two feet long, with a union-coupling *e* on its free end. Now continue from union-coupling *e* to within fourteen inches of the top of smoke-stack and screw on an elbow *f*. (See Figs. 1 and 2.) At this point cut a hole in the smoke-stack *A* just large enough to admit a one-inch pipe. In the free end of elbow *f* screw a thimble *f'* and on this a T-coupling *g*, leg down. Take a piece of pipe *b⁵* just long enough to reach from T-coupling *g* to within one inch of center of stack. Screw an elbow *h* on one end. Slip a collar *g'* with set-screws over this pipe *b⁵*. Pass it through the hole cut in said stack. Slip another collar *g²* with set-screw over this pipe, and screw this in free horizontal end of T-coupling *g*, with free end of elbow *h* turned up to receive the spray-pipe *i*. Adjust the pipe so elbow *h* will be in center of stack. Jam the collars *g'* and *g²* against inside and outside of stack and fasten down with set-screws. Make a spray-pipe *i* of one-inch pipe twelve inches long, thickly and closely perforated with small holes one-sixteenth of an inch in diameter, screw a cap *i'* on the upper end of it, and screw the lower end in elbow *h*. This completes the first division of spark-extinguisher, with the exception of the open leg of T-coupling *g*, which is for second division; but if second division is not desired screw a plug in this leg, and it will work all right; but when a forced draft is used to make steam it requires a second division to extinguish sparks while the engine is at rest, which is made as follows: Tap dome *j* of boiler, Fig. 1, and screw in a piece of one-inch pipe of any convenient length to extend beyond the side of the boiler. On the free end screw an elbow *l*. Into elbow *l* screw a piece of pipe *l'*, long enough to reach the horizontal plane where you wish to introduce a blow-pipe into the head of the boiler. On the free end of this pipe screw an elbow *m*. In this elbow screw a piece of pipe *m'* one foot long. On the free end of this screw a T-coupling *n*, leg turned up. In the free horizontal end of T-

coupling n screw a short pipe m^2 six inches long. On the free end of this screw a globe-valve o . In free end of globe-valve screw a piece of pipe m^3 , long enough to reach to a perpendicular line let fall from the center of the smoke-stack. On free end of this pipe screw an elbow m^4 , and into this elbow m^4 screw a pipe m^5 , with upper end pretty closely compressed, long enough to reach above flues and near the center of seat of smoke-stack. Now into upturned leg of T-coupling n screw a nipple n' , and on this nipple a globe-valve q . Into free end of globe-valve q screw a piece of pipe n^2 two feet long, with union-coupling n^3 on upper end. Now go back to the top of smoke-stack and screw into the leg turned down of T-coupling g a piece of pipe n^4 , long enough to reach down to union-coupling n^3 , and unite the ends of the pipes with the said union-coupling n^3 . This completes the second division of the spark-extinguisher.

By opening and closing the globe-valves a' , q , and o the fireman can put as much draft on the boiler and as much or as little steam vapor on his spray-pipe as he wishes. Now, to prevent the possibility of large cinders passing through the spray without being extinguished, make an arrester C, Fig. 7, as follows: Take the diameter of the top of the stack and make a piece of stack c one foot long and four inches in diameter larger than the smoke-stack of sheet-iron of same thickness as stack. Now take three or more straps c' of iron one-fourth by three-fourths and fourteen inches long. Drill two holes c^2 and c^3 , one-fourth inch in diameter, two and four inches from each end. Now six inches from one end of each strap bend it at right angles, and again two inches from that right angle bend again at right angles, so that the limbs of the straps will lie in planes parallel to each other and two inches apart, as shown in Fig. 3. Now rivet these straps on the outside of one end (the lower) of the arrester C, equal distances from each other, the free legs (the lower ends) turned in under the arrester. Now on the other end of the arrester C, two inches from the top and at equal distances around the circle, drill holes c^4 and put in staples c^5 , Fig. 4, one-half inch wide in loop, two inches long, with shoulders on each leg one inch from loop to hold a stay-strap. Put on stay-straps c^6 , Fig. 7, pass the ends of the staples through the holes c^7 in said stay-straps, put on another stay-strap c^8 on inside of arrester, and rivet down ends of the staples c^5 . Now cover the arrester with galvanized-iron netting D, Fig. 5, solid meshes, eight meshes to the inch. Bend down over sides of arrester. Cut slots d' for staples to pass through. Now lay two pieces of scantling two inches thick on top of smoke-stack. Set the arrester on them, mark the places on stack to rivet legs c' of the arrester, drill holes and rivet down, and remove the scantlings. Put on wire-netting D, pass a wire d^2 , Fig. 1,

through loops of staples c^5 , and tie down securely. This completes the spark-arrester for stationary engines. The size of pipe should vary with size of engine, boiler, and smoke-stack.

