March 24, 1936. J. C. SCHELLIN 2,035,194

NOZZLE CONSTRUCTION

Filed Feb. 11, 1935

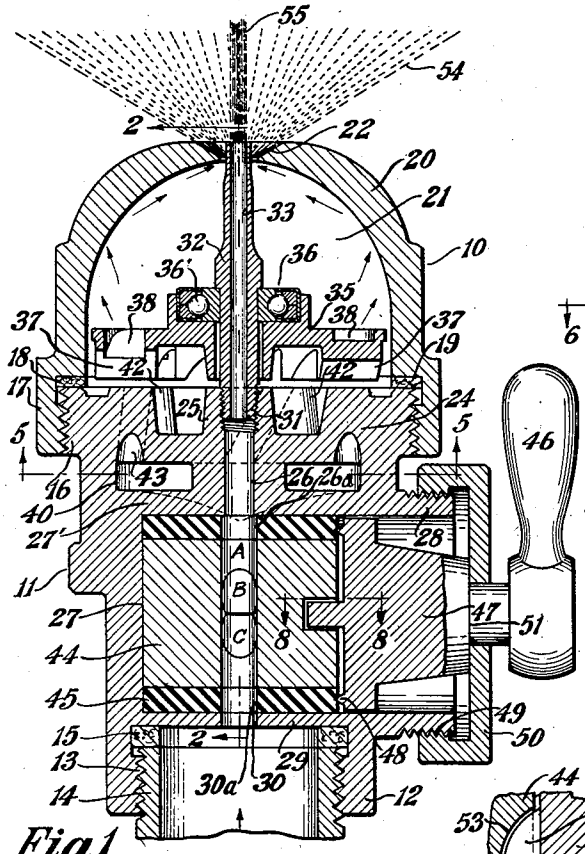


Fig.1

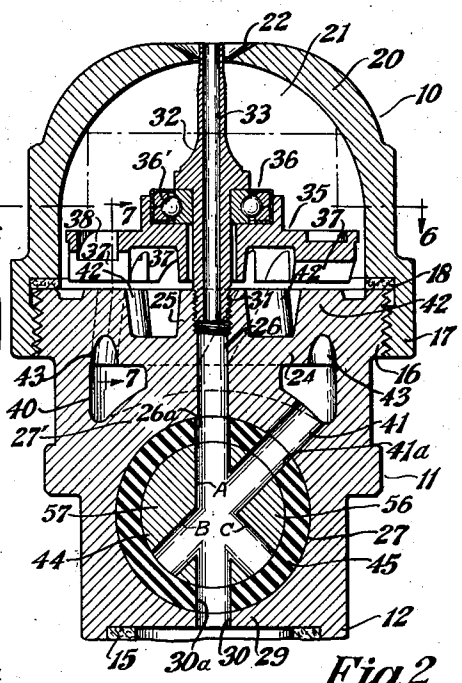


Fig.2

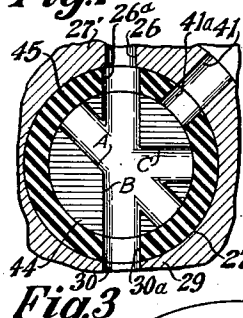


Fig.3

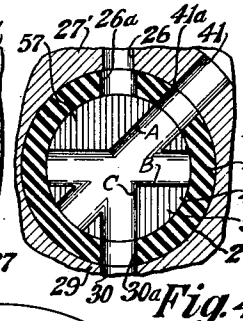


Fig.4

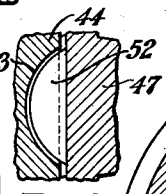


Fig.8

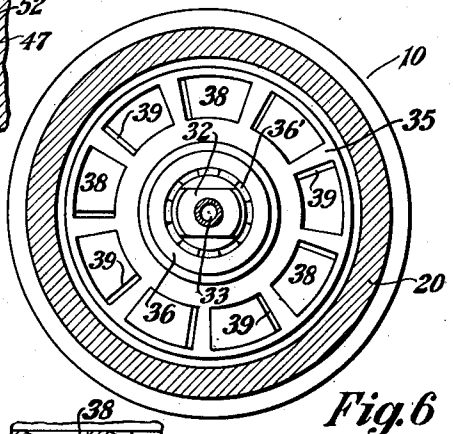


Fig.6

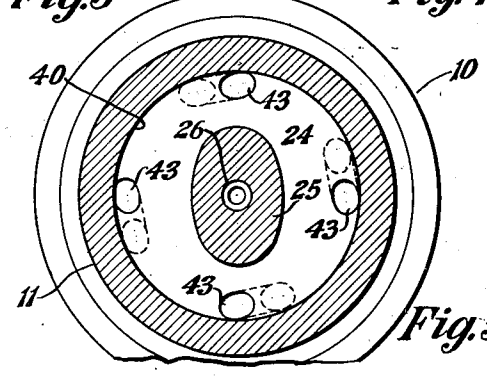


Fig.5

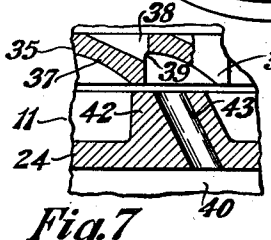


Fig.7

Inventor

J. C. Schellin

By Frease and Bishop

Attorneys

Patented Mar. 24, 1936

2,035,194

UNITED STATES PATENT OFFICE

2,035,194

NOZZLE CONSTRUCTION

John C. Schellin, Wooster, Ohio, assignor to The Akron Brass Manufacturing Company, Wooster, Ohio, a corporation of Ohio

Application February 11, 1935, Serial No. 5,957

8 Claims. (Cl. 299—115)

The invention relates to nozzles for breaking up fluid media and discharging the same in the form of extremely fine particles. More particularly, the invention relates to nozzles for discharging particles of fluid media in a state adapted to effectively extinguish various types of fires.

Many fires may be extinguished more easily, rapidly and effectively than has been previously possible by providing a nozzle which will break up and discharge fluid media in such fine particles as to form a dense fog or vapor, because the fog acts to blanket or smother a large area of fire. Such a nozzle is disclosed, described and claimed in my prior Patent No. 1,996,884, entitled Fog-producing nozzle.

Where a fire of substantial depth is to be extinguished, it is frequently desirable to have a nozzle which will discharge fluid media in the form of a stream of relatively high velocity. This type of fire occurs in the burning of relatively light material which is not too greatly compacted, such as piles of cotton waste, waste papers, rubbish and the like, where combustion takes place not only on the surface of the material, but throughout the mass.

In such instances, a high velocity stream of water or other fluid medium will act to penetrate the mass of burning material and extinguish the fire burning beneath the surface, and if the surface of the mass is also burning, the extinguishing fluid may be applied in the form of a stream and a fog simultaneously, to extinguish all of the fire with maximum effectiveness.

I have provided a nozzle which is capable of discharging a fluid medium such as water in the form of a stream and a fog, either together or singly.

Such a nozzle is particularly applicable for use by any and all persons extinguishing relatively small fires, because a small fire of waste paper and the like can be completely extinguished so quickly and with so small an amount of water that a minimum of damage results.

