(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 070 955**
A2

(12) # EUROPEAN PATENT APPLICATION

(21) Application number: 81830182.2

(22) Date of filing: 02.10.81

(51) Int. Cl.³: B 05 B 13/04
B 05 B 13/00

(30) Priority: 31.07.81 IT 4902281

(43) Date of publication of application:
09.02.83 Bulletin 83/6

(84) Designated Contracting States:
AT BE CH DE FR GB LI NL SE

(71) Applicant: Soc. SOLES r. 1.
Strada S.S. Km 333+500
I-62016 Porto Potenza Picena (MC)(IT)

(71) Applicant: Soc. COSTRUZIONI MECCANICHE C.M.C. di Cognigni, Battistelli & Co.
Via Varco
I-62018 Potenza Picena (MC)(IT)

(72) Inventor: Sagripanti, Marino
Via Santa Caterina 12
I-62010 Montecosaro -(MC)(IT)

(72) Inventor: Cognigni, Silvano
Corso Vittorio Emanuele 99
I-66018 Potenza Picena (MC)(IT)

(74) Representative: Mascioli, Alessandro, Prof.Dr.
c/o A.N.D.I. Associazione Nazionale degli Inventori Via Lima, 35
I-00198 Roma(IT)

(54) **Spraying machine for painting shoe bottoms.**

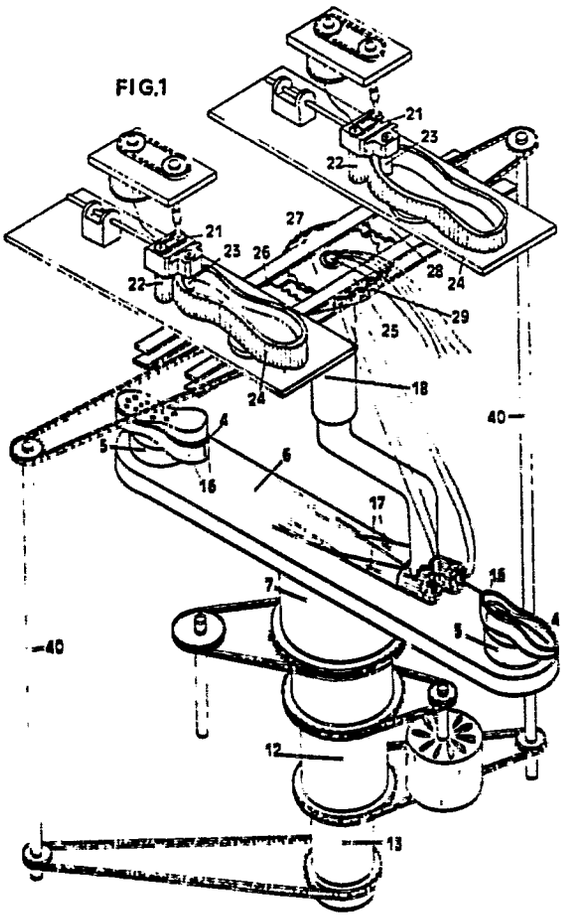
(57) Spraying machine for painting polyurethane shoe bottoms, characterized by complete, constant and uniform distribution of the paint on each piece, in particular on the lateral surface.

EP 0 070 955 A2

./...

Croydon Printing Company Ltd

FIG.1



0070955

Spraying machine for painting shoe bottoms

Marino SAGRIPANTI - Silvano COGNINI

This invention concerns a spraying machine for painting shoe bottoms equipped with a pantographic system of asynchronous contemporary movements of both bottoms and spray guns.

There currently are several machines known for the industrial painting of polyurethane shoe bottoms, some characterized by the presence of a series of aligned spray guns or sprayers to spray the side surfaces of said soles. The soles rotate completely around while they move in a straight line on a conveyor in fornt of the spray nozzles, with a spray gun at the end to spray the paint on the soles.

In other existing machines said bottoms are arranged by the operators at the end of an arm rotating about a central axis. When they enter the working area, they are sprayed with two spray guns which contemporaneously describe an acr of a circle around each bottom to paint the side surfaces. Meanwhile, another spray gun in a successive position of said rotating arms distributes the paint on the bottoms.

In all the above machines, however, the paint is distributed unevenly on the side surfaces, since the dis-

tance of the spray nozzles from said surfaces varies continuously as a function of the irregular shapes of the bottoms. Consequently, the jet is perpendicular to the surface only at some points on the perimeter, while, in particular corresponding to the toe and heel, the jet is considerably inclined. This prevents uniform distribution of the paint, and so a continuous and regular colouration of the entire piece.

Said machines are also costly and bulky, with long down times for regulation because of the presence of numerous spray guns as well as high paint consumption. Thus the colour cannot be changed quickly, even though this is a highly differentiated industrial production.

