United States Patent [19]

Kaiser

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[54] **FILLING ELEMENT FOR COUNTER PRESSURE FILLING MACHINES**

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[73] Assignee: **Seitz-Werke G.m.b.H.,** Planiger Strauss, Germany

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[30] **Foreign Application Priority Data**

Jan. 17, 1970 Germany ..... P 20 02 060.4

[52] **U.S. Cl.** **141/39,** 74/89.15, 141/46, 141/198

[51] **Int. Cl.** **B65b 31/06**

[58] **Field of Search** ..... 73/304 R, 304 C; 74/89.14, 89.15; 137/392; 141/4, 39, 40, 44–46, 48, 49, 52, 53, 58, 198; 340/244 C

[56] **References Cited**

UNITED STATES PATENTS

2,357,013	8/1944	McKinnis	141/198 X
3,209,794	10/1965	Granier	141/46
3,443,608	5/1969	Copping et al.	141/198 X
3,554,160	1/1971	Fortune et al.	74/89.15 X

FOREIGN PATENTS OR APPLICATIONS

1,063,549	3/1967	Great Britain	141/4

OTHER PUBLICATIONS

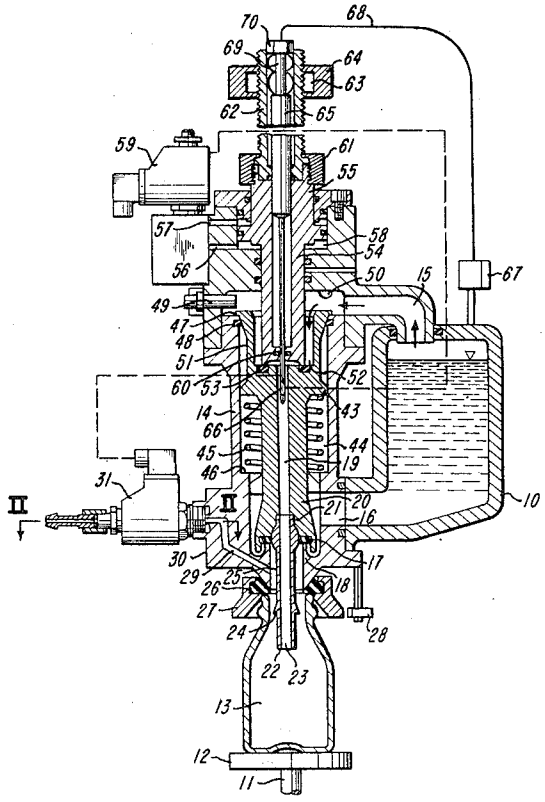
German Printed Application 1,632,004, 11–1969, Uth et al. Pertinent Shts. Dwg./Figs. 1–7/pp. spec. 1–19

Primary Examiner—Houston S. Bell, Jr.
Attorney—Walter Becker

[57] **ABSTRACT**

A filling structure free from filling pipe means for counter pressure filling machines. A gas conduit extends coaxially from a tubular fluid discharge opening into a pressed-on vessel to be filled with liquid. The gas conduit has an opening for discharging the tension gas and limiting the drop height. The gas conduit is equipped with an electric control adapted to be influenced by the substance to be filled in for releasing a closing pulse for a liquid control valve.

