Feb. 17, 1931. G. R. ISCRA 1,792,909

SPARK ARRESTER AND SMOKE PURIFIER

Filed Jan. 18, 1928 2 Sheets-Sheet 1

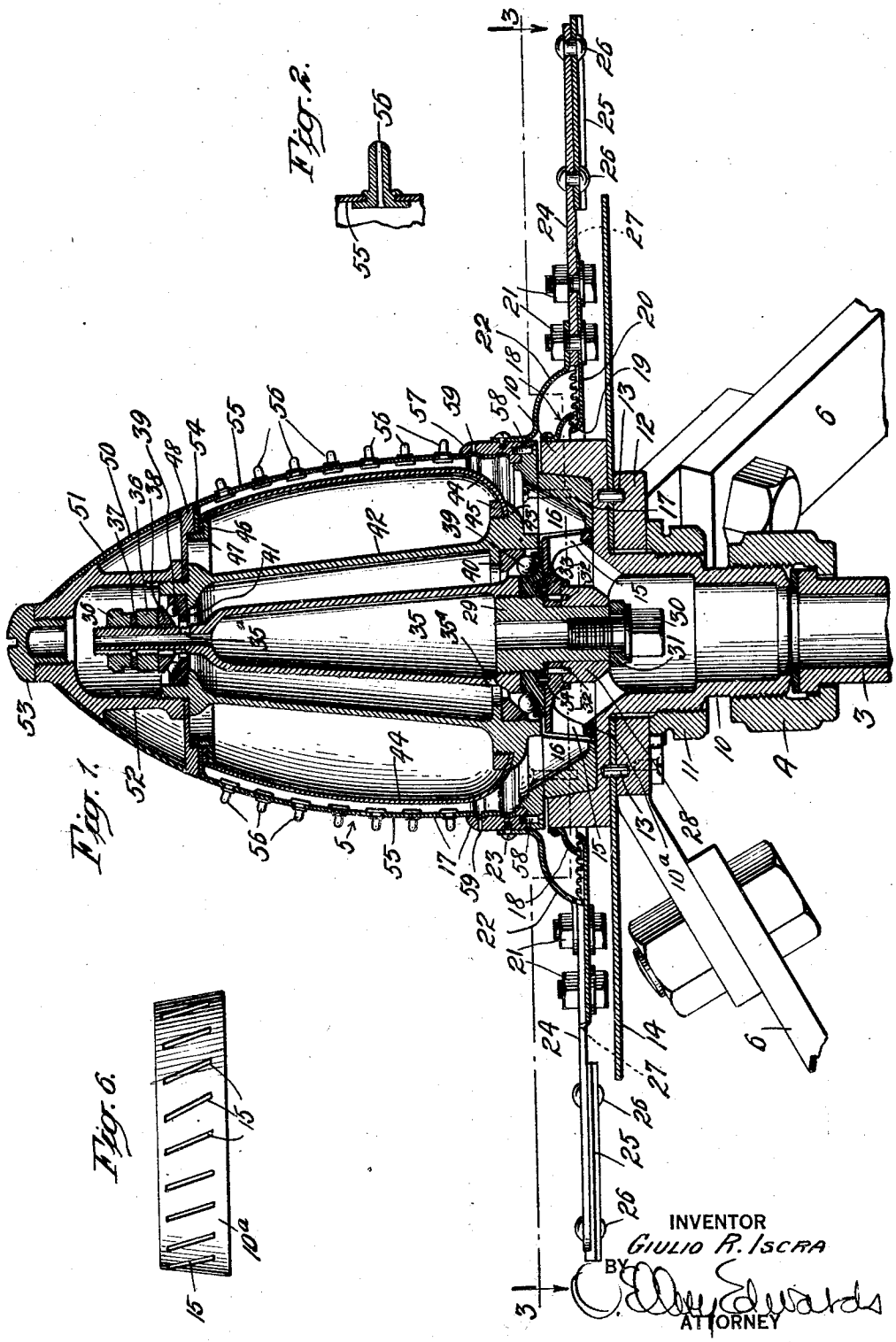


Fig. 1.

Fig. 2.

Fig. 6.

