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NOZZLES

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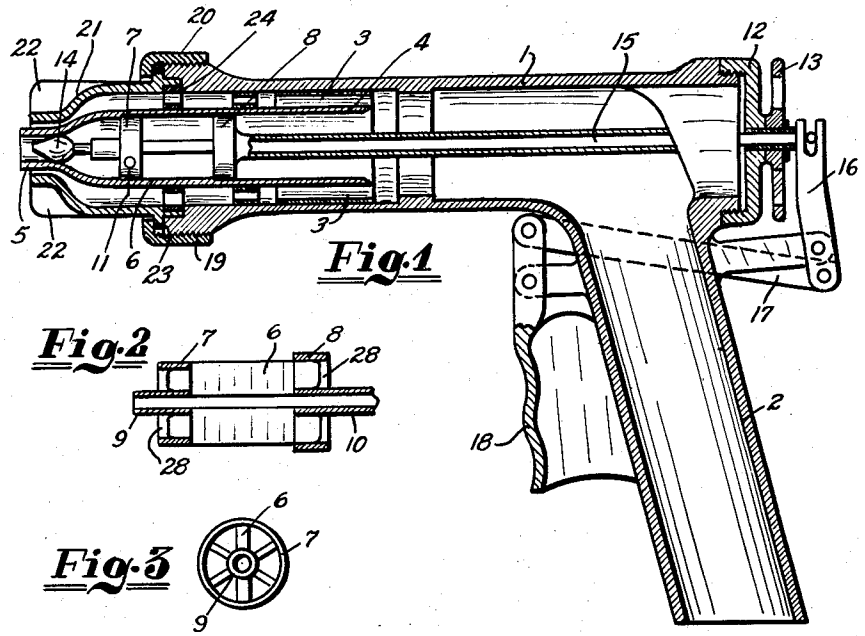



Fig. 1




Fig. 2




Fig. 3

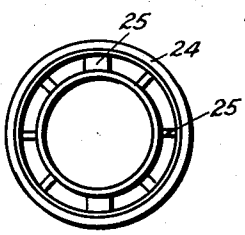



Fig. 5

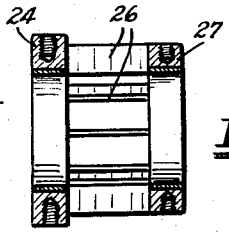



Fig. 4

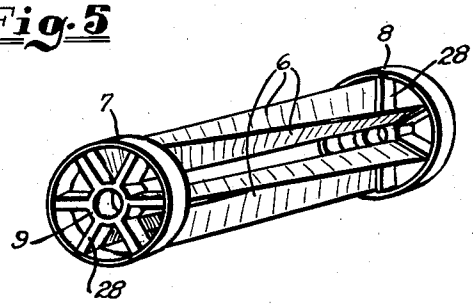



Fig. 6

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2,844,408

# NOZZLES

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7 Claims. (Cl. 299—120)

This invention relates to nozzles, and is concerned with a spray nozzle which is particularly suitable for fire extinguishing purposes.

For atomising a jet of liquid issuing from the mouthpiece of a jet pipe, it is known to produce with the jet pipe two intersecting jets of liquid concentric to one another. Also, it is known to provide a twist-imparting device in the passage along which the inner jet travels and to make the gap width of the outer passage adjustable in order to make it possible to vary the angle of opening of the spray jet. Apart from the possibility of varying the angle of opening, these known constructions are set in a fixed condition and cannot be further adapted to actual prevailing requirements. However, not only do the conditions vary very much with each particular fire, but it very often happens that even in dealing with one outbreak of fire the fineness of the sprayed jet, the angle of opening or both have to be varied during the course of the extinguishing as the fire develops, in order to obtain the best extinguishing effect with a minimum expenditure of extinguishing medium. It is also often necessary to compensate at the nozzle of the jet pipe for fluctuations in delivery pressure.

According to the invention there is provided a nozzle for atomising liquids, comprising means defining an outer flow passage, means defining an inner flow passage, the flow passages being concentric one with the other, and two twist-imparting devices disposed one in each such flow passage for imparting a twisting movement to medium flowing through the nozzle.

The twist-imparting devices are advantageously made so adjustable that the direction of twist which is imparted can be reversed through a neutral position. It is also expedient to make the outlet cross-sections of the two passages adjustable, the inner passage being advantageously controlled by an adjustable Pelton needle which makes the said inner passage an annular nozzle, and which stabilises the inner annular jet. Thus not only is it possible for the liquid issuing from each passage to be adjusted in quantity independently, but it is also possible to adjust the direction of twist of each jet as desired, so that, starting from a full jet, it is possible to obtain by adjustment any desired spray jet of any desired opening, fineness of spray and range.

For a better understanding of the invention, and to show how the same may be carried into effect, reference will now be made to the accompanying drawings, in which:

Figure 1 is an axial sectional view of a regulatable nozzle in the form of a spray-gun,

Figure 2 is an axial sectional view of part of the nozzle,

Figure 3 is a front view of the part shown in Figure 2,

Figure 4 is an axial sectional view of another part of the nozzle,

Figure 5 is a front view of that shown in Figure 4, and



Figure 6 is a perspective view of the part shown in Figures 2 and 3.