4 Claims, 2 Drawing Figures



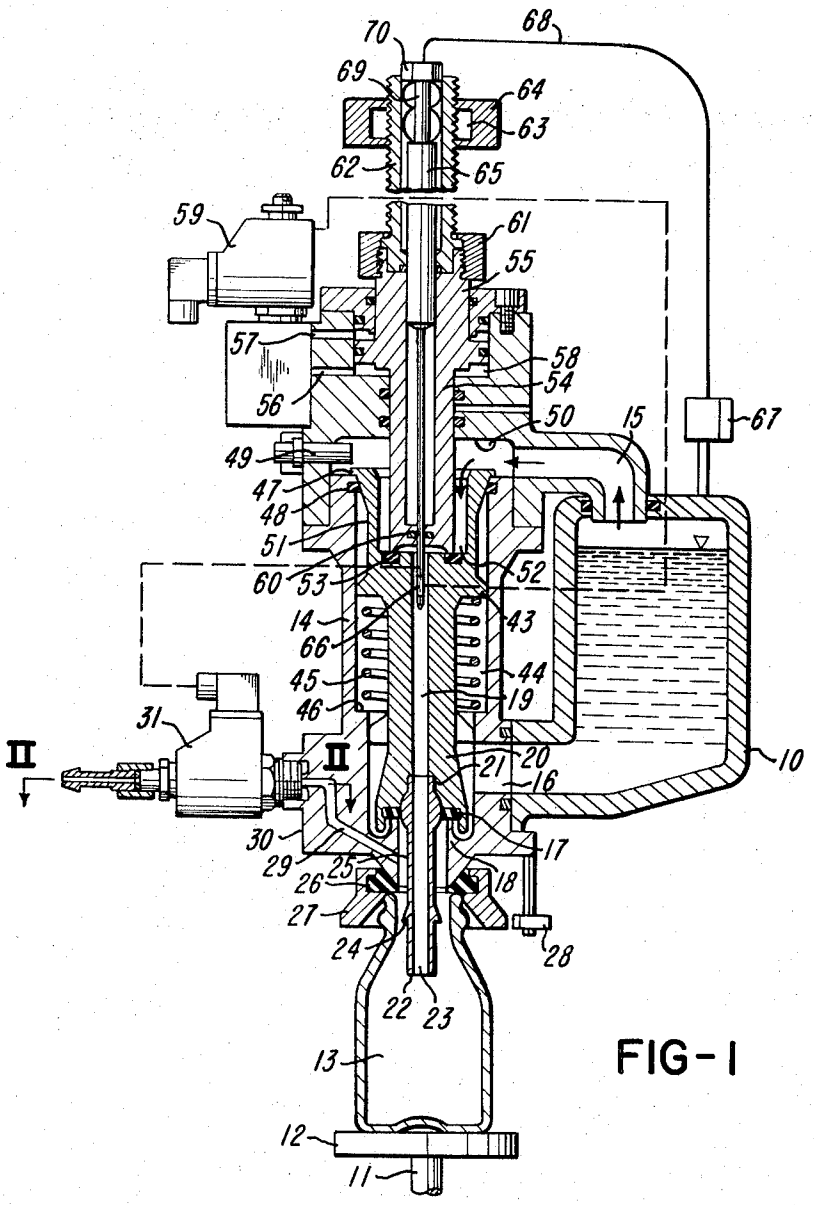

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FIG-1

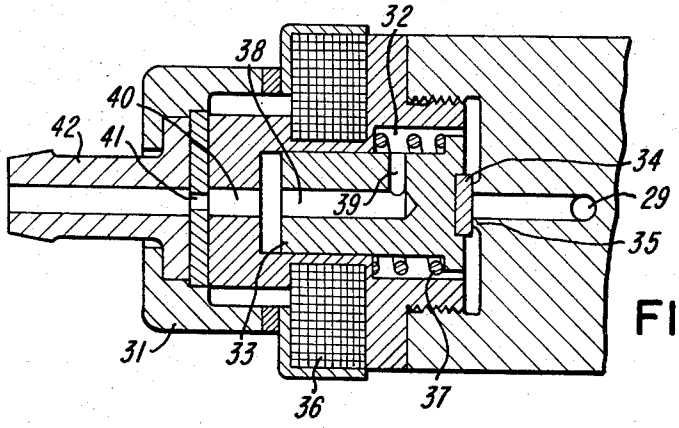
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FIG-2

FILLING ELEMENT FOR COUNTER PRESSURE FILLING MACHINES

The present invention relates to a filling element for counter-pressure filling machines and, more specifically, concerns a filling element of this type which has no filling pipe and comprises one or more chambers. Such filling element has a gas conduit which extends coaxially from a tubular fluid discharge opening into a pressed-on vessel. The gas conduit on the side of the vessel has an opening for discharging the tension gas and limiting the drop height. The gas conduit is furthermore equipped with an electric control device, adapted to be influenced by the substance to be filled in, for releasing the closing impulse for the liquid control valve.