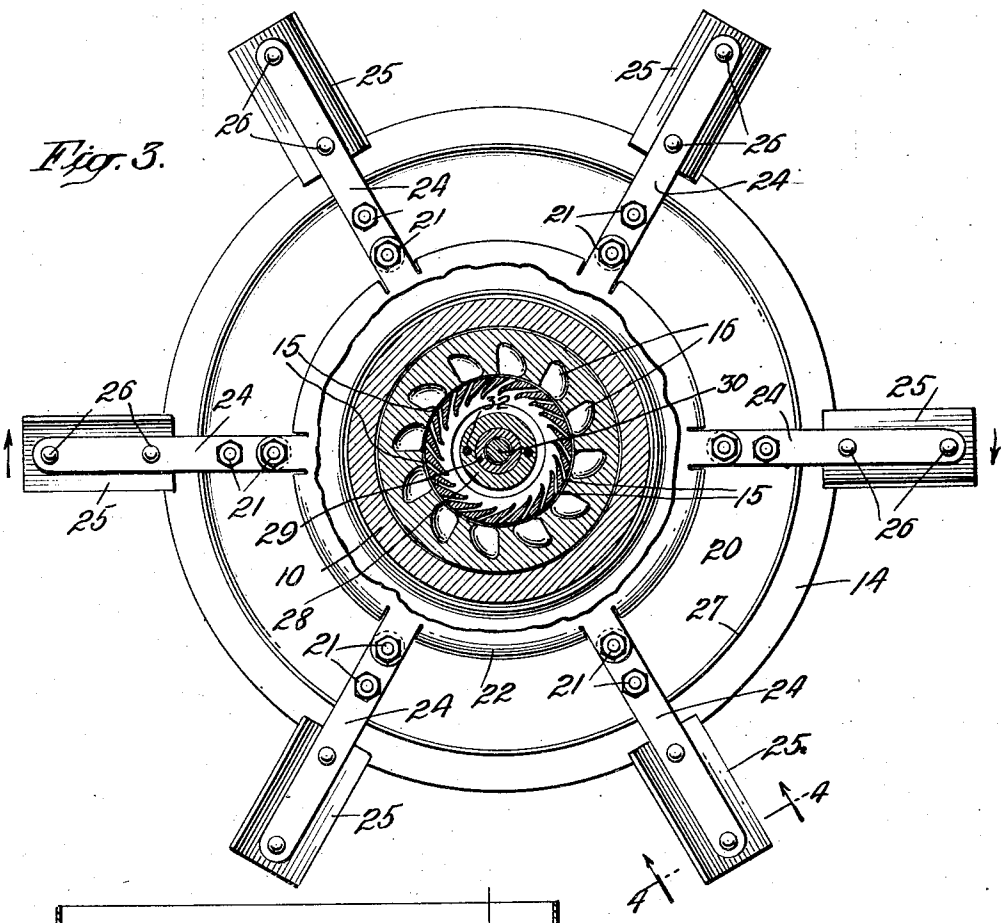
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Fig. 3.



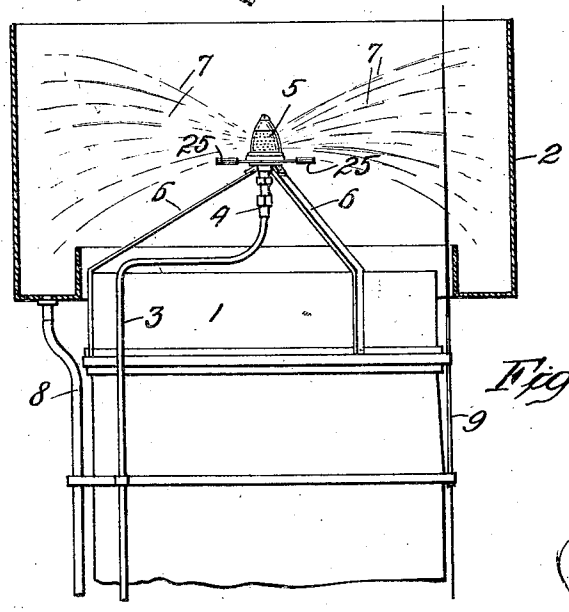
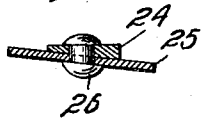


Fig. 5.

Fig. 4.



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1,792,909

UNITED STATES PATENT OFFICE

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SPARK ARRESTER AND SMOKE PURIFIER

Application filed January 18, 1928. Serial No. 247,523.

The object of my invention is to improve the device of this character set forth in the patent of H. F. Iscra dated March 14, 1916, No. 1,175,870. This object is accomplished by my invention, one embodiment of which is hereinafter more particularly set forth.

For a more detailed description of my invention, reference is to be had to the accompanying drawings, forming a part hereof, in which

Figure 1 is a longitudinal section of my improved device.

Figure 2 is a longitudinal section, somewhat enlarged, through a water nozzle.

Figure 3 is a cross section, taken on the line 3—3 of Figure 1, looking in the direction of the arrows.

Figure 4 is a sectional view, taken on the line 4—4 of Figure 3, looking in the direction of the arrows.

Figure 5 is a sectional view showing a chimney provided with my improved device, and Figure 6 shows the stator of the turbine.