The purpose of this invention is to realize a spraying machine for painting polyurethane shoe bottoms, characterized by a complete, constant and uniform distribution of paint on each piece, in particular on the lateral surface. Said machine must offer reasonable cost, minimum bulk, extremely reduced maintenance, regulation and cleaning times, low paint consumption, and the possibility of very rapidly changing colour. Also, it must require the operator to always paint the right and then the left piece, so that the colour of each pair is identical.

The purpose is achieved with a spraying machine equipped with a pantographic system of asynchronous contempora-

neous movements, in which one movement is given by the rotation of the sole being painted held in a suitable toecap support, consisting of two pneumatically separable portions, and the other is given by the paint spray guns.

The machine according to this invention has a spraybooth containing a beam rotating about its vertical symmetry axis, with two small columns which also rotate, operated by chains inside the beam itself. Said columns are placed in motion by independently rotating shafts arranged telescopically in the beam rotation axis, where a system of gaskets and grooves forms six compressed air pipes. Said pipes are caught in the central axis and distributed to the two small columns at the end of the beam, in order to power the pneumatic connectors holding the toecaps where the sole to be painted is placed. Said toecaps are also heated electrically by means of a system of brushes and isolated conductors, in order to dry the paint. When the paint does not reach the lower edge of the sole, two tone painting is possible.

Above said beam inside the spraybooth are two or three spray guns or sprayers, depending on the desired finishing, moved by a small alttice coming down from the top and anchored in the pantographic system located above said spraybooth. Said system measures the movement of two templates reproducing the right and left shapes of the soles being painted and transmits it not

only to the small sprayer-bearing lattice but also to the small sole-supporting columns.

Connected to the axis of rotation of said templates are plate wheels which transmit motion to the small columns, while a cam is connected with the same axis which, at the end of each revolution, interacts with a travel end which stops all movement, interrupting the oil flow to the hydrodynamic motor by means of an electro-valve.

The outside cogged surface of said templates engage two cogged needle-roller motors which, coupled with a loose roller inside the same templates, form pincers in continuous pressure with the templates; copier heads are anchored in an oscillating fashion by means of a fork on the point of a raft which can slide along on two ball bearings. The axes of the two motor needle rollers emerge from the upper end of the two heads; when one is turned, a chain brings the other into motion as well. Above the templates and copier heads are the hydraulic motors which, through a universal joint transmission bring the motor rollers into motion. Said rollers engage the cogged templates to give rise to the movements necessary during the spraying phase of the spray guns.

The invention is represented in a purely illustrative fashion in the enclosed drawings, figures 1-10.

Figure 1 shows an axonometric view of a general scheme of the machine.

Figure 2 is an external view of the machine complete with feed reservoirs for the paint and blow-down tanks.

Figure 3 shows a lateral view of the clutch device for the pantographic movement.

Figure 4 shows an axonometric view of the pantographic carriage.

Figure 5 shows a lateral section of the toecap-bearing beam.

Figure 6 shows a lateral section of the beam-bearing shaft.

Figure 7 shows an upper and cut-away view of the transverse arm of said beam.

Figure 8 shows a lateral section of the toecap-bearing columns.

Figures 9 and 10 show axonometric and vertical section views of the paint reservoir, respectively.

In the drawings, booth 1 is indicated, which can be affixed to a conveyor, equipped with a control panel 2,

of electro-hydropneumatic controls of known type in front of which the operator sits protected by a plastic sheet 3 shaped so as to allow lateral entrance and exit of toecaps 4, carrying the manually placed soles. Said toecaps are placed at the tops of columns 5 at the ends of beam 6, rotating around central shaft 7. In the bottom of said booth 1, water continuously washes down the traces of paint from the spray operations and collects in the blowdown basin 10.

Said columns 5 are operated by chains 11 which are placed in motion by the independently rotating telescopic small shafts 12 and 13 placed in the central shaft 7, where the gasket 14 and groove 15 system forms six pipes for compressed air. Distributed to columns 5, these activate pneumatic connector 16 of the sole-bearing toecaps 4. Central spray gun 17 is placed at the lower end of lattice 18 which is placed in motion so as to exactly follow always in a perpendicular sense the side surface of the soles to be painted, following insertion of the piston-cotter pin 19 in bushing 20. In this way they follow the movements of the copier heads 21, from the top of which emerge the axes of the two cogged needle rollers 22, which with neutral roller 23 make up the copier pincers in continuous pressure with templates 24.

Carriage 25 is underneath said templates 24 and heads 21, running on longitudinal guides parallel to the sliding axis of the head-bearing rafts 31. It consists of

two plates, preferably alluminum, inside of which are the plate wheels 26, 27 and 28, each with the same number of cogs, connected by chain 29, with wheel drape 30.