With filling elements of the above-mentioned type, the conduit end located at the vessel side is provided with an opening and is customarily designed as a detachable pipe section. When the gas access to this pipe section which is identical with the gas conduit is interrupted by the rising liquid level, also the inflow of the liqud ends. The pipe section in most instances is additionally equipped with a rejecting shield for the inflowing liquid. This simultaneously results in functions as a limiting device for the filling quantity so that the liquid control valve is closed at a later time and subsequently the relief valve is opened. The control movements for these valves are customarily initiated by common abutment element which have to be adjusted when vessels of different sizes are processed.

With filling elements which do not have a filling pipe and which are equipped with electrically controllable liquid control valves, it has become known by U.S. Pat. No. 3,443,608 Copping et al. issued May 13, 1969 to determine the filling height in the pressed-on vessels by means of an electric control member adapted to be introduced into the vessels. Influenced by the filling substance rising to the predetermined filling height, the control member initiates the impulse for the closing movement of the liquid control valve. The control member associated with each element at that end of the gas conduit which is located on the vessel side is mounted below the conduit opening which serves merely for withdrawing the tension gas and remains outside the region of the rising filling substance. Thus, the control members replace the common abutment elements mentioned above and customary with mechanically controlled filling elements.

Experience has shown that with arrangements of the last mentioned type, at high filling speeds especially with vessels having a narrow neck, a uniform filling height can in most instances not be realized. This is due above all to the inertia inherent to the complicated structure of the liquid control valves and the control elements therefor. The inherently different length of closing periods following the impulse being emitted by the control member result in permitting non-controllable quantities of filling substance can flow into the vessels consequently different height of liquid levels occur below the mouths of the vessels. With the known filling elements it is also unfavorable that the control element is arranged at that end of the gas conduit which is located on the vessel side. Thus the control member is not protected against damage which may occur above all when the control member is introduced into a poorly centered vessel or when a vessel breaks, especially during the tensioning process.

It is therefore, an object of the present invention to provide a filling element which will overcome the above mentioned drawbacks.

This object and other objects and advantages of the invention will appear more clearly from the following specification in connection with the accompanying drawings, in which:

FIG. 1 illustrates a longitudinal section through a filling element according to the invention.

FIG. 2 is a section taken along the line II—II of FIG. 1.

The filling element according to the present invention which does not have a filling pipe is characterized primarily in that the control member is located in the path of the gas above the opening of the gas conduit. According to a further development of the invention it is suggested to make the control member adjustable as to height and to provide it with an adjusting device associated with the filling element. In view of the design according to the invention, according to which the gas conduit determines the filling height in the pressed-on vessel, whereas the control element controls the liquid control valve and, if desired, initiates or releases the relief valve and further control functions, the additional advantage is obtained that by means of the suggested height adjustment of the control member, the control period for the closing movement of the liquid control valve can be selected freely.

According to the present invention it is further suggested to connect the control member to that end of a shank which is located on the vessel side and which is vertically guided in the interior of the element and has that end which is located opposite the control element connectable to the adjusting device. To this end, the adjusting device advantageously comprises a threaded sleeve with a manually operable handwheel mounted thereon to which the shank end is coupled. The threaded sleeve is vertically connected to the element housing or is connected to an element detail which protrudes from the element housing.

Referring now to the drawings in detail, of the one-chamber counter-pressure filling machine involved, merely the filling container **10** for the liquid and tension gas and the lifting element **11** with a dish-shaped surface **12** are shown. Opposite each lifting element **11** there is provided a filling element **14** which is flanged to the container **10.** The filling element **14** is connected through separate gas and liquid inlet means **15** and **16** to corresponding outlets of the container **10** in a gas-tight and liquid-tight manner. The gas inlet **15** is designed in the manner of a connection adapted to be plugged into the container outlet.

