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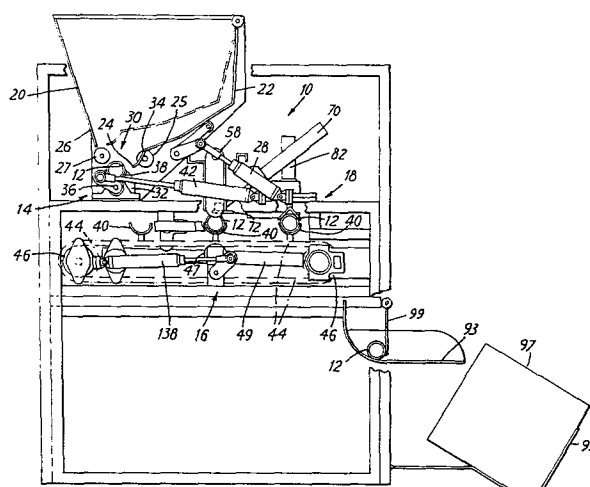
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54 **Cartridge filling apparatus.**

57 The invention provides a cartridge filling apparatus for filling cartridges with a viscous material such as mastic, the apparatus including a loading station (14), a cartridge filling station (16), a cartridge capping station (18) and a packaging station. An endless chain conveyor (44) conveys individual cartridges (12) successively from the loading station to the filling station where each cartridge is filled in turn and then to the capping station where each filled cartridge is capped. The cartridges are then dropped from the endless conveyor into the packaging station which ensures that the cartridges are correctly orientated for packaging and directs the cartridges into a suitably positioned packaging such as a cardboard box (97).



Title: Cartridge filling apparatus

The present invention relates to apparatus for filling cartridges and the like with viscous material such as mastic.

Hitherto, the filling and capping of cartridges with mastic has generally been a manual operation with only parts of the process automated. As will be appreciated, this is a time consuming and expensive process, in addition to which it has proved extremely difficult to control accurately the final weights of filled cartridges and ensure that air pockets are not present in the filled cartridges.

The present invention seeks to provide an improved apparatus for filling cartridges with a viscous material.

Accordingly, the present invention provides an apparatus for filling cartridges with a viscous material such as mastic, the apparatus comprising a cartridge loading station for receiving said cartridges and successively dispensing a cartridge at preselected intervals; a filling station for filling each cartridge with said viscous material; a capping station for capping each said cartridge; and conveyor means for receiving cartridges dispensed by said loading station and conveying said cartridges in turn to said filling station and then to said capping station.

A preferred embodiment of the apparatus is pneumatically

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controlled and includes a packing station where cartridges dispensed from the capping station are automatically stacked in a suitably located container such as a cardboard box.

The present invention is further described hereinafter, by way of example, with reference to the accompanying drawings, in which:

Figure 1 is a side elevation diagrammatically illustrating an apparatus according to the present invention, various parts being omitted for clarity;

Figure 2 is a side elevation of a traversing unit of the apparatus, the drawing showing the traversing unit in relation to cradles of the apparatus;

Figure 3 is a plan view of part of the apparatus particularly illustrating the filling station;

Figure 4 is a plan view showing part of the filling station of the apparatus;

Figure 5 is a detailed view of the capping point of the apparatus; and

Figure 6 is a schematic diagram of a pneumatic circuit of the apparatus.

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The drawings show a machine 10 for filling cartridges 12, here cardboard tubes, with a viscous material such as a mastic. The apparatus comprises basically four stations which are arranged substantially in a line and through which each cartridge 12 passes. These stations comprise a loading station 14, a filling station 16, a capping station 18 from which the cartridges are ejected and a packing station 19.

Referring firstly to the loading station 14, this comprises a hopper 20 which is loaded with cartridges 12 which are to be filled with mastic. In this particular example the cartridges 12 are provided at one end with a dispensing nozzle, the other end being open, and are loaded in the hopper with the open end facing out of the plane of Figure 1. The hopper has an angled flap or side wall 22 which is pivotally mounted near the upper end of the hopper and has a lower edge 24 which co-operates with an opposing wall 26 of the hopper to form an opening 30 through which cartridges 12 are dispensed one by one. Two or more freely rotatable rollers 25 are mounted on a common axis on the underside of the side wall 22 adjacent the lower edge 24 and project through slots in the side wall to assist the movement and settling of cartridges adjacent the dispensing opening. One or more further rollers 27 adjacent the lower end

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of the wall 26 are also provided to assist dispensing. Pivoting of the side wall 22 is effected by means of a double acting cylinder 28. The hopper is shown with the wall 28 pivoted into one extreme position to allow a cartridge 12 to pass through the opening 30 to a dispenser 32. The cylinder 28 is then extended to pivot the wall 22 into its upper extreme position shown in dotted lines. As can be seen from the drawing as the wall pivots upwardly the edge 24 moves underneath the cartridge 12 immediately adjacent the cartridge in the dispenser 32 to prevent this former cartridge from also passing through the opening 30. A ridge 34 on the inner surface of the wall 22 disturbs the cartridges remaining in the hopper to prevent these forming, for example, a bridge which would block the hopper.

The dispenser 32 conveniently comprises a number of parallel discs coaxially mounted about an axis 36 of rotation and partially cut away at 38 to receive the cartridge 12. Once the side wall 22 has been pivoted into its upper position the dispenser 32 is pivoted in a clockwise direction as seen in Figure 1 about axis 36 to deposit the cartridge 12 onto a cradle 40. Rotation of the dispenser 32 is effected by means of a double-acting cylinder 42 whose piston rod is eccentrically secured to the dispenser 32 by a link rod. As shown the piston rod is fully extended to hold the dispenser 32

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in a position to receive a cartridge 12. Retraction of the piston rod rotates the dispenser 32 to transfer the cartridge 12 to the cradle 40.

A plurality of such cradles 40 are provided on an endless chain and the cradles 40 are driven in a stepwise manner around the rollers 46 by means of a cylinder 50 of a traversing unit 49 as is described below. The action of the cylinder 50 and thus the movement of the cradles 40 is synchronised to rotation of the dispenser 32 to ensure that a cradle 40 is positioned to receive a cartridge 12 when the cylinder 42 is actuated to dispense the cartridge.