To apply spark-arrester to wood-burning locomotives, referring to Fig. 8, drill perpendicular holes through bed-piece of engine, on each side and as near the steam-chest as possible, large enough to pass one-inch pipe immediately over exhaust-pipe. Tap exhaust-pipe and screw in pieces of one-inch pipes 1, (note all pipes mentioned in this explanation are one inch in diameter,) long enough to extend two inches above bed-piece. Screw on free end of pipes 1 a one-and-one-half-inch globe-valve 2. Screw in free end of globe-valve 2 pipes 3, bent to conform to contour of boiler, long enough to reach to the neck of smoke-stack 4. Screw elbows 5 on free ends. Screw into elbows 5 pieces of pipe 6 to reach half-way up outside of smoke-stack, bent to conform to neck and body of smoke-stack 4. Screw on free ends union-couplings 7. Now make a crown or annular spray 8, Fig. 9, of one-inch pipe in four segments 8', large enough, when screwed into T-couplings 9 and the ends joined together with union-couplings 10, to lie securely in the annular enlargement 11 of the smoke-stack. Drill three lines of small holes one-sixteenth of an inch in diameter closely together along the interior face of the spray-pipe, as shown in Fig. 9, so that they will face each other when the circle is completed by connecting the segments. Now cut three holes in the annular enlargement 11 of the smoke-stack large enough to pass the legs of the T-couplings 9 through—one hole 12, Fig. 10, immediately over the perpendicular line let fall from this ring to center line on top of boiler, the other two holes 13 and 14, or right and left sides of the smoke-stack, immediately over and in perpendicular lines with pipes 16. Place spray-pipe 8 in position, the legs of T-couplings 9 passing out through holes 12, 13, and 14 in the annular enlargement 11 of the smoke-stack. Screw a nipple in each outer leg of said T-couplings. Screw elbows 15 on each nipple, leg down. Screw in free end of elbows 15 pieces of pipe 16 long enough to reach pipes 6. Secure ends together with union-couplings 7. Into elbow 17 screw a piece of pipe 18, long enough to reach top of boiler, bent so as to conform to shape of smoke-stack, and screw elbow 19 on lower end. Into elbow 19 screw a piece of pipe 20, long enough to reach within one foot of cab 21 of engine. Screw a union-coupling 22 on this end. Now tap dome 23 of boiler at any convenient point. Screw in a piece of pipe 24 long enough to reach cab 21. Screw an elbow 25 on this end. In free end of elbow 25 screw a nipple. Screw a globe-valve 26 on this nipple. Screw a nipple in free end of globe-valve 26 and an elbow 27 on this nipple, and into free end of elbow 27 a piece of pipe 28, long enough to

reach the end of pipe 20. Secure ends of pipes 20 and 28 with union-coupling 22. This completes spark-extinguisher for locomotive wood-burners. By opening globe-valves 2 the engine while running kills all sparks made, and by opening valve 26 kills them when engine stops or is standing with steam on; but in locomotive coal-burners the stack must be made according to Fig. 11. The arrester C should be made five inches larger in diameter than the smoke-stack, should be strapped on with four or more straps instead of three, as in stationary engines, the bottom of arrester C even with top of stack, the stack enlarged six inches from top, as at 29, Fig. 11, to receive a crown-spray 8, Fig. 9, made and fitted in and connected with exhaust-pipe and dome of boiler, in same way as described for locomotive wood-burners and explained in Figs. 8 and 10.