At that end which is adjacent the container or vessel **13** the element **14** has a valve seat **18** within the housing. The valve seat together with a valve body **20** supported by said valve seat and provided with a seal **17** forms the liquid control valve **18, 20.** This liquid control valve, when in open condition, forms a gas barrier in the form of a labyrinth. A central bore **19** extends through the valve body **20** and is provided with a thread **21** within the region of the seal **17.** Screwed onto the thread **21** is a gas pipe **23** with an opening **22.** Pipe **23** with bore **19** forms the gas conduit **19, 23.** The gas pipe **23** itself is provided with a rejecting shield **24.**

Below the liquid valve **18, 20** and below the valve seat **18** there is provided a liquid discharge member **25** which is of tubular shape and through which the gas

conduit 19, 23 extends coaxially. The liquid discharge member 25 is surrounded by a centering tulip 27 provided with a rubber insert 26 and adapted to be lifted and lowered. A switch 28, expediently an approximation switch, or proximity limit switch extends into the stroke range of the tulip 27. From the liquid discharge member 25, a passage 29 leads to a magnetic valve 31 which is connected to the housing extension 30, preferably in screwed thereinto, and communicates with the passage 29.

As will be seen from FIG. 2, valve 31 has a valve body 33 which is longitudinally movable in a valve chamber 32. Valve body 33 is located opposite a bore 35 provided with a seat 34 and leading to the passage 29. The force exerted by the spring 37 acts in a direction counter to the force exerted by the magnet 36. The valve chamber 32 communicates with the atmosphere through a coaxial bore 38 in the valve body 33. The bore has an exit opening 39 leading to the chamber 32 and through a bore 40 provided in the valve housing 31 and leading into the atmosphere. Bore 40 is expediently provided with a throttle area 41 and at its exit is provided with a hose nipple 42.

As has been shown in FIG. 1, the valve body 20 extends vertically in the element housing 14. The valve body 20 has its upper end portion located opposite the seat 18 and widened so as to form a collar 43. The valve body 20 is longitudinally guided in a housing bore 44 by means of the collar 43. One end of a spring 45 rests against the collar 43 whereas the other end of spring 45 rests against a shoulder 46 of filling element 14. Opposite an extension 47 provided on the upper end of collar 43 there is located an approximation or proximity limit switch 49 connected in housing 14. There is furthermore located a housing abutment 50 for limiting the upward stroke of the valve body 20. Valve body 20 rests by means of the extension 47 against a seal 48 located in the housing bore 44. Below the extension 47, the collar 43 is preferably provided with a restriction 51 which tapers conically in downward direction within the region of the seal 48. Coaxially provided within the collar 43 is a pot-shaped recess 52 having a diameter which is larger than the diameter of the lower portion of the body 54. Provided on the plane bottom surface of the recess 52 is a valve seat 53 for the body 54 which forms a valve body in the form of a tubular section. Valve seat 53 and valve body 54 together form the tension gas valve 53, 54 for which the valve body 20 of the liquid control valve 18, 20 forms the supporting element. The upper end of the valve body 54 forms a piston 55 which extends into a chamber 58 of a magnetic valve 59. The chamber 58 is provided with inlet openings 56, 57. The upper end of piston 55 which protrudes from the housing 14 is provided with a threaded sleeve 62 which is connected to the piston 55 by means of a clamping nut 61. Sleeve 62 has longitudinal slots which are located in the sleeve walls opposite to each other and has its outer thread in engagement with a handwheel 64 provided with an inner annular groove 63.