Throughout the various views of the drawings, similar reference characters designate similar parts.

The numeral 1 indicates the top of a smoke-stack chimney or flue and the construction embodying my invention is preferably located at the upper end or mouth of the same.

My spark arresting and purifying arrangement preferably comprises a casing 2 which conforms to the shape of the top of the chimney and is of somewhat greater size, and to this casing runs a water supply pipe 3 which carries water or similar fluid under a proper head to a union 4 which is connected to a sprinkler head 5 which will be described below. This head 5 is supported by a suitable tripod, or other means 6, which is carried by the chimney 1 and is adapted to throw streams of water 7 or similar fluid into the interior of the casing 2 where it is caught together with any absorbed or entrained gases, solids, vapors or liquids that may issue from the smoke-stack 1 and these various products are drained through a suitable drain 8 which is connected to the bottom of the casing 2, as shown in Figure 5.

If desired, a lightning rod 9 may extend above the chimney 1 and be secured thereto in the conventional manner and either inside or outside of the casing, as desired.

Water or other fluid, which flows under pressure through the pipe 3, passes through the union 4 and thence into the lower casing 10 of the sprinkler head 5 which is held fixed by a lock nut 11 which bears against a plate 12 of the tripod 6. This plate 12 has several holes in which dowels 13 are placed and these dowels also extend through a baffle plate 14 which prevents the hot products of combustion from having direct contact with the sensitive parts of the sprinkler 5. Resting on the upper part of the fixed casing 10 is a stator 10*a* with suitable, horizontal, nozzle slots 15 which project water in jets to the buckets 16 of the rotor 17 which will be more particularly described below. The upper end of the fixed casing 10 is preferably given an annular recess to receive the buckets 16 and this upper portion rests on the plate 14, as shown in Figure 1, and receives the dowels 13, in the conventional manner, so that it will be held true at all times.

Some water will leak between the nozzles 15 and the buckets 16 and this will be caught by the petticoat collar 18 which is fixed to the upper end of the fixed casing 10 and projects over an annular collar 19 extending from a plate 20 which runs parallel to the plate 14 and this plate 20 is held by suitable bolts 21 to a second petticoat collar 22 which at its upper end is fixed to the rotor 17 by means of suitable screws 23, or any other suitable means. Between the disc 20 and the annular collar are placed a number of arms 24 which are held in position by the bolts 21 and the lower end surfaces of these arms 24 carry blades 25 held by suitable rivets 26

and so arranged and disposed that these blades present an inclined surface to the hot gases rising from the chimney and they are driven by the buckets 16 in a direction opposite to that in which they would be driven if driven by these gases so that bearings which are described below will be relieved of some of their friction and therefore function more easily.

The disc 20, at its outer edge, has an upwardly turned flange 27 which is recessed at suitable intervals for the arms 24 and if any water escapes from between the nozzles 15 and the buckets 16, as above set forth, it will ultimately reach this plate 20 and be forced by centrifugal action to the periphery thereof and over the flange 27 or along the arms 24 and from these it will be thrust by centrifugal force into the hot gases issuing from the chimney in the form of drops or a fine spray, and ultimately join with the water thrown by the nozzles which will be described below.

The upper portion of the fixed casing 10, on the inner side of the passages 15, has a central boss 28 which has a central bore through which passes a bushing 29 which will be described below. This bushing is held in place by means of a cap screw 30 and a washer 31 which rests between the head of the screw 30 and the lower portions of the parts 28 and 29. The center 28 carries the stator 10*a* which contains the upper wall of the passages 15 and this is held in position by dowels 32 in the part 10 and by a shoulder of the bushing 29, as shown. On top of this stator 10*a* and about the bushing 29 is a ball race 33 which is held in place by dowel pins 34 and a hollow spindle 35, made and mounted as shown in Figure 1, and at the top of this are a number of lock nuts 36 separated by a washer 37 and below the lowest nut 36 is an adjustably mounted race 38. Ports 35*a* permit grease to flow to the bearings described below.

Engaging the races 33 and 38 are suitable balls 39 which also engage the movable races 40 at the bottom and 41 at the top and these movable races are connected by a suitable hub 42 so as to be held in fixed relation. The hub 42 is fixed to the buckets 16 and is preferably made integral with them and so forms a part of the rotor 17.