To apply spark-extinguisher to portable engines, follow directions for stationary engines, Fig. 1, for using exhaust-steam. Put in a crown-spray and arrester C, as in Fig. 8, and connect the spray with dome of boiler for live steam, as in Fig. 10. Use three-fourth pipe for small engines. In all cases get the receiving end of your pipe as near and in as direct a line with the force of the exhaust-steam as possible, when it is expelled through the port of the cylinder, and if possible introduce it by the side of exhaust-pipe to receive steam directly from port of cylinder. If necessary, screw in on top of petticoat-pipe in locomotives reducers, so as to force sufficient exhaust-steam in feed-pipe to spray.

The crown or annular spray may be used for stationary as well as for other engines, and may be applied as in Fig. 8.

In all portable as well as locomotive engines there should be a separate pipe from the dome of the boiler for spark-extinguisher—that is, a separate pipe to carry steam to spray, instead of using the same pipe for both blower (force draft) and spray, and more satisfactory results will be obtained in the same way for stationary engines.

My invention (spark arrester and extinguisher) does not in any way obstruct the draft, and by conveying the steam vapor on the outside of smoke-stack to the point where it is to be used—to wit, within and near the top of the stack—the full humidity of the steam is retained until it is directly applied to its work in extinguishing the sparks, and the spark-arrester made and attached as above described is a valuable part of this invention and necessary for its complete success in stopping all large cinders, &c., which may pass through the vapor.

Having described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination, with a steam-engine, of the pipe b' , entering into the elbow a of the exhaust-pipe b , globe-valve a' , secured to

the free end of said pipe b' , said pipe being continued upward by means of pipes b^2 , b^3 , and b^4 , connected by proper elbows and couplings, and then turned into the smoke-stack near its upper end and connected with a perpendicular spray-pipe i by means of elbows f , T-coupling g , and elbow h , substantially as shown and described, and for the purposes set forth.

2. The combination, with a steam-engine, of the pipe b' , entering into the exhaust-pipe b , globe-valve a' , secured to the free end of said pipe b' , said pipe being continued upward by means of pipes b^2 , b^3 , b^4 , connected by proper elbows and couplings, and then turned into the smoke-stack by means of elbow f , T-coupling g , and short pipe b^5 , and connected with the perpendicular spray-pipe i by means of an elbow h , pipe k , extending from the top of the boiler to beyond its side and turned down by means of elbow l to near the bottom of the boiler, and then turned in by means of elbow m and continued to the center of the boiler by means of the short pipe m' , T-coupling n , globe-valve o , and pipe m^3 , and then united with pipe m^5 by means of the elbow m^4 , and the pipe extending from T-coupling n to T-coupling g , provided with the globe-valve q , substantially as shown and described, and for the purposes set forth.

3. In a spark extinguisher and arrester, in combination with the spray i , the arrester C, consisting of the continuation c , straps c' , securing the same to the top of the smoke-stack, wire-netting D, provided with the loop-holes d' and secured to the top of said extension c by means of the shouldered U-staples c^5 , and the wire d^2 , substantially as shown and described.

4. The combination, with a steam-engine, of the pipes 1, entering the exhaust-pipe, globe-valves 2, secured to the free ends of said pipes, pipes extending up each side of the boiler and the smoke-stack bent to conform thereto and united by proper couplings and elbows, and then united near the upper end of the smoke-stack with a spray 8 by means of T-couplings 9, substantially as shown and described, and for the purposes set forth.

5. The combination, with a steam-engine, of the pipes 1, entering the exhaust-pipe, globe-valves 2, secured to the free ends of said pipes, pipes extending up each side of the boiler and smoke-stack bent to conform thereto and united by proper couplings and elbows, and then united near the upper end of the smoke-stack with the spray 8 by means of T-couplings 9, and a pipe passing from the dome of the boiler 23 and united with said spray by means of the elbow 17, provided with proper elbows and couplings, and a union-coupling 22, substantially as shown and described, and for the purposes set forth.

6. In a spark killer and arrester, as above described, the smoke-stack head, as shown, consisting of the lower section 4, having the

flange 30, with the openings 12, 13, and 14,
the staples c^5 , set in said flange, and the lugs
34, set around the head of said section, and
section 3, having the inner flange 33, seat 32,
5 and the outer flange 31, having the slots c^6 and
the staples c^7 , substantially as shown and de-
scribed, and for the purposes set forth.

In testimony whereof I affix my signature in
presence of two witnesses.

ADAM PERRY AMAKER.

Witnesses:

O. M. DANTZLER,
E. W. JONES.