The cylinder 42 is retracted to rotate the dispenser 32 clockwise to dispense a cartridge 12 into the adjacent cradle 40 and on completion of its retraction it activates the cylinder 50 to move the cradle 40 into the filling station 16 and bring the cartridge 12 into register with a filling mandrel 48. To ensure that each cartridge is always located at the correct height in the filling station in relation to the filling mandrel 48 the endless chain is supported on a sprocket 49 or the like immediately beneath the mandrel. This ensures

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that the cartridge positioning remains unaffected by, for example slackness in the chain. To provide drive to the cradles the traversing unit 49 is raised by means of a cylinder 138 to engage the piston rod 52 of the cylinder 50 in turn with each cradle 40. When a cartridge at the filling station is filled the cylinder 138 retracts to pivot the traversing unit 49 and thus the cylinder 50 into engagement with the cradle 40 at the filling station. Extension of the cylinder 50 then moves the filled tube into the capping station. Once the cartridge has been capped the cylinder 138 extends to disengage the cylinder 50 and allow its retraction ready for engagement with the following cradle 40. The cylinder 138 remains retracted during capping to maintain, in cooperation with a clamping cylinder 82, the cartridge cradle at the capping station at the correct elevation for capping. As will be appreciated, therefore the chain is driven in a clockwise direction as seen in Figure 1 in a stepwise manner, the length of each step being determined by the stroke of the piston rod 52.

As the cartridge 12 is brought into alignment with the filling mandrel 48, completion of the extension stroke of cylinder 50 actuates a double acting cylinder 54 to draw the cartridge 12 onto the mandrel 48. This cylinder is

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mounted to one side of the path of the cradles 40, with the substantially horizontal axis of its piston rod 56 lying substantially vertically above the cartridge 12. The free end of the piston rod carries an abutment plate 57 and the piston rod is extended prior to the movement of the cartridge 12 into register with the mandrel 48.

When the cylinder 54 is actuated the piston is withdrawn into the cylinder at a controlled rate, bringing the abutment 58 into engagement with the cartridge 12 drawing the latter onto the filling mandrel 48. Once the cartridge 12 has been drawn onto the mandrel 48 to a preselected position the cartridge triggers a positionally adjustable switch 57 which actuates two cooperating cylinders 59 and 60 to extend these to open a mastic supply valve 62 to allow mastic to flow under pressure through the hollow filling mandrel 48 into the cartridge 12. The cylinders 59 and 60 will not, however, extend until capping of the preceding cartridge at the capping station is commenced. The pressure of the mastic will of course force the cartridge 12 from the mandrel 48 and in order to prevent pockets of air forming in the mastic in the cartridge 12 a resistance to the movement of the cartridge 12 is provided by way of the abutment plate 58 and the

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cylinder 54. The resistance to the movement of the cartridge 12 can be varied by suitably controlling the venting of the cylinder 54. In instances where the mastic is of a very low viscosity and therefore cannot overcome the inertia and friction of the piston rod 56 low pressure air may be applied to the cylinder 54 to extend the rod 56.

A cartridge-filling sensor is provided in the form of a rod 61 which is secured at one end to the abutment plate 58 above the piston rod 56, with its axis substantially parallel to that of the piston rod 56. The rod 61 has a tapered end 63 remote from the abutment plate 58 which cooperates with two axially spaced apart air switches 65, 67 to control the rate of filling of the cartridge. As the cartridge withdraws along the mandrel 48 to a position where it is close to being full the tapered end 63 trips the first switch 65. This activates the larger cylinder 59 causing it to retract and partially close the mastic supply valve 62. This serves two purposes. Firstly, it allows the mastic in the cartridge to expend and secondly it considerably slows the rate of withdrawal of the cartridge from the mandrel to enable a finer degree of control to be exercised over the filling of the cartridge. Continued withdrawal eventually causes the tapered end 63 of the rod 61 to trip the second switch

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67 which retracts the smaller cylinder 60 to close the mastic supply valve 62. This enables accurate and consistent filled cartridge weights to be achieved with a tolerance as low as 0.5%. The positions of the switches 65, 67 and the degree to which actuation of cylinder 59 closes the mastic supply valve 62 are adjustable as is the axial position of the rod 61 to vary the filled weight of a cartridge.

The tripping of switch 67 also retracts cylinder 138 to raise the traversing unit and engage the cylinder 50 with the cradle 40, raising the latter slightly. The full retraction of cylinder 138 actuates a further cylinder 64 which retracts to raise a fine-positioning device into juxtaposition with the open end of the cartridge. A further cylinder 66 of the fine-positioning device then extends to position the open end of the cartridge level with the end of the filling mandrel 48. Extension of cylinder 66 to about halfway trips a one way trip valve 150 to cause cylinder 54 to be rapidly extended to its fullest extension ready for the next cartridge received at the filling station. When cylinder 66 reaches its full extension it activates the cylinder 50 (provided cylinder 42 is fully retracted) to move the cradle 40 carrying the cartridge 12 to the capping station 18. As the open end of the cartridge 12 moves past the mandrel 48 the latter wipes the end edge of the cartridge preventing stray mastic from transferring to

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the machine or the outside of the cartridge. In order to prevent axial movement of the cartridge 12 during this operation a cylinder 70 is also actuated by full retraction of cylinder 138 to bring suitable clamping means such as a pressure plate 72 into abutment with the cartridge 12. The pressure that can be applied by the plate 72 to the cartridge 12 is of course limited to ensure that the cartridge is not deformed or damaged.

The capping station has a cap magazine 74 such as a bowl feeder which receives caps and conducts these one by one down a spiral feeder track 75 of the feeder and a magazine chute 76 to a capping point 78. The caps may be metal or plastic material and are substantially cup-shaped and it is important that they be presented to the cartridges 12 with the base of the cap facing the open end of the cartridge. To this end the feeder track is formed with notches 300 in its radially inner edge so that a cup which runs onto the leader track upside down, that is with its base uppermost, will not be fully supported by the track and will drop over the track edge back into the bowl of the feeder.

As cylinder 50 reaches its fully extended position it actuates a cylinder 82 which clamps the cartridge 12 in position at the capping station and pushes the

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cartridge downwardly to its correct height relative to the capping point 78 because of the cylinder's mechanical advantage over the still retracted cylinder 138 which holds the traversing unit in its raised attitude. The extension of cylinder 82 actuates a further cylinder 84 whose piston rod 86 carries a preferably cylindrical capping head aligned with the capping point 78. Extension of the piston rod 86 engages the capping head in a cap at the capping point 78 and drives the latter into the open end of the cartridge 12 thus completing the capping operation.