It is therefore an object of the present invention to provide an improved nozzle construction for pressure fluid lines which is capable of producing simultaneously a fog composed of particles of maximum fineness and a fluid stream of relatively high velocity.

Another object is to provide an improved nozzle construction for pressure fluid lines which is adapted to selectively produce a fog composed of particles of maximum fineness or a fluid stream of relatively high velocity.

A further object is to provide an improved nozzle construction having manually operable valve means for controlling the form in which the fluid is discharged.

A still further object is to provide an improved nozzle construction which is simply and compactly constructed, and adapted for quick and easy connection to any portable or stationary pressure fluid line.

These and other objects are attained by the parts, elements, combinations and improvements comprising the present invention, which are hereinafter described in detail and defined in the appended claims.

In general terms, the improved nozzle may be stated as including a separable housing having a fluid entrance end and a fluid discharge end, the entrance end being adapted for connection to a pressure fluid line, the discharge end being provided with a discharge aperture, rotor means intermediate the ends of the housing for breaking up fluid passing in the entrance end into fine particles and imparting a rapid whirling motion thereto, said rotor means being adapted to discharge the fine whirling particles into a chamber in the discharge end of the housing from which they issue through the discharge aperture, there being a direct fluid passage through the nozzle for conducting fluid from the entrance end directly to the discharge aperture in the discharge end, and valve means for selectively closing off said direct passage or closing off communication between the rotor means and the entrance end of said housing.

Referring to the drawing forming part hereof:

Figure 1 is a longitudinal sectional view of the improved nozzle showing the valve means in position to permit the discharge of fluid in the form of a fog and a stream simultaneously;

Fig. 2 is a longitudinal sectional view of the improved nozzle taken at right angles to the view in Fig. 1;

Fig. 3 is a fragmentary section similar to Fig. 2, showing the valve means in a position closing off the discharge of fluid in the form of a fog;

Fig. 4 is a fragmentary section similar to Fig. 2, showing the valve means in a position closing off the discharge of fluid in the form of a stream;

Fig. 5 is a transverse sectional view as on line 5—5, Fig. 1;

Fig. 6 is a plan sectional view taken substantially on line 6—6, Fig. 2;

Fig. 7 is a fragmentary sectional view taken substantially on line 7—7, Fig. 4; and

Fig. 8 is a fragmentary sectional view as on line 8—8, Fig. 1.