The two side wheels 26 and 28 have their axis coincident with that of the bushings of the head above carriage 25; the piston-cotter pin 19, passing through raft 31, controled by a pneumatic piston 32, behaves such that, depending on the right or left movement of the template 24, it can engage head 21. In that moment of engagement, wheel 26 or 28 is also moved and, fixed to carriage 25, takes the longitudinal movements from the carriage from the head to which it is joined. It also takes the angular movements of the head and transmits them to the other wheels, such that since the small lattice 18 is anchored to central wheel 27, sprayers 17 are angularly moved, while the wheel opposite the involved one turns in neutral since the piston cotter pin 19 remains out for the entire period in which the opposite head is in function.

Moreover, next to booth 1 there are three reservoirs 33 which feed paint sprayers 17 under pressure using suitable tubing. The central one contains solvent for washing, while the two side ones both contain paint, for contemporaneously spraying two colours or for holding one as reserve while the other feeds. Said reservoirs are equipped with concave covers 34, readily remove-

able by means of the single central screw 35 (or wheel), with o-ring sealing gaskets 36, with reducers 37 for continuous mixing of the contents, controlled heaters 38 to hold the paint temperature constant (25°-35°C) and cart 39, which allows a single person to move it even when fully loaded.

In the machine according to this invention, the cam shafts 40 mechanically distribute the commands from the panel or control center 2.

The machine functions as follows: by pressing the buttons on panel 2, the operator opens toe-cap 4 and inserts a polyurethane shoe bottom in it; a second command (possibly by foot pedal) locks it in place. When the start button is pressed, the beam 6 describes a 180° arc and carries the piece to be painted into the booth 1. Just before beam 6 stops, one of the cam shafts 40 automatically opens the toecap 4 that is coming down. As soon as beam 6 stops, the spraying phase begins with the rotation of the polyurethane soles on columns 5 and the movement of the spray guns 17, as well as any other side one. Contemporaneously with the above phase, the operator inserts a new sole (right if the first were left) in toecap 4. The latter remains open until it is closed automatically by one of the cam shafts 40, which hits a contact just before the sole in rotation for the painting phase stops, while an electircal impulse is also sent which, collected by a relay and a timed re-

tard switch, returns the automatic restart impulse.

Of course, while the principle of the finding remains the same, the forms of realization and the details of construction may be widely varied from those described and illustrated here, without going beyond the bounds of this invention.

Claims:

1. Spraying machine for painting shoe bottoms equipped with a pantographic system of asynchronous contemporaneous movements, in which one movement is given by the rotation of the sole being painted held in a suitable toecap support, consisting of two pneumatically separable portions, and the otheriis given by the paint spray guns.

2. Spraying machine as claimed in claim 1, consisting of a spraybooth containing a beam rotating about its vertical symmetry axis, with two small columns which also rotate, operated by chains inside the beam itself; said columns are placed in motion by independently rotating shafts arranged telescopically in the beam rota tion axis, where a system of gaskets and grooves forms six compressed air pipes; said pipes are caught in the central axis and distributed to the two small columns at the end of the beam, in order to power the pneumatic connectors holding the toecaps where the sole to be painted is placed; said toecaps are also heated electrically by means of a system of brushes and isolated conductors, in order to dry the paint; when the paint does not reach the lower edge of the sole, two tone painting is possible.

3. Spraying machine as claimed in the preceding claims, wherein two or three spray guns or sprayers, depending

on the desired finishing, are moved by a small lattice coming down from the top and anchored in the pantographic system located above said spraybooth; said system measures the movement of two templates reproducing the right and left shapes of the soles being painted and transmits it not only to the small sprayer-bearing lattice but also to the small sole-supporting columns.

4. Spraying machine as claimed in claim 2, with booth 1, equipped with a control panel 2, of electro-hydro-pneumatic controls of known tupe in front of which the operator sits protected by a plastic sheet 3 shaped so as to allow lateral entrance and exit of toecaps 4, carrying the manually placed soles; said toecaps are placed at the tops of columns 5 at the ends of beam 6, rotating around central shaft 7; in the bottom of said booth 1, water continuously washes down the traces of paint from the spray operations and collects in the blow-down basin 10.

5. Spraying machine as claimed in the preceding claims, wherein said columns 5 are operated by chains 11 which are placed in motion by the independently rotating telescopic small shafts 12 and 13 placed in the central shaft 7, where the gasket 14 and groove 15 system forms six pipes for compressed air; districuted to columns 5, these activate pneumatic connector 16 of the sole-bearing toecaps 4.

6. Spraying machine as claimed in the preceding claims, wherein central spray gun 17 is placed at the lower end of lattice 18 which is placed in motion so as to exactly follow always in a perpendicular sense the side surface of the soles to be painted, following insertion of the piston-cotter pin 19 in bushing 20; in this way they follow the movements of the copier heads 21, from the top of which emerge the axes of the two cogged needle rollers 22, which with neutral roller 23 make up the copier pincers in continuous pressure with templates 24.