The rapid insertion of a cap into the open end of a cartridge compresses air trapped between the mastic and the cap and this compressed air can then force the cap out of the cartridge after the cylinder 84 withdraws the capping head. To avoid this problem the capping head is either provided with or constructed in the form of a further cylinder 88 whose piston rod 89 is extendable to abut a cap inserted into a cartridge by the capping head. The full extension of cylinder 84 to drive a cap into the cartridge causes the cylinder 84 then to retract while at the same time the capping head cylinder extends to maintain the piston rod 89 in abutment with the cap, thus retaining the latter on the cartridge. Retraction of the capping head cylinder is actuated by the full

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retraction of cylinder 138. The delay allows any compressed air trapped in the cartridge to bleed past the cap before the capping cylinder piston rod 89 is withdrawn. The full extension of cylinder 84 also results in cylinder 139 to extend and lower the traversing unit. Full retraction of the cylinder 84 and subsequent extension of cylinder 138 causes cylinder 50 to retract, ready for another cycle. Full retraction of cylinder 50 actuates cylinder 138 which retracts to engage the traversing unit with a cradle ready to move the following filled cartridge 12 into the capping station. As the chain 44 continues its movement about the rollers 46 the capped cartridges drop off the cradles 40 as the latter pass around the right hand roller 46.

A sensor is conveniently provided at the capping point 78 to inhibit operation of the cylinder 84 in the absence of a cap. A U-shaped magnet 90 is also provided at the capping point 78 to position each metal cap correctly prior to actuation of the cylinder 84. Plastics caps also sit on the magnet. Resistance to movement of the caps by the capping head is provided by two coil springs 91 which part under pressure to allow the cap to be forced therebetween into the cartridge.

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The mastic supply valve 62 is prevented from opening until the cylinder 84 extends. The capped cartridges drop from the cradles 40 onto a chute 43 which ends in a substantially horizontal run over a packaging tray 95. The latter holds a box 97 in an attitude such that cartridges dropping down the chute under gravity stack themselves in the box in substantially horizontal attitudes with their axes aligned. To ensure correct orientation the floor of the chute is inclined to the horizontal at a shallow angle from one side to the other and includes a flap 99 which brakes the roll of each cartridge along the chute and aligns it with its longitudinal axis substantially perpendicular to the direction of roll. The apparatus can be set to produce a desired number of cartridges to fill a box and then stop to allow the filled box to be replaced with an empty box.

Figure 6 illustrates a pneumatic circuit for controlling the operation of the apparatus described above. The various cylinders illustrated in Figures 1 to 4 are given like reference numerals in Figure 6.

The pneumatic circuit shown in Figure 6 is supplied with compressed gas such as air from a source 200 through pressure reducing valves 202 and 204 to respective air reservoirs 206 and 208. The first reservoir 206 is the main air reservoir and serves all of the cylinders except for cylinders 59 and 60. The second reservoir 208 serves cylinders 59 and 60 to ensure that cut off of the mastic supply valve 62 by the cylinders 59 and 60 is unaffected by fluctuations in pressure which occur in the main air circuit. This enables the closing of the mastic supply valve to be controlled extremely accurately. The two reservoirs 206 and 208 have respective main output air lines 210 and 212 which branch to the associated valves and cylinders. The valves 102-120 are five-port two-position air valves having two compressed air input pilot ports each marked respectively c and d. These valves control the extension and retraction of the associated cylinders. A plurality of interpilots 124 are also provided, these being in the form of switches which are actuated by the associated cylinder when the latter is fully extended. Additional interpilots 126 are provided, these being actuated when the associated cylinder is fully retracted. The interpilots control the connection of the main air lines with the various pilot inputs of the valves 102-120 in dependence on the operational state of their associated cylinders and are all shown in their actuated positions.

The compressed air source 200 is in fact connected to the main air reservoir 206 through an exhaust safety valve 212 which in turn is controlled through a further safety valve 214 and a

main ON/OFF manually operated valve 216. When open, the latter couples the air pressure source 200 through the safety valve 214 to the pilot input of the exhaust safety valve 212 to maintain the latter open. The safety valve 214 is maintained open by air pressure applied to its pilot input by way of a branch line from the main ON/OFF valve 216. The branch line is coupled through various safety valves 218 which close the branch line when, for example, safety doors or covers of the apparatus are opened to close the safety valve 214 and cut off the air supply from the reservoir 206.

In this event the cylinders 59 and 60, being supplied from the reservoir 208, will continue to operate until the mastic supply valve is closed thus preventing loss of mastic.

If we consider the sequence of operation of the machine from the point where a cartridge 12 is about to be dispensed from the hopper 20 the cylinder 28 is extended by compressed air supplied through valve 102 to line 28b. This extension of cylinder 28 lifts the side wall 22 of the hopper to select a single cartridge 12 between the ridge 34 and the opposing wall 26. The full extension of the cylinder 28 also triggers the associated interpilot 124 to connect the main air line 210 to the pilot input 204c of valve 104. The latter is thus switched to supply compressed air to cylinder 42 extending cylinder 42 and rotating the dispenser 32 ready to receive the selected cartridge. The full extension of cylinder 42 triggers its interpilot 124 to trip valve 102 causing the cylinder 28 to

retract and draw the side wall 22 downwardly allowing the selected cartridge 12 to drop into the dispenser 32. A sensor in the dispenser 32 senses the presence of a cartridge and reverses valve 104 to initiate retraction of the cylinder 42 thus lowering the selected cartridge 12 onto a cradle 40 positioned to receive the cartridge 12. Full retraction of the cylinder 42 triggers the associated inter-pilot 126 which actuates the valve 106 to extend the cylinder 50. Extension of the cylinder 50 moves the selected cartridge on the cradle 40 into the cartridge filling station 16, the previously filled cartridge at the filling station 16 of course being moved to the capping station 18.

It should be mentioned here that before the cartridge is carried into the filling station the cylinder 54 is fully extended to prevent the abutment plate 58 fouling the cartridge. This is effected by the one-way trip valve 150 which is mechanically tripped by cylinder 66 as it extends. The valve 150 then applies pressurised air to a pilot input c of a valve 109 to switch the latter and apply pressurised air to cylinder 54 to extend the latter.

The pressurised air is fed to the cylinder 59 from the main air line 210 through a flow control valve 152, open valve 108, a further flow control valve 154, valve 109 and a further open valve 113. When cylinder 54 is fully extended it trips a further one-way trip valve 156 which applies pressurised air to pilot inputs c and d of valve 109 and 113 to switch these

over to exhaust to atmosphere the expansion chamber of cylinder 54 leaving the cylinder free of pressurised air or vacuum.

