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JET-NOZZLES

2 Sheets-Sheet 1

FIG. 1

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JET-NOZZLES

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2 Sheets-Sheet 2

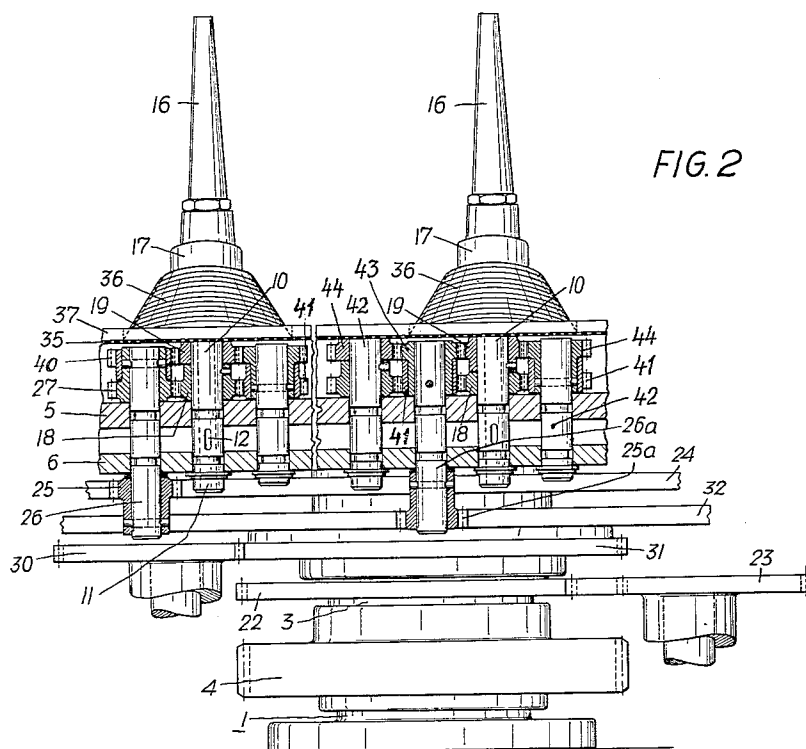


FIG. 2

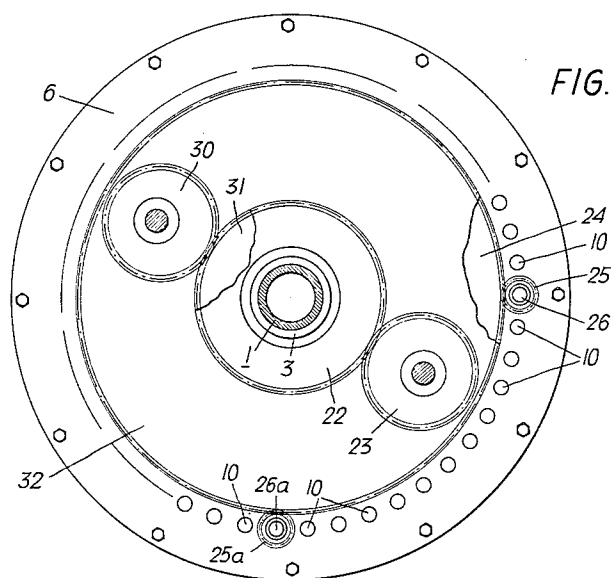


FIG.3

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JET-NOZZLES

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5 Claims. (Cl. 239—227)

The present invention relates to a jet-nozzle which can be guided in a number of ways and which is particularly suitable for the erection of fountains or for the play of waterworks but which can also be used for other applications in which a jet of water has to be guided in different directions, as, for example, in fire-fighting.

It is one object of the present invention to provide a jet nozzle, the controllability of which is ensured by the fact that a conduit leading to the actual nozzle is in the form of two pipe-bends, one of which is affixed to the water-supply pipe and the other is rotatably mounted on the first bend and of which each has its own separate rotary drive. The rotation of one bend about the axis of one arm of this bend causes the other arm of the bend to describe a cone, and the same applies to the second bend, so that when the appropriate conical angle is selected the jet can be guided to all points of a spherical segment. If the two parts are caused to rotate, the jet of water can be caused to perform the most widely varying movements, by varying the speed and direction of rotation.