Similar numerals refer to similar parts throughout the several views of the drawing.

The improved nozzle preferably includes a separable housing or casing which may include the head member indicated generally at 10 and the tail member indicated generally at 11.

The tail member 11 is preferably provided at its entrance end with the female coupling portion 12 which is internally threaded as shown at 13 for connection with a pressure fluid line 14 in the usual manner. The usual gasket 15 is provided in the female coupling portion 12 for making a leak-proof connection between the pressure line and the nozzle.

At its other end the tail member 11 is provided with an annular externally threaded portion 16, and the head member 10 is provided with an annular internally threaded portion 17, which is adapted to be screwed onto the externally threaded portion 16 of the tail member 11.

Preferably, a gasket 18 of rubber and the like is inserted between the end face of the portion 16 and a shoulder 19 in the annular wall of the head member 10 for making the joint between the head and tail members leak-proof.

The head member 10 may have a hemispherical or dome-shaped wall 20 forming a dome-shaped discharge chamber 21. The dome-shaped wall 20 is preferably provided with a restricted central discharge aperture 22 which is coaxial with the entrance end of the nozzle, that is, with the female coupling portion 12. Preferably, the discharge aperture 22 is outwardly flared as shown, for a purpose to be hereinafter described.

The tail member 11 preferably has its discharge end closed by transverse partition wall 24. The wall 24 preferably has a central boss 25 formed thereon provided with the axial bore 26.

Preferably, the tail member 11 is provided between its entrance end and the wall 24 with a valve chamber 27 which may be cylindrical as shown and disposed at right angles to the longitudinal axis of the nozzle, having the open end 28. The valve chamber wall 29 at the entrance side is preferably provided with an axial entrance port 30 communicating with the coupling portion 12, and the axial bore 26 extends through the valve chamber wall 27' at the discharge side. The discharge end of the axial bore 26 is internally threaded as shown at 31, and a nozzle jet member 32 is screwed into the threaded bore 31.

The nozzle jet member is adapted to be disposed axially of the nozzle, and is of such length that the discharge end of the jet member 32 will extend through the discharge aperture 22 of the head member 10 and preferably terminates substantially at the outer surface of the dome wall 20. The nozzle jet member 32 is provided with an axial bore 33 which is in axial alignment with the bore 26, so that a straight and direct passage is provided from the entrance end of the nozzle to and through the discharge aperture 22 for discharging a stream of water axially of the nozzle and of the discharge aperture.

Preferably, a rotar 35 is rotatably mounted on the jet member 32 adjacent to the discharge side of boss 25 of the transverse partition wall 24. The rotor 35 may be mounted on the nozzle jet member by means of an anti-friction bearing indicated at 36, the inner race of the bearing being secured to the jet member 32 and the outer race portion thereof being secured to the rotor 35, with balls 36' rolling on and between the races, in a usual manner.

The rotor 35 is provided on its underside or entrance side with a series of blades 37, which may be radially disposed thereon, and the rotor 35 is preferably provided in its upper or discharge side with recessed portions 38 forming angular discharge ports 39 through the rotor.

Preferably, an annular chamber 40 is formed between the partition wall 24 and the wall 27', and surrounds the boss portion 25 in which the axial bore 26 is located, and a port 41 extends through wall 27' for providing communication between the valve chamber 27 and the annular chamber 40.

The partition wall may be provided on its discharge side with circumferentially arranged bosses 42, each having an angular passage 43 extending therethrough and providing communication between the annular chamber 40 and the discharge chamber 21 in the head member 10. The passages 43 are angularly disposed to the longitudinal axis of the nozzle so as to conduct fluid toward the underside or intake side of the rotor in such a way that the fluid will impinge upon the blades 37 to rotate the rotor and then discharge through the ports 39, during which the fluid is broken up into extremely small particles and the particles are given a rapid whirling movement and discharged angularly outward against the inner wall of the dome-shaped chamber 21.

The improved valve means for selectively closing off the passage 26 leading to passage 33 of the jet member 32 or for closing off the passage 41 which establishes communication between the entrance end of the nozzle and the passages 43 leading to the rotor, may include a cylindrical valve body 44 rotatably mounted in the valve chamber 27.