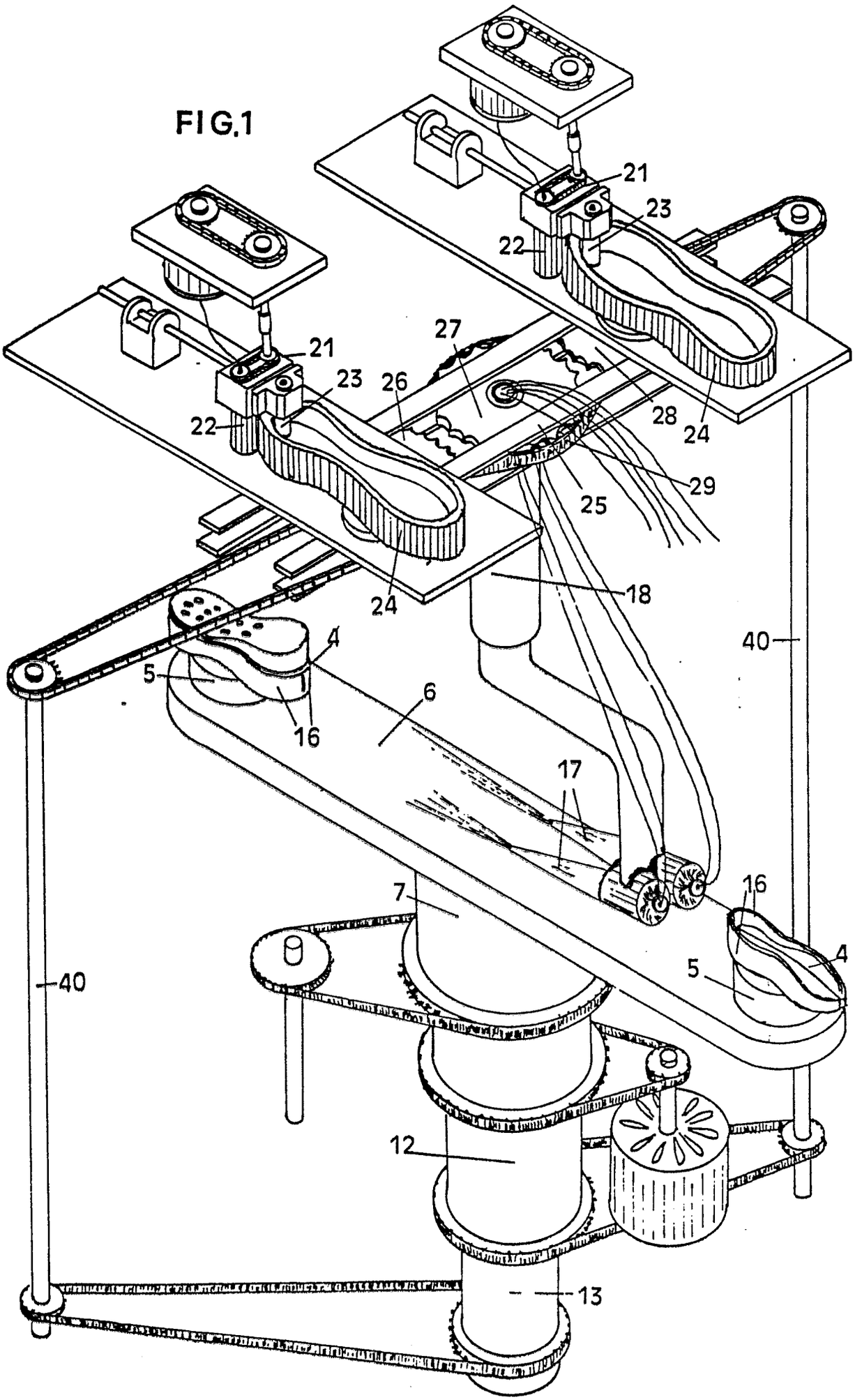
7. Spraying machine as claimed in the preceding claims, wherein carriage 25 is underneath said templates 24 and heads 21, running on longitudinal guides parallel to the sliding axis of the head-bearing rafts 31; it consists of two plates, preferably alluminum, inside of which are the plate wheels 26, 27 a,d 28, each with the same number of cogs, connected by chain 29, with wheel drape 30.

8. Spraying machine as claimed in the preceding claims, wherein the two side wheels 26 and 28 have their axis coincident with that of the bushings of the head above carriage 25; the piston-cotter pin 19, passing through raft 31, controled by a pneumatic piston 32, behaves such that, depending on the right or left movement of the template 24, it can engage head 21; in that moment of engagement, wheel 26 or 28 is also moved and, fixed to carriage 25, takes the longitudinal movements from

the carriage from the head to which it is joined; it also takes the angular movements of the head and transmits them to the other wheels, such that since the small lattice 18 is anchored to central wheel 27, sprayers 17 are angularly moved, while the wheel opposite the involved one turns in neutral since the piston cotter pin 19 remains out for the entire period in which the opposite head is in function.