The full extension of the cylinder 50 actuates the associated inter-pilot 124 to trip valve 102 and cause the cylinder 28 to extend and commence selection of a further cartridge in the hopper 20. Actuation of the associated inter-pilot 124 also trips valves 108, 112, 118 and 120 and causes retraction of cylinders 54 and 66, extension of cylinders 64 and 82 and retraction of cylinder 70. Cylinder 82 extends to grip the filled cartridge which has just been moved to the capping station 18 while retraction of cylinder 54 draws the empty cartridge at the filling station onto the filling madrel 48. The retraction of cylinder 66 and extension of cylinder 64 returns the fine positioning device to its rest position ready for actuation to align the cartridge with the end of the filling madrel 48 once the cartridge has been filled. Compressed air to the inter-pilot 124 of cylinder 50 is supplied via line 66b of cylinder 66 so that the cylinders 28, 54, 64, 66 and 82 are actuated only when the cylinder 50 is in its extended state. Referring to cylinder 82, at its fully extended position it actuates the associated inter-pilot 124 which causes the valve 116 to extend cylinder 84 and force a cap into the end of the cartridge at the filling station. The pilot line from the inter-pilot to the valve 116 is controlled by a valve 132 which is the cap sensor. If no cap is present then the valve 132 remains closed preventing extension of the cylinder 84. The operation of the machine will also be halted at this point

prior to filling of the cartridge at the filling station 16. In this event it is not necessary to restart the machine manually. Once a cap is sensed at the capping point 78 the valve 132 is opened and the machine cycle continues.

Referring to the cartridge which has been drawn onto the filling mandrel 48, as is mentioned above, once the cartridge has been drawn onto the mandrel 48 to the fully on position it triggers an air switch 57 which opens a pilot line from line 84b of cylinder 84 to pilot inputs c of valves 110 and 111 to cause cylinders 59 and 60 to extend and open the mastic supply valve 62. The switch also cuts off the air supply to cylinder 54 allowing the latter to be extended as the cartridge is filled and pushed off the mandrel by the pressure of the mastic. The resistance provided by cylinder 54 to movement of the cartridge 12 may be varied by means of a relief valve 136. There may be occasions, for example with relatively thin mastics, where the mastic viscosity is insufficient to overcome the natural resistance of the cylinder 54. The extension of cylinder 54 is therefore given some assistance by feeding air at a reduced pressure to the cylinder 54. To this end a pressure assist valve 160 and pressure reducing valve 162 are connected between the main air line output of valve 108 and the air input of valve 113. When manually actuated the valve 160 will provide a controlled extension of cylinder 54 when the valves 108 and 113 are correctly set. The pressure assistance given can be regulated by adjustment of the pressure reducing valve 162.

The extension of cylinder 84 actuates its interpilot 124 which is connected directly to the main air line 210 through valve 108, and to the pilot inputs c, d and d respectively of the valves 114, 116 and 118. The valves 114, 116 and 118 are thus tripped to extend cylinder 138, lowering the traversing unit, to retract cylinders 84 and 82 and extend cylinder 88.

Retraction of cylinder 82 releases the capped cartridge at the capping station to allow the cartridge to be carried from the capping station on the next step movement of the chain 44. Retraction of cylinder 84 actuates its interpilot 126 to trip valve 106 and retract cylinder 50 ready to move the chain to transfer the following filled cartridge to the capping station. The air line to the interpilot 126 of cylinder 84 is controlled by the interpilot 124 of cylinder 138 so that the cylinder 50 is not retracted unless the cylinder 138 is fully extended and the traversing unit lowered. As the cartridge at the filling station fills and draws off the mandrel the air switch 65 opens to trip valve 110 to retract cylinder 59 and then air switch 67 trips valve 111 to retract cylinder 60 and fully close the mastic supply valve. When opened, the air switch 67 also feeds compressed air to the interpilots 126 and 124 respectively of the cylinders 50 and 66. Since the cylinder 50 is retracted its interpilot is open, thus tripping valve 114 to retract cylinder 138 and open its interpilot switch 126. This causes cylinder 64 to retract and cylinder 66 to extend and precisely position the end of the cartridge in line with the end of the filling mandrel 48. Extension of the cylinder 66 opens the

associated interpilot 124 thus supplying air through the interpilot 126 of the cylinder 42 to cause extension of cylinder 50 and move the filled cartridge from the filling station to the capping station. This movement of the cartridge causes the open end of the cartridge to be wiped by the end of the filling mandrel 48 as the cartridge moves past the end. The opening of the interpilot 126 of cylinder 138 also trips valves 120 and 117. The former valve causes extension of cylinder 70 to bring the pressure plate 72 into abutment with the cartridge 12 and prevent axial movement of the latter as its open end is wiped by the mandrel edge. Extension of cylinder 70 is effected through a pressure reducing valve 210 to prevent cartridge damage due to excess pressure being applied by the plate 72. The valve 210 is effective only in the extension direction to enable rapid retraction of the cylinder 70. The tripping of valve 117 causes retraction of the capping head cylinder 88. The opening of interpilot 124 of cylinder 66 also trips the valve 106 through the interpilot 126 of cylinder 42 to extend the cylinder 50 to move the cartridges on the cradles forward one step.

Control of the pneumatic circuit is effected in the main by two main control valves 400 and 402 which provide respectively for a continuous cycle operation and a single cycle operation. The position of the two valves and other manually actuated valves is shown on a control panel 404. Actuation of the control valve 400 allows the machine to operate continuously to produce a preselected number of filled cartridges, these being counted on a pneumatic counter 406 which stops the machine when the desired count is reached. Air is supplied from the main airline 210 through two subsidiary control valves 408 and 410 which are normally open, through the valve 400 and a spring return valve 412 to the pneumatic circuit proper. During continuous operation of the machine the spring return valve 412 is actuated by a constant pilot air pressure signal from the counter 406 to maintain the line from the control valve 400 open. The count of the counter 406 is operated by air pulses delivered through valve 112 from the main air line 210. When the count is completed the pilot air pressure to the spring return valve 412 is relieved and the valve 412 closes the line from the main valve 400 to stop operation of the apparatus. The counter is reset by manual actuation of a reset valve 414 and the cycle recommences. Single cycle operation of the apparatus is effected by manual actuation of the single cycle control valve 402.