Preferably, a rubber sleeve or tube 45 is vulcanized or otherwise secured to the inner surface of the chamber 27, and the valve body 44 fits in the sleeve 45 with a close sliding fit. The sleeve and valve body fit tightly against the closed end of chamber 27, and the sleeve is provided with ports 26*a*, 30*a* and 41*a*, registering with passages 26, 30, and 41 respectively in the walls of the valve chamber.

The means for rotating the valve may include the handle 46 secured to a shank portion 47 which is located in the open end 28 of chamber 27, and the inner surface of shank portion 47 may be provided with an annular rib 48 for fitting against the end of sleeve 45.

The projecting annular wall of the open end 28 of the valve chamber may be provided with external threads indicated at 49 and a cap 50 may be screwed thereon for abutting the shoulder 51 on the shank portion 47 to force the rib 48 against the end of sleeve 45 and form a leak-proof seal around the valve body 44.

Preferably, a segmental rib 52 projects inwardly from the shank portion 47 and fits loosely in a slot 53 in the valve body 44, as best shown in Fig. 8, for providing a floating connection between the valve body and handle, so that the valve body is capable of slight movement relative to the shank caused by compression of the sleeve 45 when the valve is closed.

The valve body 44 is preferably provided with a plurality of passages for registering with ports 26*a*, 30*a* and 41*a* in the sleeve 45. The through passage A extends through the valve body 44 and provides communication between ports 26*a* and 30*a* when the valve is in the position of Fig. 2. The through passage B extends through the valve body and intersects passage A at the central portion thereof, and provides communication be-

tween ports 26a and 30a when the valve is in the position shown in Fig. 4. The passage C extends only half way through the valve body and communicates with passages A and B at the central portion of said valve body, so that passages C and A provide communication between ports 30a and 41a in the position of the valve shown in Fig. 4.

While I have illustrated and described a preferred embodiment of valve means, it will be understood that modified forms of valve means may be utilized for accomplishing the purposes of my invention, without departing from the scope of the invention as defined in the appended claims.

In the operation of the improved nozzle, assuming that it is connected with a pressure fluid supply such as the pipe 14, in the position of the valve 44, as shown in Fig. 4, the passage 26 is closed and the passages C and A connect ports 30a and 41a to provide communication between the entrance port 30 and passage 41. Hence fluid passing into the tail member 11 from pipe 14 will pass into annular chamber 40 and thence be conducted through passages 43 to impinge upon the blades 37 of rotor 35, as indicated by arrows in Fig. 7, to rotate the rotor on the bearing 36 at a high rate of speed.

As the rotor 35 rotates, the fluid will be broken up into particles and discharged from the ports 39 angularly and upwardly outward to form a rapidly whirling vortex, the particles of which impinge upon the inner surface of dome wall 20 in the discharge chamber 21. As indicated in Fig. 1, the whirling particles are further broken up and deflected by dome wall 20 until they finally issue from the restricted discharge aperture 22. Since the aperture 22 is outwardly flared the extremely fine whirling particles of fluid will issue therefrom in the form of a hollow cone-shaped fog, as indicated at 54 in Fig. 1, which rapidly expands and covers a relatively large volume.

Where a fire to be extinguished is burning substantially at the surface of a combustible mass, it has been found by actual test that the fog produced by the improved nozzle envelops and extinguishes the fire with greater rapidity and greater effectiveness than has been heretofore possible with prior types of nozzles and that the volume of water or other extinguishing fluid required is extremely low.

If the fire to be extinguished is one where a combustible mass is burning below the surface, so that it is desirable to have the extinguishing fluid penetrate beneath the surface of the mass, the operator of the improved nozzle has but to turn the handle 46 to rotate the valve to the position shown in Fig. 3, in which position passage B connects ports 30a and 26a and all of the pressure fluid entering the tail member 11 of the nozzle will pass directly through the axial fluid passage formed by passages 26 and 33 and issue out of the central portion of the discharge aperture in the form of a high velocity stream as indicated at 55 in Fig. 1.

When the handle 46 is turned to rotate the valve 44 to the position shown in Figs. 1 and 2, in which passages A and B provide communication between the port 30a and both the ports 26a and 41a some of the fluid entering the nozzle will issue in the form of a hollow cone-shaped fog and the remainder of the fluid will issue in the form of a high velocity stream in the center of the cone of fog, all as indicated in Fig. 1. With the valve in this position, the nozzle therefore becomes effective in extinguishing a fire which is burning at the surface of a mass and also substantially throughout the mass.