Referring now to the drawings, there is shown a regulatable nozzle in the form of a spray-gun, the gun comprising a jet pipe **1**, and a shaft **2** which serves for connecting the nozzle to a pipe supplying the medium which is to be ejected. A tubular piece **4** is guided in the outlet end of the pipe **1** by means of radial ribs **3**, and the tubular piece **4** terminates in a nozzle mouthpiece **5**. A twist-imparting device **6** is situated in the tubular piece **4**, and consists of six blades **6** of a flexible material which form a guide assembly in the tubular piece **4**. The blades **6** are held at one end in a ring **7** and at the other end in a ring **8**, each of which rings has a central hub **9** and **10** respectively, the hubs **9** and **10** being connected fast to the rings **7** and **8** respectively by spokes **28**. The front ring **7** is held secure against rotation in the tubular piece **4** by grub screws **11**. The hub **10** of the rear ring **8** extends through a fluid-tight seal in a closure cover **12** of the jet pipe **1**, and carries at its free end a hand wheel **13** which can be provided with means for locking the wheel **13** with respect to the cover **12**. By turning the hand wheel **13**, the ring **8** and thus the blades **6** can be turned in either direction from a neutral middle position, where the blades extend in the direction of flow through the nozzle, in such a manner as to impart to the blades **6** a twist of any desired pitch so that the jet of liquid passing through the tubular piece **4** can be given any desired twisting movement.

The two hubs **9** and **10** are hollow, and serve to guide an adjusting rod **15** which is provided with a head **14** and which is connected by a lever mechanism **16**, **17** to a hand lever **18** mounted on the shaft **2**, the mechanism **16**, **17** being adapted to displace the rod **15** in the axial direction of the jet pipe **1**. The head **14** which is constructed in the manner of a Pelton needle controls the passage of the medium through the nozzle mouthpiece **5**. The Pelton needle assembly **14**, **15** thus carries out quantity regulation by varying the free annular cross-section of the mouthpiece **5**, the pressure in the mouthpiece **5**, however, remaining constant. The head **14** is rounded at its end in order to stabilise the direction of twist.

The jet pipe **1** is provided at its end with external screw-threading **19** and carries thereon a retaining nut **20** which holds in place an outer nozzle mouthpiece **21**. The outer nozzle mouthpiece **21** is freely rotatable and is provided with two operating lugs **22**, there being a spacer ring **23** preventing the mouthpiece **21** from being clamped fast when the retaining nut **20** is tightened.

The mouthpiece **21** carries a double ring **24** which has ribs **25**, flexible blades **26** extending from the ribs **25** to a double ring **27** disposed around the tubular piece **4**. Thus by rotating the nozzle mouth piece **21**, the blades **26** can be twisted from a neutral middle position which does not influence the passage of the through-flowing liquid, since the blades **26** extend in the direction of flow through the nozzle, in either direction so as to give the blades **26** a desired pitch, whereby a desired twisting movement can be imparted to the liquid passing through the outer annular chamber formed between the mouthpieces **5** and **21**.

When the nozzle is closed, the mouthpiece **5** closes the opening in the mouthpiece **21**, and the head **14** closes the opening in the mouthpiece **5**. The distance over which the needle **14**, **15** can be displaced is limited by abutment of the head **14** on the hub **9**. When the hand lever **18** is operated, the inner annular passage is first of all opened, and if when the head **14** abuts against the hub **9** the hand lever **18** is moved further, the rod **15** then entrains the tubular piece **4** so that the

passage between the two nozzle mouthpieces **5** and **21** is opened up to a greater or less degree. Therefore a quantity of liquid issuing from the outer annular nozzle **5, 21** can be adjusted according to requirements.

We claim:

1. A nozzle for atomising liquids, comprising means defining an outer flow passage, means operatively associated with the first said means and defining an inner flow passage, the flow passages being concentric one with the other, and two twist-imparting devices disposed one in each such flow passage for imparting a twisting movement to a medium flowing through the nozzle, and adjusting means operatively associated with said twist imparting devices for varying the twist imparted by each of said devices, such adjusting means being adapted for varying the twist in different directions from a neutral position in which the devices impart no twist to the medium flowing through the nozzle.

2. A nozzle as claimed in claim 1, comprising further means operatively associated with the passage defining means for altering the cross-sectional areas of the flow passages.

3. A nozzle as claimed in claim 2, wherein said further means includes a Pelton needle provided for controlling the inner flow passage, the head of said needle being rounded.

4. A nozzle as claimed in claim 2, wherein each of said twist-imparting devices comprises a turnable adjusting member at one end of the passages and a plurality of flexible blades, which extend axially and generally radially of their respective flow passage, the blades being fixedly secured at the other end of the passages and held in said turnable adjusting member.



5. A nozzle as claimed in claim 4, comprising a stationary hub and ring at said other end and a turnable hub and ring at said one end and wherein the blades of the inner passage are secured by said stationary hub and ring and said turnable hub and ring, the hubs being hollow for receiving the shank of the Pelton needle, and the hub of the turnable ring including a handle wheel for adjustment.

6. A nozzle as claimed in claim 5, comprising a tubular piece operatively associated with the first said means and wherein the inner flow passage is defined by said tubular piece which is axially displaceable and which is adapted to close the outer flow passage, the Pelton needle being movable and being adapted to entrain the tubular piece, when the needle is displaced beyond a position where it fully opens the inner flow passage, thereby to open the outer flow passage.

7. A nozzle as claimed in claim 6, wherein the tubular piece is fixed against rotation, and wherein the nozzle includes a turnable mouthpiece for defining at least part of the outer flow passage, the blades of the outer twist-imparting device being disposed between said mouthpiece and said tubular piece.

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