A shank 65 extends through the vertically arranged sleeve 62, the piston 55 and the tension gas valve body 54 and has its lower end extend into the gas conduit 19, 23. The lower end preferably is offset within the tension gas valve body 54. This shank end which is sealed relative to the valve body 54 by means of a seal 60 has connected thereto an electric control member 66 adapted to be controlled by the filling substance. The control means (not shown in detail) of control member 66 are provided on a card 67 which is exchangeably connected to the vessel or container 10. The conductor leading from the control member 66 to the card 67 is designated with the reference numeral 68. At the opposite end of the control member 66, the shank 65 is coupled to the handwheel 64 by means of a bolt 69 extending through the slots of sleeve 62. Counter nuts 70 secure the bolt 69 vertically arranged on an extension of the shank. The end of bolt 69 extend into the annular space 63 of the hand-wheel 64.

The operation of the device is as follows:

When the magnetic valves 31 of the elements 14 are closed and the control members 66 of all filling elements 14 have been individually and manually set by means of the control wheels 64 for the required level in the gas conduits 19, 23, and when the machine has been turned on operation proceeds. By means of a customary feeding turnstile, the vessel will be moved onto the lifting members 11, 12. In this connection it is advisable to arrange the control members 66 directly below the tension gas valves 53, 54. This assures that the gas spaces which form in the gas conduits 19, 23 below the valves 53, 54 will with the rising liquid remain small. Thus the contents of the vessel will not be disquieted when the pressure is reduced to atmospheric pressure. In the course of the starting upward movement of the lifting members 11, 12, it will be appreciated that when considering an individual filling element 14, first the centering of the vessel 13 by the tulip 27 will be effected while the gas pipe 23 is introduced into the vessel 13. In the course of the further upward stroke of the vessel, the tulip 27 will engage the lower side of the housing. In this position, the vessel 13 will be pressed against the rubber insert 26 in the tulip 27.

The switch 28 during the upward stroke of vessel 13 is influenced by the centering tulip 27. Through the intervention of the control means on card 67, the switch 28 will actuate the magnetic valve 59 which opens the inlet 56 to permit the liquid to flow into the chamber 58. With started upward movement of the piston 55 the bottom side of which is subjected to fluid pressure, the valve body 54 is lifted off the seat 53 so that tension gas will pass into the pressed-on vessel 13 from the filling container 10 through conduit 15, recess 52, the opened tension gas valve 53, 54 and the gas conduit 19, 23.

When approximately equilibrium has been established between the tension gas pressure in the pressed-on vessel 13 and in the filling container 10, spring 45 opens the liquid control valve 18, 20. The upwardly moved valve body 20 will have its extension 47 engage the adjustable abutment 50 while the tension gas valve 53, 54 remains open. In the course of the upward movement of the valve body 20, the extension 47 furthermore influences the approximation or proximity limit switch 49. Through the control means of card 67, the switch 49 brings the control member 66 into readiness. The filling substance now flows through the opened liquid control valve 18, 20 and the labyrinth and furthermore the outlet 25 and over the rejecting shield 24 into the vessel 13. The displaced tension gas passes through conduit 19, 23, the opened valve 53, 54, the recess 52 and the conduit 60 back into the gas chamber of the filling vessel 10.

When the rising liquid level reaches the opening **22** of the gas pipe **23**, the filling substance cuts off the return gas path, and the admission of liquid is interrupted. The liquid level now with a quieted surface rises in the gas pipe **23** and subsequently in bore **19** reaches the control member **66** above the vessel **13.** The control member **66** now influences the control means of card **67** associated with the magnetic valve **59.** The valve **59** is now again actuated and closes the inlet **56.** This establishes communication with the atmosphere and simultaneously opens the inlet **57** to the piston chamber **58.** The fluid medium up to this point via inlet **56** acts continuously upon the bottom side of piston **55** and keeps the valve body **54** in its opened position. Now the fluid medium actuates the top side of piston **55** via inlet **57** whereby the valve body **54** is moved back to the seat **53.** Subsequently also the valve body **20** is returned to its seat **18** so that the tension gas valve **53, 54** and the liquid control valve **18, 20** are closed. The magnetic valve **31** is actuated by the control member **66** after the expiration of a selected delaying time. The magnetic valve **31** changes the location of its valve body **33** and thereby opens the bore **35** which communicates through passage **29** with the outlet **25.** As a result thereof, the gas spaces communicating with the pressed-on vessel **13** will lose their tension through gas paths **32, 39, 38, 40** and the throttle area **41** of the magnetic valve **31** and will assume atmospheric pressure. When subsequently the vessel **13** is withdrawn from the filling element **14** by lowering the lifting element **11, 12,** the tulip **27** again occupies its starting position. The tulip **27** then moves out of the range of the approximation or proximity limit switch **28.** Through the control means of the card **67,** the switch **28** interrupts the current to the magnetic valve **31.** In view of the influence of spring **37,** the valve body **33** of valve **31** closes the passage **29.**