Obviously, by rotating the valve body 44 to bring one of the solid portions 56 or 57 over the port 30a, the nozzle will be entirely shut off. Thus the valve has four positions: one where the nozzle is completely shut off, one for discharging a stream only, one for discharging a fog only, and one for discharging a stream and fog simultaneously.

The improved nozzle is adapted to be operated by any and all persons in extinguishing various types of fires, and is particularly applicable to use in extinguishing relatively small household fires of waste paper and the like, because such fires can be extinguished almost immediately with such a very small amount of water or other fluid that a minimum of damage results.

The improved nozzle is light in weight and easily handled and operated, and is adapted to be quickly and easily connected to any portable or stationary pressure fluid line.

I claim:

1. Nozzle construction including a housing having an entrance end and a discharge end, walls forming a discharge chamber in the discharge end and provided with a discharge aperture, rotor means for breaking up fluid passing into the entrance end into particles and imparting whirling movement thereto, said rotor means being adapted to direct said whirling particles into the discharge chamber for being discharged from the discharge aperture, and walls forming a fluid passage leading directly from said entrance end to said discharge aperture.

2. Nozzle construction including a housing having an entrance end and a discharge end, walls forming a discharge chamber in the discharge end and provided with a discharge aperture, rotor means for breaking up fluid passing into the entrance and into particles and imparting whirling movement thereto, said rotor means being adapted to direct said whirling particles into the discharge chamber for being discharged from the discharge aperture, walls forming a fluid passage leading directly from the entrance end to said discharge aperture, and valve means for closing said fluid passage.

3. Nozzle construction including a housing having an entrance end and a discharge end, the discharge end being provided with a discharge aperture, rotor means for breaking up fluid passing into the entrance end into particles and imparting whirling movement thereto, said rotor means being adapted to direct said whirling particles into the discharge end of said housing for being discharged from said discharge aperture, walls forming a fluid passage leading directly from said entrance end to said discharge aperture, and single valve means for selectively closing said fluid passage or closing off said whirl imparting means from said entrance end.

4. Nozzle construction including a housing having an entrance end and a discharge end, walls forming a discharge chamber in the discharge end provided with a discharge aperture, a rotor rotatably journalled in the housing, means for directing fluid passing into said entrance end toward said rotor for rotating the same, the rotor being provided with ports for discharging whirling fluid particles into said discharge chamber, and walls forming a fluid passage leading directly from said entrance end to said discharge aperture.

5. Nozzle construction including a housing having an entrance end and a discharge end, walls forming a discharge chamber in the discharge end provided with a discharge aperture, a rotor rotatably journalled in the housing, means for directing fluid passing into said entrance end toward said rotor for rotating the same, the rotor being provided with ports for discharging whirling fluid particles into said discharge chamber, walls forming a fluid passage leading directly from said entrance end to said discharge aperture, and valve means for selectively closing said fluid passage or closing off fluid passing to the rotor.

6. Nozzle construction including a housing having an entrance end and a discharge end, walls forming a discharge chamber in the discharge end provided with a discharge aperture, a rotor rotatably journalled in the housing, means for directing fluid passing into said entrance end toward said rotor for rotating the same, the rotor being provided with ports for discharging whirling fluid particles into said discharge chamber, the walls of said discharge chamber being adapted to cause the whirling particles to issue from said discharge aperture in the form of a hollow cone, and walls forming a fluid passage leading directly from said entrance end of the housing to said discharge aperture for discharging a fluid stream within the central portion of said hollow cone.

7. Nozzle construction including a housing having an entrance end and a discharge end, walls forming a discharge chamber in the discharge end provided with a discharge aperture, a rotor rotatably journalled in the housing, means for directing fluid passing into said entrance end toward said rotor for rotating the same, the rotor being provided with ports for discharging whirling fluid particles into said discharge chamber, the walls of said discharge chamber being adapted to cause the whirling particles to issue from said discharge aperture in the form of a hollow cone, walls forming a fluid passage leading directly from said entrance end of the housing to said discharge aperture for discharging a fluid stream within the central portion of said hollow cone, and valve means for closing said fluid passage.

8. Nozzle construction including a housing having an entrance end and a discharge end, walls forming a discharge chamber in the discharge end provided with a discharge aperture, a rotor rotatably journalled in the housing, walls forming passages for conducting fluid toward said rotor for rotating the same, the rotor being provided with ports for discharging whirling fluid particles into said discharge chamber, walls forming a port providing communication between said entrance end of the housing and said fluid conducting passages, walls forming a fluid passage leading directly from said entrance end to said discharge aperture, and valve means for selectively closing said direct fluid passage or the port communicating with said fluid conducting passages.

JOHN C. SCHELLIN.