Under normal operating conditions, if for example the hopper empties the apparatus will stop with a filled cartridge at the filling station and a cartridge at the capping station since the absence of a cartridge on the dispenser will be sensed

as previously described. The two control valves 408 and 410 enable these last two cylinders to be capped. Manual actuation of both of these valves 408 and 410 ensures that the machine will carry out its normal operation to cap these two cartridges with the exception that cylinders 59 and 60 will not be actuated so that the mastic supply valve 62 remains closed, and cylinder 4 also is not operated.

Finally, a manually operable control valve 420 is provided for switching on the bowl feeder with a safety valve 422 being connected in the air supply line to the bowl feeder to switch off the feeder when the feed track and magazine chute are full of caps.

CLAIMS:

1. An apparatus for filling cartridges with a viscous material such as mastic, characterised in that the apparatus comprises a cartridge loading station (14) for receiving said cartridges (12) and successively dispensing a cartridge at preselected intervals; a filling station (16) for filling each cartridge with said viscous material; a capping station (18) for capping each said cartridge, and conveyor means (44) for receiving cartridges dispensed by said loading station (14) and conveying said cartridges in turn to said filling station (16) and then to capping station (18).
2. Apparatus as claimed in claim 1 further comprising a packing station (19) for directing filled and capped cartridges into a packaging means.
3. Apparatus as claimed in claim 1 or 2 wherein said apparatus is pneumatically operable.
4. Apparatus as claimed in claim 1, 2 or 3 wherein said loading station (14) comprises hopper means (20) for receiving and containing said cartridges; dispensing means (32, 42) for successively dispensing cartridges to said conveyor means; and selecting means (28, 22) for successively selecting cartridges contained in said hopper means and transferring said cartridges to said dispensing means.

5. Apparatus as claimed in any of claims 1 to 4 wherein said filling station (16) includes nozzle means (48) for dispensing said viscous material, said nozzle means being engageable in a cartridge at said filling station for dispensing said viscous material into said cartridge.

6. Apparatus as claimed in claim 5 wherein said nozzle means is a filling mandrel (48).

7. Apparatus as claimed in claim 5 or 6 wherein said filling station comprises means (63,65,67) for monitoring the quantity of viscous material dispensed into a cartridge and control means (59,60) operable to stop said flow after a preselected quantity of viscous material is dispensed by said nozzle means.

8. Apparatus as claimed in claim 7 wherein said control means (59,60) is operable to reduce said flow of viscous material after a first preselected quantity of viscous material is dispensed by said nozzle means, and to stop said flow after a further, second preselected quantity of viscous material is dispensed by a nozzle means.

9. Apparatus as claimed in claim 5 wherein said nozzle means is a filling mandrel (48) and said filling station (16) further comprises means (54,58) for axially displacing a cartridge at said filling station relative to said filling mandrel to engage said mandrel in said cartridge means for initiating dispensing of said material after said mandrel is engaged in said cartridge,

control means (59,60) for controlling the flow of viscous material dispensed by said nozzle, said control means being operable to reduce said flow after a first preselected quantity of viscous material is dispensed and to stop said flow after a further, second preselected quantity of viscous material is dispensed.

10. Apparatus as claimed in any of claims 5 to 9 wherein said filling station (16) further comprises means (47) for maintaining a cartridge at a preselected elevation relative to said nozzle means (48).

11. Apparatus as claimed in claim 6, 9 or claim 7 or 8 when appendant to claim 6 wherein said filling mandrel (48) is engaged in said cartridge such that the flow of viscous material into said cartridge acts to force said cartridge from the mandrel, and further comprising means (54,58) for controlling the rate at which said cartridge withdraws from said mandrel.

12. Apparatus as claimed in claim 11 wherein said control means (54,58) provides a resistance to withdrawal of said cartridge from said mandrel

13. Apparatus as claimed in claim 12 wherein said resistance is variable.

14. Apparatus as claimed in any of claims 1 to 13 wherein said capping station (18) comprises means (74,76) for delivering a

cap to a capping point (78) arranged in alignment with an open end of a cartridge in said capping station, and means (84,88) for engaging and driving said cap into said open end of said cartridge.

15. Apparatus as claimed in claim 14 wherein said delivering means (74,76) includes means (75,300) for ensuring each cap delivered to said capping point is correctly orientated.

16. Apparatus as claimed in claim 14 or 15 further comprising means (88,89) for retaining said cap in said cartridge for a preselected time period after said driving means (84,88) is withdrawn.

17. Apparatus as claimed in claim 14, 15 or 16 further comprising means (82,49) for locating said cartridge in said capping station at a preselected elevation relative to said capping point (78).

18. Apparatus as claimed in claim 14, 15, 16 or 17 wherein said capping point (78) comprises means (90,91) for retaining a cap in said capping point and providing a preselected resistance to movement of said cap towards said cartridge to ensure full engagement of said driving means (84,88) with said cap.

19. Apparatus as claimed in claim 2 or any of claims 3 to 18 when appendant to claim 2 wherein said packing station (19) comprises means (99) for controlling the orientation of each

said cartridge conveyed from said capping station relative
to said packaging means.