9. Spraying machine as claimed in claims 1 and 2, wherein three reservoirs 33 feed paint sprayers 17 under pressure using suitable tubing; the central one contains solvent for washing, while the two side ones both contain paint, for contemporaneously spraying two colours or for holding one as reserve while the other feeds; said reservoirs are equipped with concave covers 34, readily removeable by means of the single central screw 35 (or wheel), with o-ring sealing gaskets 36, with reducers 37 for continuous mixing of the contenst, controlled heaters 38 to hold the paint temperature constant (25-35°C) and cart 39, which allows a single person to move it even when fully loaded.

FIG.1



0070955

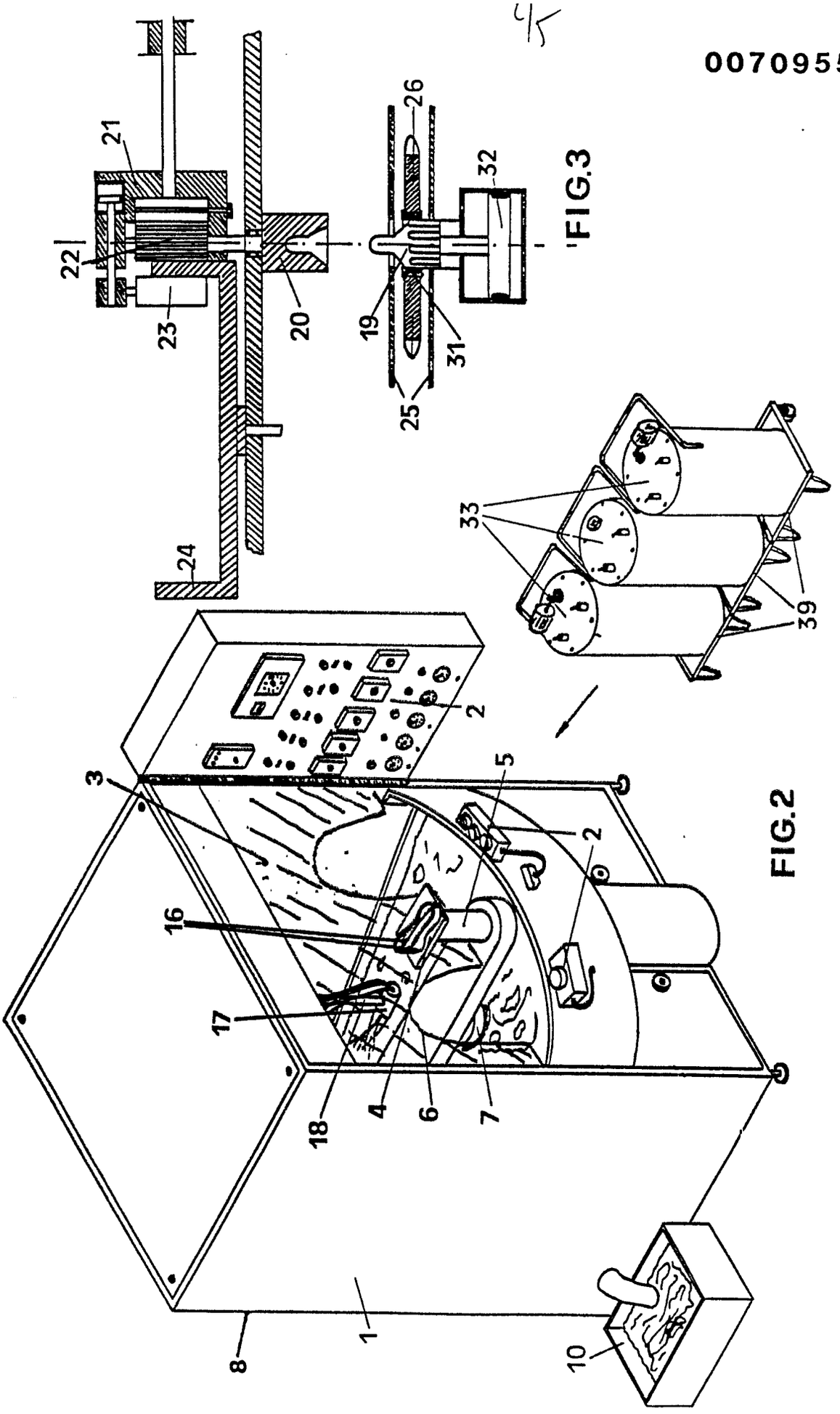


FIG.2

FIG.3

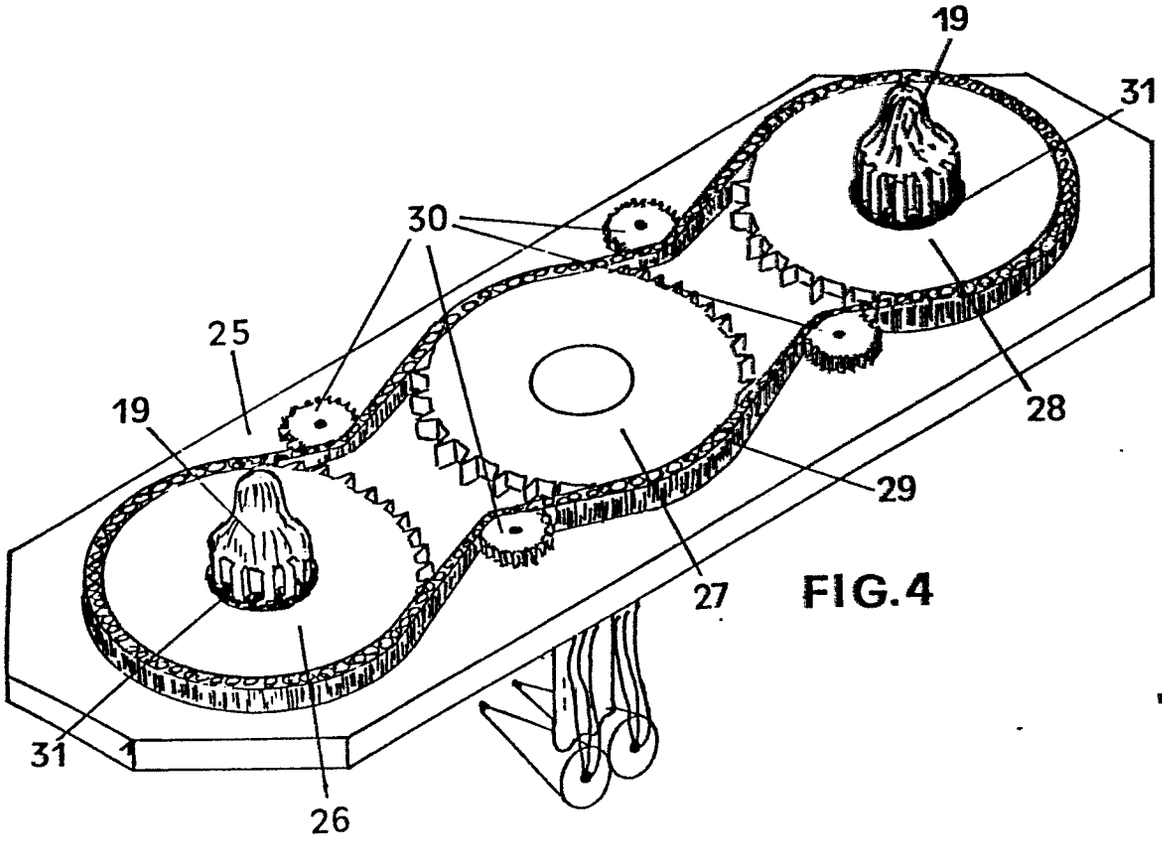


FIG.4