The hub 42 has a projecting annular flange 43 on which rests the lower end of a casing 44 which is preferably made of spun metal and shaped substantially as shown, so as to form a guide for water or similar fluid issuing from the buckets 16. This casing 44 at its lower end is held in position by means of a nut 45 and at its upper end it is flanged and turned inwardly so as to take over a corresponding flange 46 which projects from a small cylinder 47, and this is surmounted by a screw threaded disc 48 which has a central bore through which passes the hub 42 and it is held in place between a flange 49 on this hub and a cap 50 which is also secured to this hub and provided with an outer shell 51 which goes to the outer periphery of the disc 48 and is flush with the same and a central portion 52 which surrounds the nuts 36 in the manner shown. The upper end of this cap may be provided with a screw plug 53 through which access may be had to the interior of the spindle 35 of the cap for the purpose of supplying grease to the chamber about the nuts 36 and the chamber in the spindle 35. It is preferable, however, not to use grease, but to let the balls 39 run with water which acts as a lubricant, as only a little water is required and this can leak in and run out through the small passages which are indicated in Figure 1.

The lower surface of the disc 48 engages a flange 54 which rests on the upper flange of the casing 44, above described, and is held firmly in place between these two elements and this flange 54 projects from the nozzle casing 55 which is provided with a number of water nozzles 56 each of which is adapted to project water radially and all of them diagonally from the axis of the rotor 17. The lower end of this casing is preferably spun in a collar 57 which is fixed to the buckets 16 by means of screws 58, or any other suitable means. In the collar 57 are holes 59 which are radially and horizontally disposed so that water will issue from them as from the nozzles 56, but in a horizontal plane. Above these holes 59, the nozzles are arranged so as to project slightly upwardly at increasing angles to the horizontal, say five degrees for the first layer, ten degrees for the second and so on to the top, the purpose being to keep the streams from interfering one with another after the water issues from the nozzles so that there will be no chance for the mist which is formed, to consolidate into drops and so destroy the effectiveness of the water issuing in the form described from these respective nozzles.

In view of the foregoing, the operation of my improved spark arrester and smoke purifier will be readily understood. Water, or other liquid, flows through the pipe 3, in the usual manner and issues from the nozzles 15 in the form of jets, and therefrom passes through the buckets 16 and drives the rotor of the apparatus from the buckets 16. Water goes through between the shells 44 and 55 and issues from the nozzles 56 and 59, above described, and any leakage is taken care of by the flange 27, above set forth. The water thus thrown in all directions with a rapid rotation makes practically layers of sheets or films through which the ascending gases rise and anything that is soluble in water or that may be washed out by the water is caught and carried into the trough at the bottom of the

casing 2 and thence drained down through the pipe 8. The rotor turns readily because of the ball bearings, above described, and also because of the blades 25 which function, as above set forth. As long as hot gases issue from the chimney, this apparatus will function automatically if water be turned on and when such gases cease to issue, water should be drained from the apparatus, in the conventional manner.

While I have shown and described one embodiment of my invention, it is obvious that it is not restricted thereto, but that it is broad enough to cover all structure that come within the scope of the annexed claims.

Having thus described my invention what I claim is:

1. In an apparatus of the class described, a sprinkler adapted to be mounted at the top of a chimney, means for supplying said sprinkler with water, means for catching said water, means for driving said sprinkler so that a portion thereof will rotate and means for reducing the friction on the bearings of the rotating part through the action of gases passing up this chimney while this rotor is rotating.

2. In an apparatus of the class described, a sprinkler adapted to be put in a chimney and in the path of hot products of combustion and having a part thereof rotatable, means for supplying said sprinkler with water, a turbine in said sprinkler through which said water passes having a series of fixed nozzles, a corresponding series of buckets in the rotor, a series of nozzles in the rotor and means for guiding the water from the buckets to the last named nozzles.

3. In an apparatus of the class described, a sprinkler adapted to be put in the path of hot products of combustion and having a part thereof rotatable, means for supplying the sprinkler with water or similar fluid, said sprinkler having a turbine with fixed nozzles and rotary buckets and disc means for projecting horizontally any water that leaks from the said turbine into the hot products of combustion.

4. A fixed spindle and means for mounting the same, bearings at the top and bottom of said spindle, a shell carried by means connected to said bearings, a second shell concentric with the first and spaced from it, a series of nozzles projecting from the second shell, a turbine for rotating the two shells with the same angular velocity and means for supplying the space between the two shells with water.

5. In an apparatus of the class described a hollow spindle through which water may pass, bearings on the top and bottom of said spindle, rotary means mounted on said spindle and carried by said bearings, said rotary means having a cone surrounding said spindle, and interior shell fixed to the said cone, an exterior shell also fixed to said cone, and spaced from the interior shell, buckets for causing the rotary means to rotate, means for supplying water to said buckets and to the space between the two shells, and means for throwing streams of water through the exterior shell so that one stream will not interfere with another when washing products of combustion.

In testimony whereof, I have hereunto set my hand this 7th day of January, 1928.

GIULIO ROBERTO ISCRA.