FIG. 2

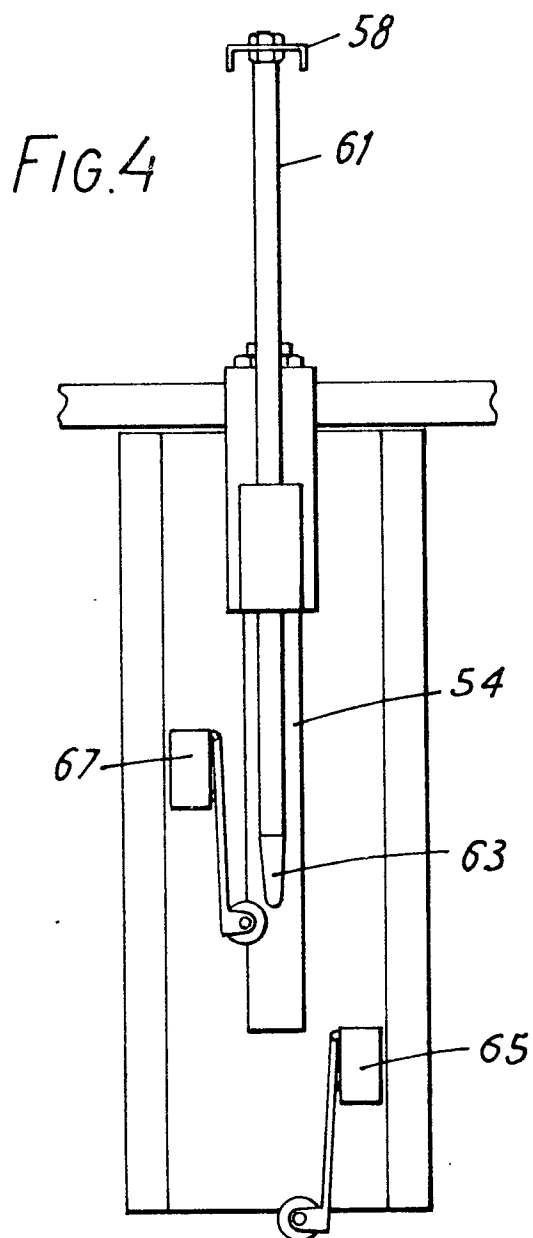
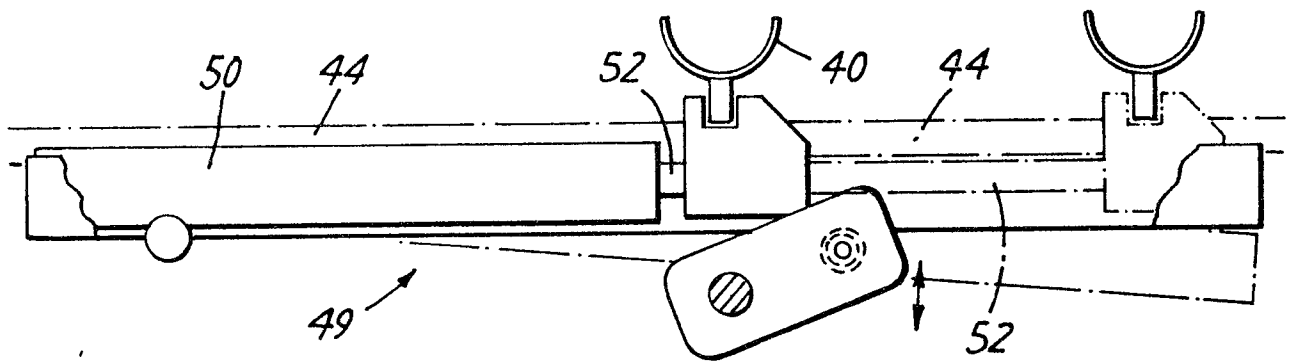
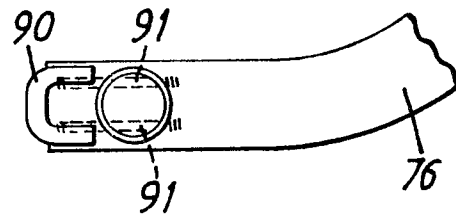