With this and other objects in view which will become apparent in the following detailed description, the present invention will be clearly understood in connection with the accompanying drawings, in which:

FIGURE 1 is a central vertical section through the fountain together with its drive;

FIG. 2 is a section along the lines II—II of FIG. 1; and

FIG. 3 is a section along the lines III—III of FIG. 1.

Referring now to the drawings to a fixed water-supply pipe-socket 1, which at the same time serves as a pivot, there is affixed by means of the roller-bearing 2, a pipe 3, the latter having at the bottom a spur-wheel rim 4 and at the upper extremity a disc-shaped hollow body 5 through which the water fed in centrally is guided to the periphery. The disc-shaped hollow body 5 consists of a lower disc 6 and an upper disc 7, the discs 6 and 7 being screwed together at their outer edge. In the center the disc 7 has an assembly-boring which is sealed by a screwed-on cover 8.

The outer periphery of the disc-shaped body 5 carries rotatably mounted thereon a considerable number of jet-nozzles, say eight or twelve. These jet-nozzles consist of a hollow bolt 10 which is closed at the bottom by a screw 11 and which has a lateral inlet-aperture 12 through which the water flows in from the hollow body 5. The hollow bolt 10 takes the form of an obtuse-angled pipe-bend because, in the upper part, it has an obliquely mounted pipe 13. On this pipe 13 there is rotatably mounted a further obtuse-angled pipe 14 and 15 and this terminates in the actual jet-nozzle. The two pipes 13 and 14 are surrounded by a screw-threaded socket 17 and are sealed off from the outside. To enable the bend 10 and 13 to be driven in rotation, the hollow bolt 10 has a small rigidly mounted cog wheel 18. Above the cog wheel 18 a further cog wheel 19 is mounted, so that it can be loosely rotated on the hollow bolt 10, and the cog wheel 19 bears a second conical toothed rim 20 which engages with a suitable conical toothed rim 21 situated on the internal end of the pipe 14. The rotation of the cog wheel 18 causes the pipe 13 to describe a cone open at the top, and the rotation of the cog wheel 19 causes the pipe 15 and with it the jet-nozzle 16 to describe a cone open at the top, about the common

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axis of the pipes 13 and 14, so that the two conical movements are added together.

In a system of this kind, the rotation of the two cog wheels 18 and 19 enables the jet of water to be guided to any point on a spherical segment which is defined by the vertical opposie angle α .

For the rotary drive of the cog wheels 18 and 19 the following method has been adopted:

On the pipe 3 is mounted, loosely rotatable, a spur-wheel 22 which has the same pitch-diameter as the cog wheel 4 and which receives its rotary drive from a fixed spur-wheel 23 and which is keyed together with a cog wheel 24 which engages with a pinion 25. The latter is mounted on a shaft 26, which is rotatably mounted between two hollow bolts 10 on the two discs 6 and 7 of the hollow body 5 and which is provided at the top with a pinion 27 disposed at the level of the cog wheel 18.

A pinion 40 is rotatably mounted on the shaft 26 above the pinion 27 at the level of the cog wheel 19. The pinion 27 engages on one side one of a plurality of pinions 18 disposed about the entire periphery and mounted on one of the hollow shafts 10 and on the other side one of a plurality of pinions 41, each of which is mounted on a corresponding pin 42 loosely rotatably in the two discs 5 and 6. The pinion 41 drives, over another pinion mounted on a loosely rotatable pin, one of the pinions 18 which is mounted on a hollow shaft 10 and so on over the entire periphery of the disc 7. Thus a closed rim of interengaging pinions is provided, wherein all the pinions 18 and the corresponding hollow shafts 10 turn in the same direction, upon driving the spur-wheel 23. The drive of the pinions 18 can be arranged also in alternately opposite directions by adding or deleting of intermediate gears. It is quite apparent that the same driving effect can also be obtained, for example, by means of a chain which passes over the pinions 18 either on the outside or partly on the outside and partly on the inside.

For the drive of the cog wheels 19, an exactly analogous system has been provided which comprises a driving toothed gear 30, a gear 31 mounted on the hub of the gear 22, a gear 32 secured to the gear 31 and a pinion 25a, shown in FIGS. 2 and 3, which pinion 25a is mounted on a shaft 26a supported by the discs 5 and 6 and carrying at its upper end, at the level of the cog wheel 19, a pinion 43. Below the pinion 43 a cog wheel 41 is loosely rotatably mounted at the level of the cog wheel 18, the latter being a part of the lower gear circle.