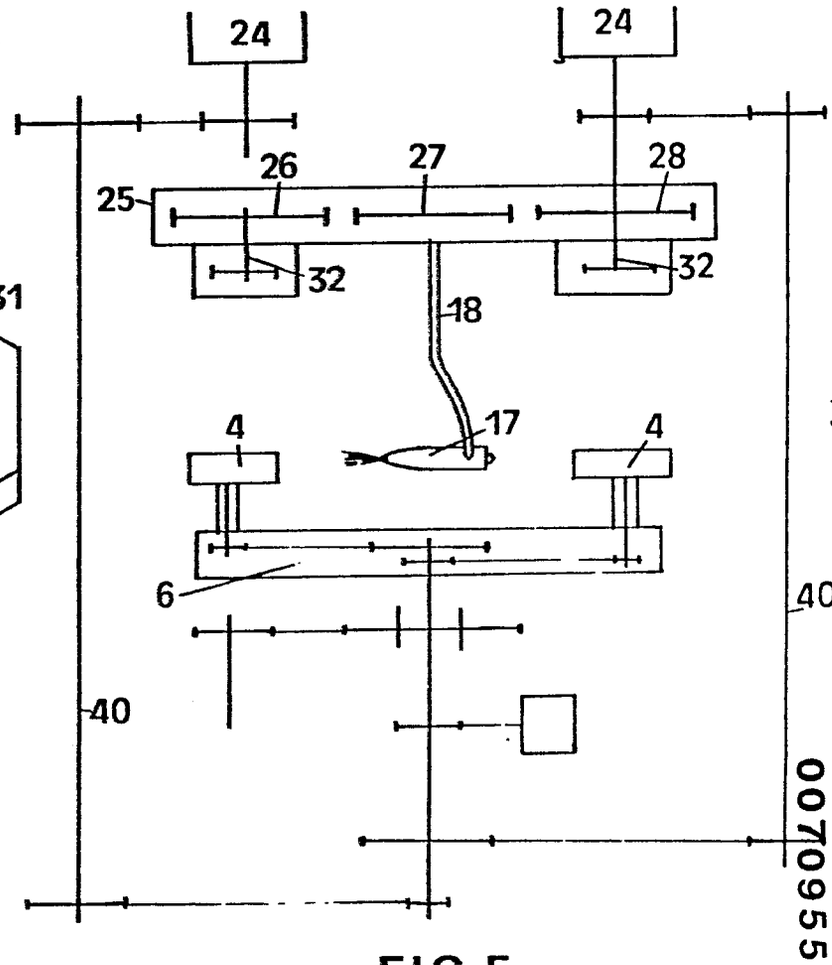


FIG.5

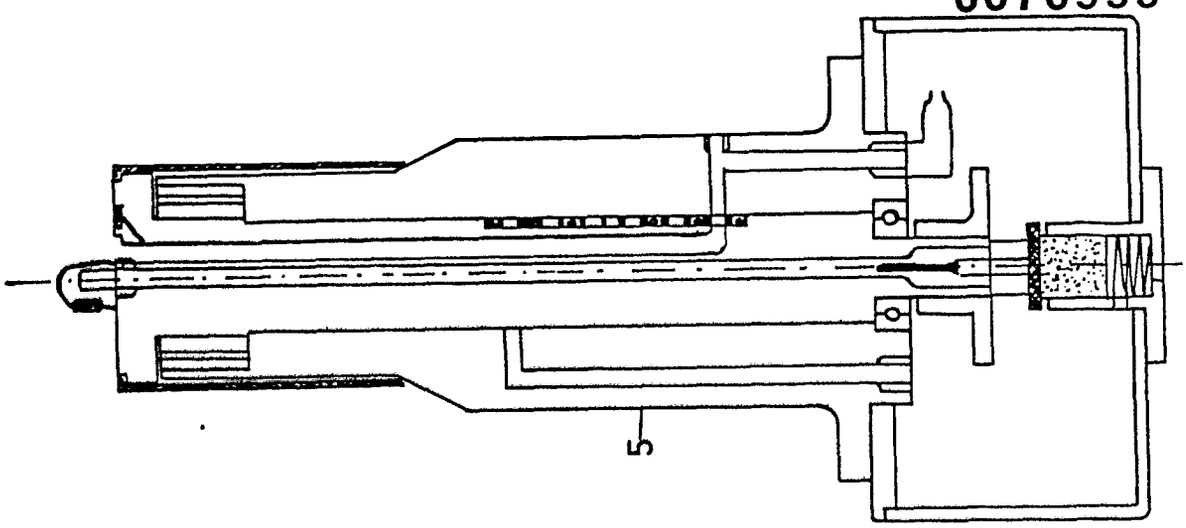


FIG.8

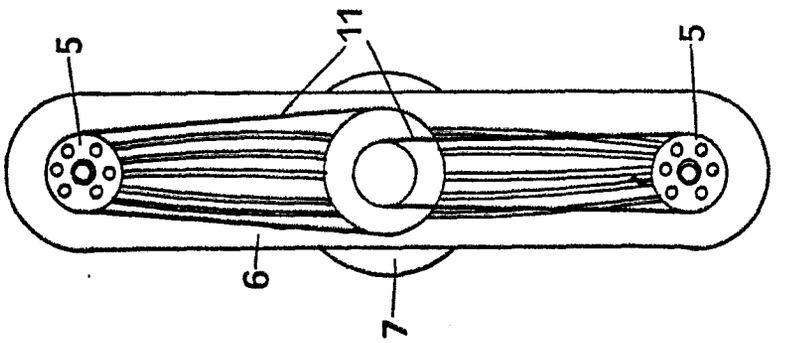


FIG.7

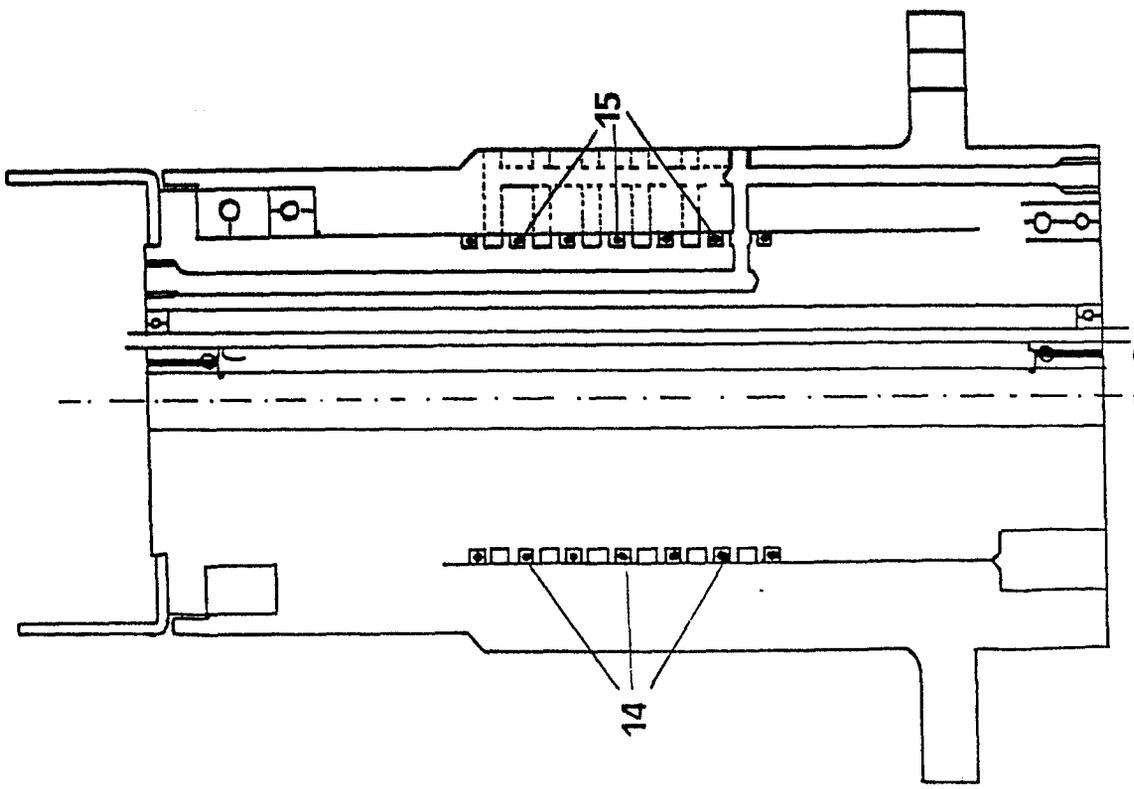


FIG.6

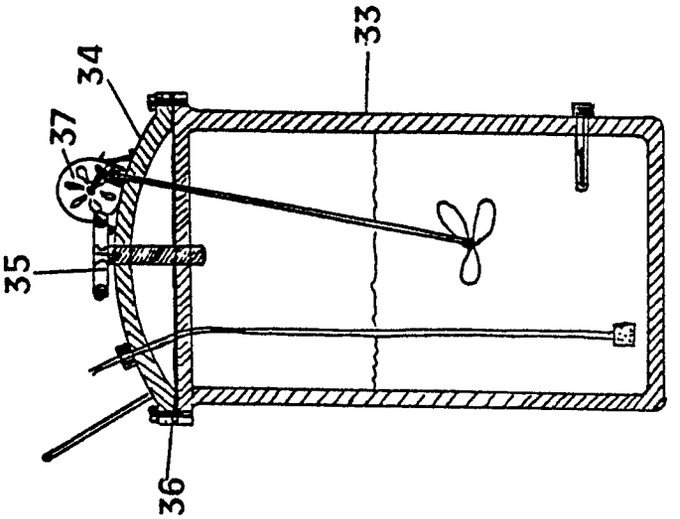


FIG.10

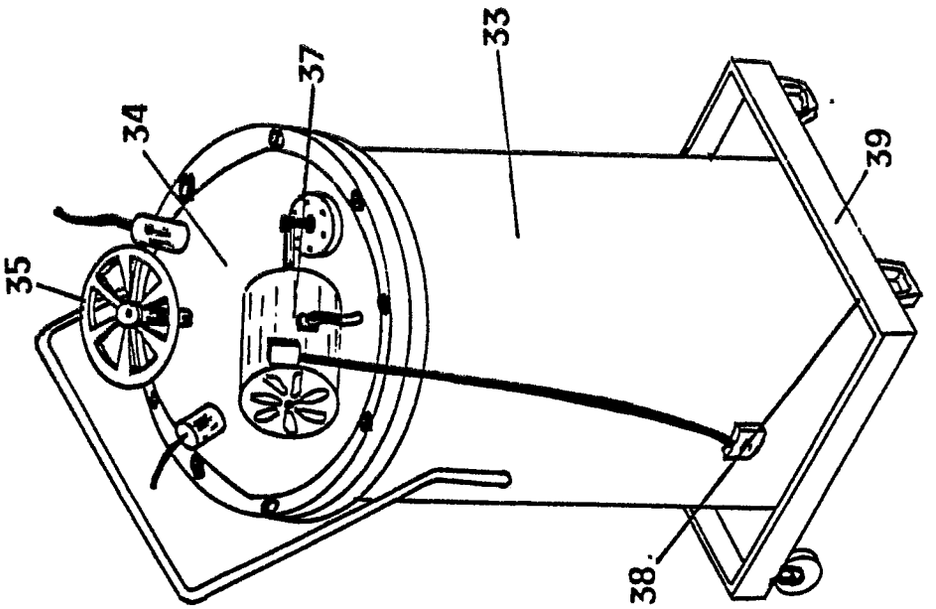


FIG.9