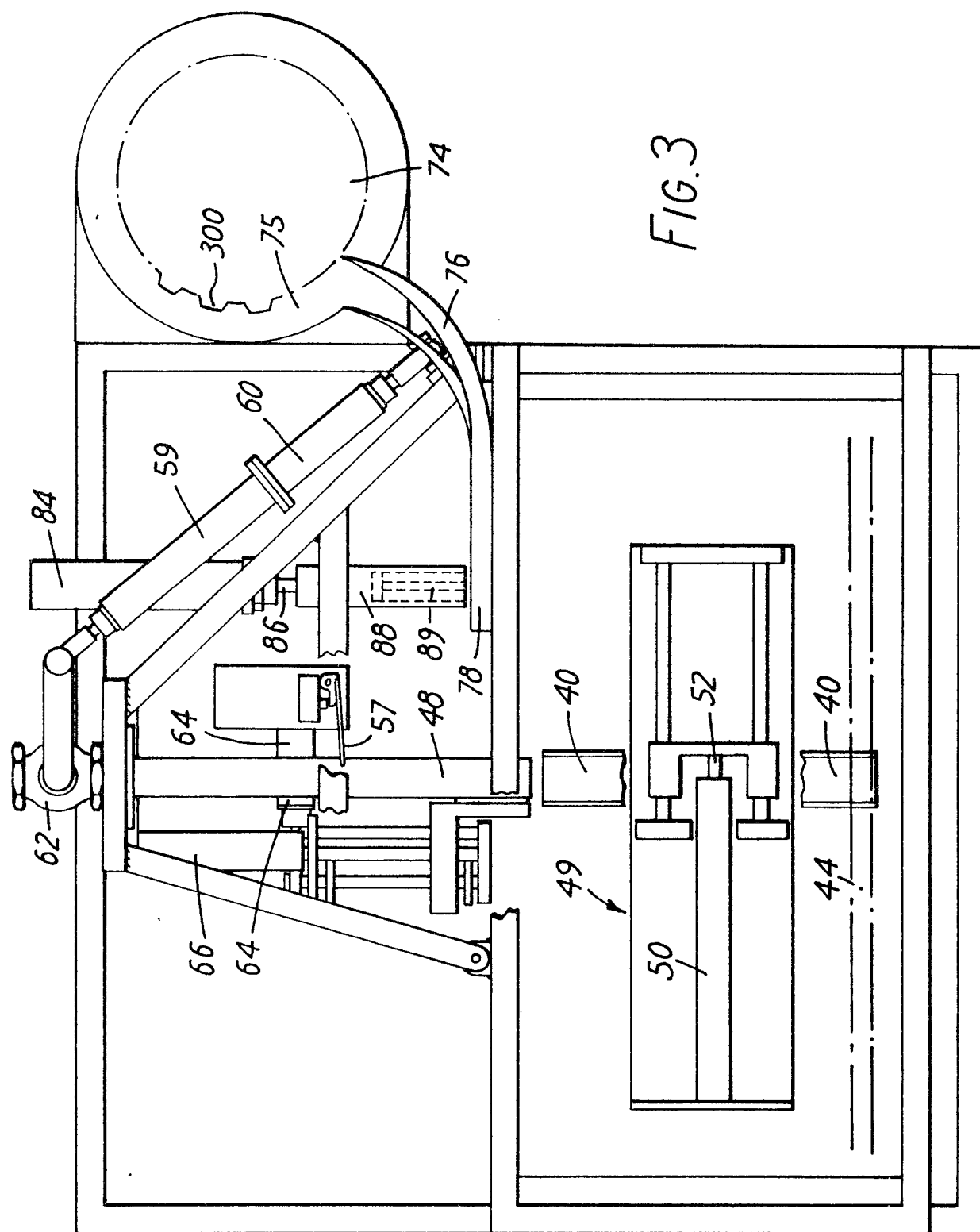
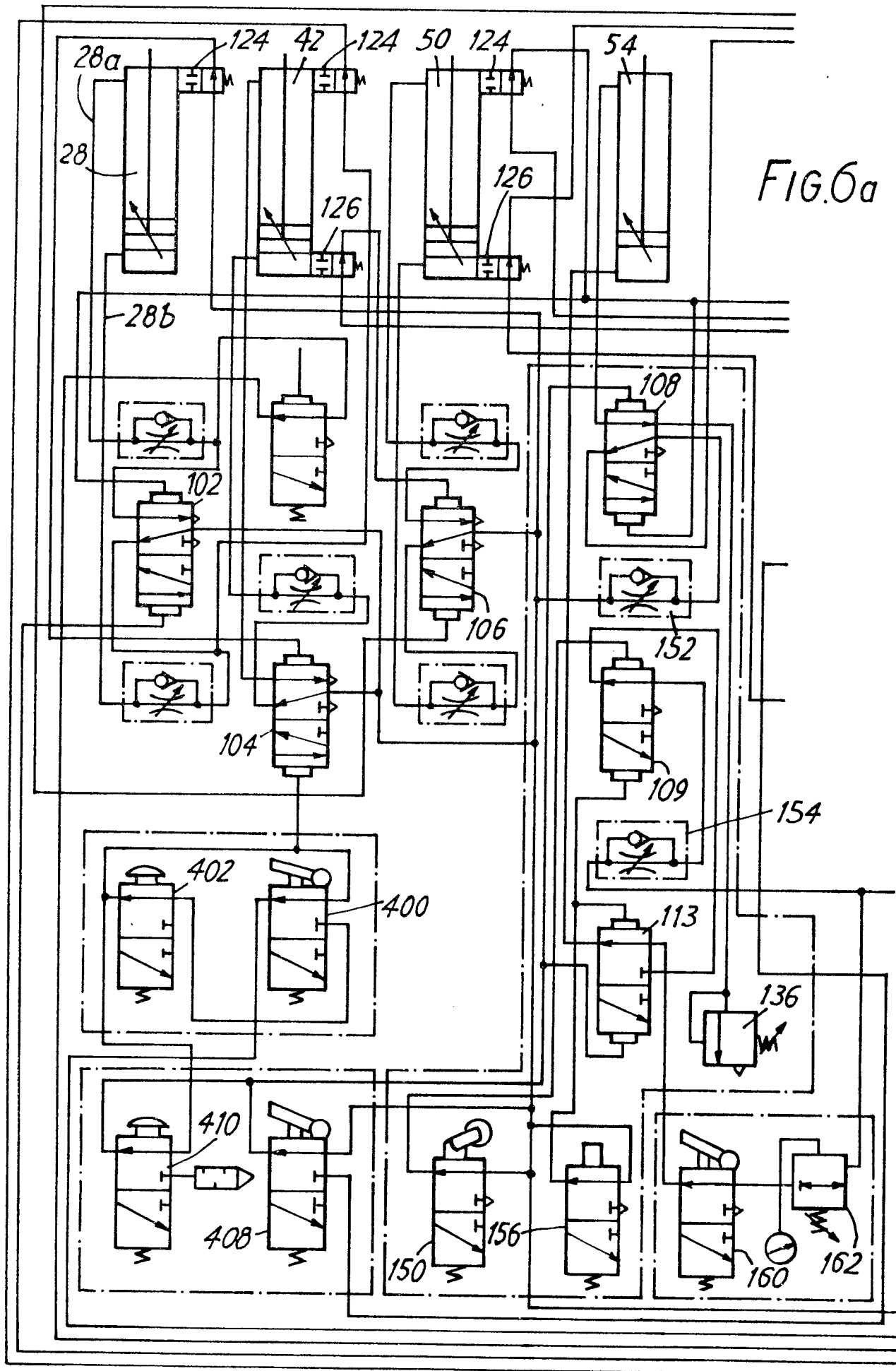
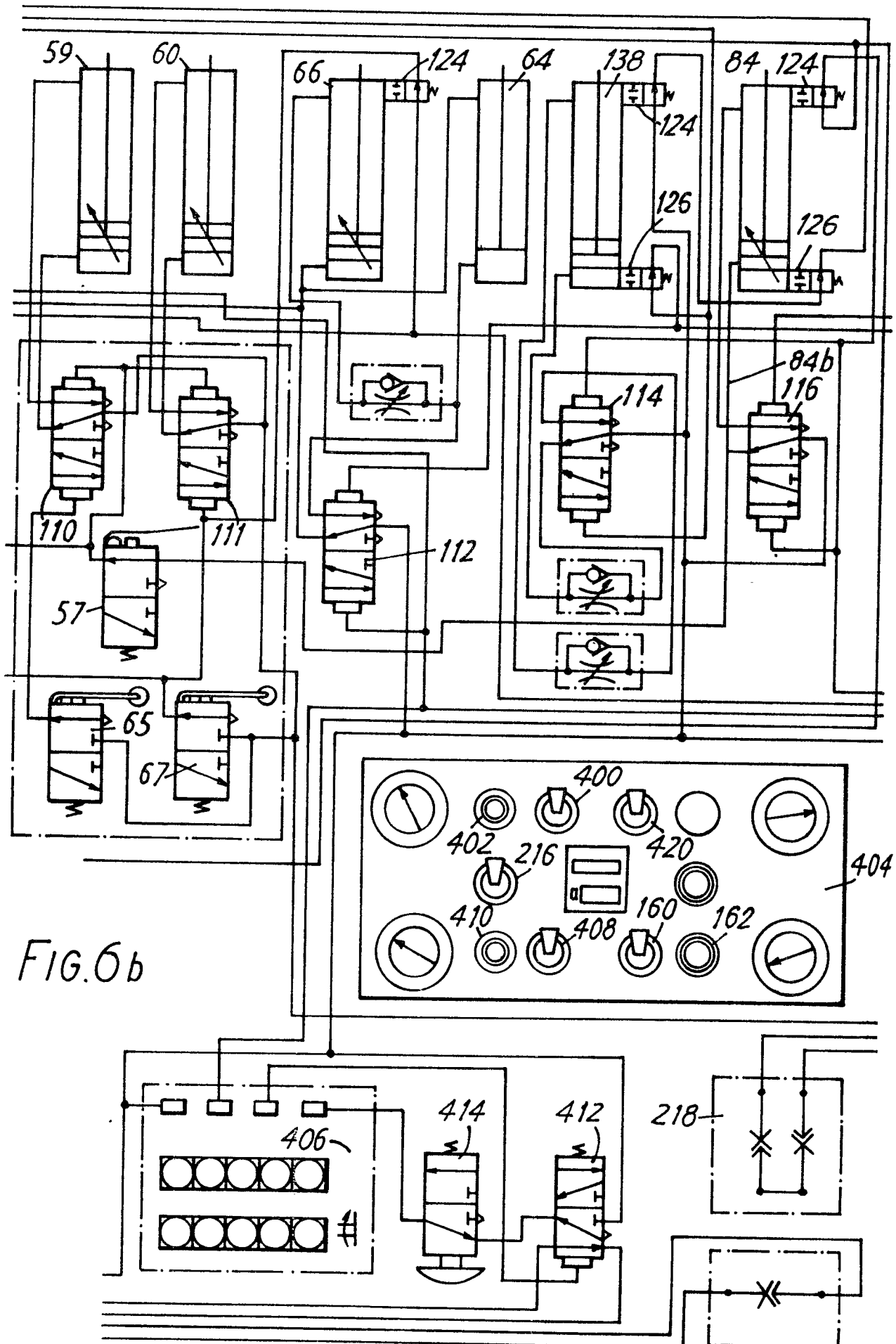