The pinion 43 engages directly on one side with one of the cog wheels 19 and drives on the other side, in a manner analogous to that of the pinion 40, as set forth above, the next adjacent of the cog wheels 19 disposed about the periphery by means of two intermediate gears 44, and so on, until the entire circle is closed.

It should be noted that the drive of the cog wheels 18 and that of the cog wheels 19 are entirely independent of each other and have no effect on each other. It should also be noted that the disc 5 bearing the jet-nozzles can also be set in rotation by the cog wheel 4, in which case the pinion 25 and also the pinion which engages with the cog wheel 32 roll over these cog wheels 24 and 32, even if the latter are held rigid, and thus receive a rotary drive which, if necessary, can be compensated and reduced to zero by suitably driving the cog wheel 24 or 32 in the same direction.

A suitable means of driving the cog wheels 4, 23 and 30 is a separate slow-moving electric motor preferably allowing of variation of speed and reversal of direction, or a motor with a steplessly variable secondary gearing. The electric motors are electrically controlled by a "controller" (not shown), likewise motor-driven, so that if the controller is suitably adjusted the individual drives can be started

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or stopped or caused to run more slowly or more quickly, or the direction of rotation can be reversed so that an infinite variation can be obtained in the movements of the water-jets.

The lower edge of the disc 5 is provided with a rim 34 which extends obliquely upwards and which is seen in cross section. The resulting cavity 28 accommodates the driving-elements 18, 19, 27, 40, 41, 43 and 44 and is covered at the top by a perforated plate 35 which gives access to water but which keeps out any coarse impurities. The driving-elements 20 and 21, extending above the perforated plate 35, are surrounded by an elastic bellows-device 36 the purpose of which is to ensure the necessary mobility for the jet-nozzle and the edge of which is secured by a ring 37 attached to the perforated plate 35.

For other purposes, e.g. for guiding the jet in the case of fire-fighting, the two bends of the controllable jet-nozzles do not receive any permanent rotary drive and the driving-devices are only used for adjusting the jet-nozzle to the desired direction. For this purpose the jet-nozzle is provided with worm-wheels, for example, in place of cog wheels and these worm wheels can be operated from the foot of the fire-engine via suitable worms, e.g. via telescopically extending shafts, while the controllable jet-nozzle is situated at the top of a mast which can be likewise extended telescopically. In this case the use of a ladder is unnecessary, and the fireman has no climbing to do, as the jet of water can be remote-controlled from the ground, e.g. by the operation of two cranks.

While I have disclosed one embodiment of the present invention, it is to be understood that this embodiment is given by example only and not in a limiting sense, the scope of the present invention being determined by the objects and the claims.

I claim:

1. A controllable jet-nozzle, particularly for water plays, comprising
 - at least one nozzle,
 - a first pipe bend carrying said nozzle,
 - a second pipe bend,

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said first pipe bend being rotatably mounted on said second pipe bend,

a body adapted to feed water through said second and first pipe bends to said nozzle,

said second pipe bend being rotatably mounted on said body, and

means for driving said first and second pipe bends independently from each other.

2. The jet-nozzle, as set forth in claim 1, wherein said pipe bends are bent for an obtuse angle.

3. The jet-nozzle, as set forth in claim 1, which includes a first toothed gear secured to said second pipe bend and constituting a part of said driving means for said second pipe bend,

a second toothed gear loosely rotatably mounted on said second pipe bend and constituting a part of said driving means for said second pipe bend,

a first bevelled gear rigidly connected with said second toothed gear, and

a second, bevelled gear rigidly secured to said first pipe bend and engaging said first bevelled gear.

4. The jet-nozzle, as set forth in claim 1, wherein said body comprises a hollow disc member, said driving means include means for driving said hollow disc member,

a plurality of said nozzles supported by said hollow disc member and disposed on said hollow disc member about at least one circle, and

a feeding conduit leading into said hollow disc member.

5. The jet-nozzle, as set forth in claim 4, which includes a shaft rotatably mounted on and projecting upwardly and downwardly from said hollow disc member and carrying upper and lower gears to constitute part of said driving means for said first and second pipe bends.

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