FIG. 5









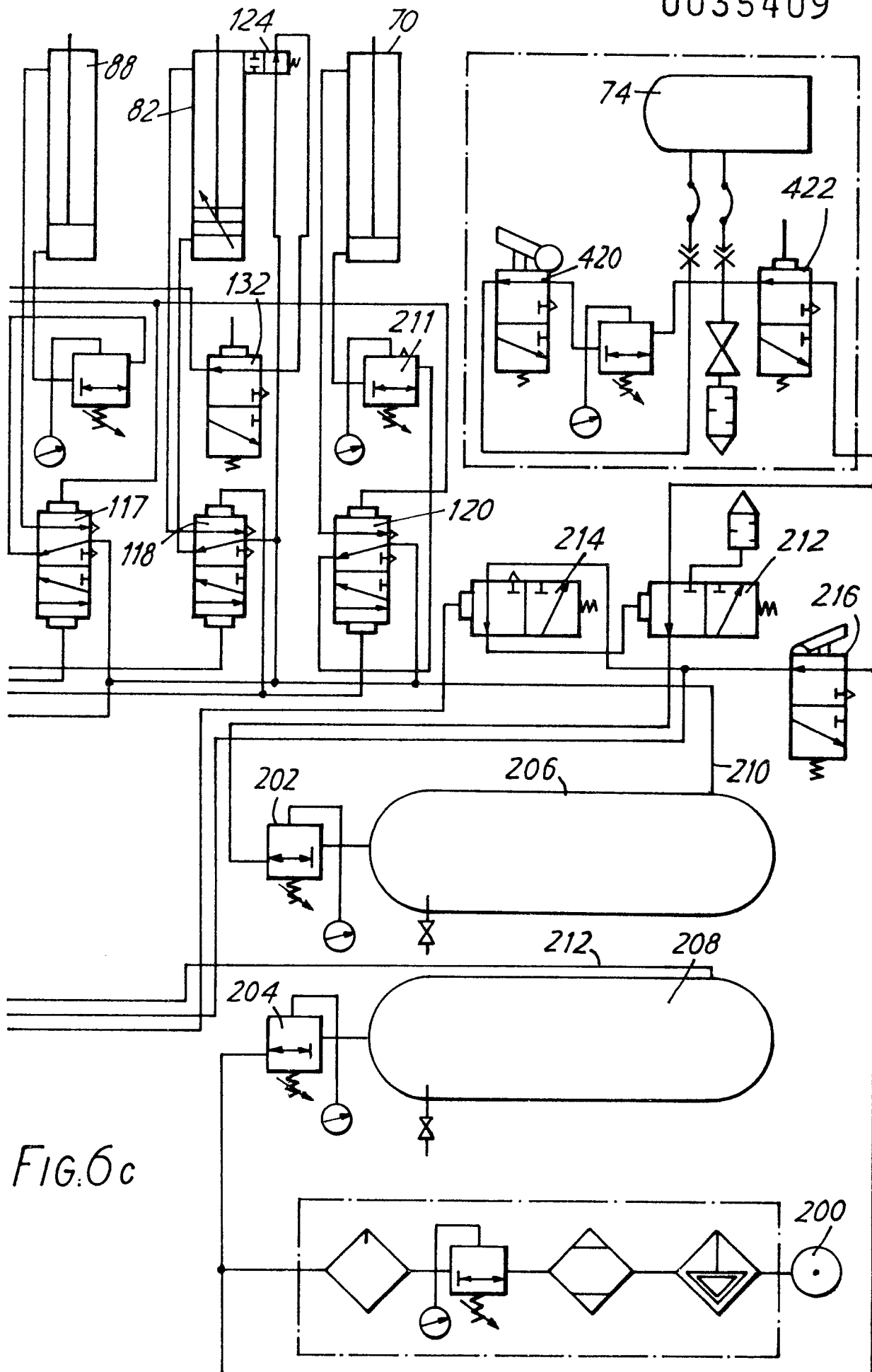


FIG. 6c



DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl. ')
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
A	<u>US - A - 3 738 400</u> (WEIL) --		B 65 B 3/04
X	<u>US - A - 3 994 117</u> (KINNEY) + Claims + --	1,5,7	
A	<u>GB - A - 694 825</u> (ARENCO AKTIE BOLAG) -----		
			TECHNICAL FIELDS SEARCHED (Int. Cl. ')
			B 65 B 3/00 B 65 B 7/00 B 65 B 37/00 B 65 B 39/00 B 65 B 43/00 B 65 B 61/00 B 65 B 65/00
			CATEGORY OF CITED DOCUMENTS
			X: particularly relevant A: technological background O: non-written disclosure P: intermediate document T: theory or principle underlying the invention E: conflicting application D: document cited in the application L: citation for other reasons
			&: member of the same patent family, corresponding document
X	The present search report has been drawn up for all claims		
Place of search VIENNA		Date of completion of the search 15-05-1981	Examiner MELZER