If it should happen, for instance, that in a damaged vessel no or only a minor tension gas pressure is built up, the liquid control valve **18, 20** retains its closing position, and the extension **47** of the valve body **20** does not pass into the region of the approximation or proximity limit switch **49.** The control impulse previously was initiated by the approximation or proximity limit switch **28.** Thus in the manner described above the magnetic valve **59** was caused to open the inlet **56** and the tension gas valve **53, 54** was opened by the fluid medium. This control impulse is extinguished after a predetermined time while the magnetic valve **59** is deenergized. The fluid medium which subsequently through inlet **57** acts upon piston **55** returns the latter to its starting position whereby the tension gas valve **53, 54** is closed.

It is, of course, to be understood that the present invention is, by no means, limited to the particular structure shown in the drawings but also comprises any modifications within the scope of the appended claims. Furthermore, even though the invention has been described in connection with one-chamber filling elements, it will be appreciated that it is also applicable to multi-chamber filling elements which do not have filling pipes and that for such filling elements the same arrangement of the control member in the gas path opposite the opening of the gas conduit is intended.

It is also to be understood that the control member **66** which by means of the pulse controlling the closing movement of the valve body **20,** also controls the closing movement of the magnetic or relief valve **31** may also control additional operations in the filling structure according to this invention.

What I claim is:

1. A filling structure for counter-pressure filling machines with relief valve means which includes: housing means comprising liquid inlet means for receiving liquid to be filled into a vessel and also comprising liquid discharge means with a discharge bore adapted to communicate with said liquid inlet means for discharging liquid into the vessel to be filled, means located at the outer end of said discharge bore and surrounding said liquid discharge means and being adapted to receive pressed thereagainst the mouth of a vessel to be filled with liquid admitted through said inlet means, the interior of said housing means comprises a valve seat at the inner end of said discharge bore, a first valve body reciprocably guided in said housing means and having a bore therethrough extending in the direction of reciprocation of said valve body for conveying tension gas therethrough, said valve body having a portion at one end of said last mentioned bore operable to sealingly engage said valve seat and to disengage said valve seat to control the communication between said liquid inlet means and said discharge bore, valve seat means at the other end of said bore through said first valve body, gas inlet means for conveying tension gas into said last mentioned bore, a second valve body movable into and out of sealing engagement with said valve seat means for controlling the communication between said gas inlet means and the bore through said first valve body, spring means arranged within said housing means and continuously urging said first valve body to disengage said valve seat for establishing communication between said liquid inlet means and said liquid discharge means, fluid operable means associated with said second valve body and operable to move said second valve body into sealing engagement with said valve seat means for interrupting communication of said gas inlet means with said bore through said first valve body, said fluid operable means also being operable to move said second valve body against the thrust of said spring means into sealing engagement with said valve seat to interrupt fluid communication between said liquid inlet means and said liquid discharge means, gas conduit means having one end thereof connected to said first valve body while having its interior in communication with the bore which extends through said first valve body, said gas conduit means having its other end protruding from said liquid discharge means to extend into the vessel to be filled, control means extending protected into the bore which extends through said second valve body, and electric means electrically connected to said control means for controlling said first and second valve bodies after achieving filling height.

2. A filling structure according to claim **1,** in which said control means is adjustable in the longitudinal direction of the bore which extends through said first valve body, and manually operating adjusting means operatively connected to said control means for adjusting the same.

3. A filling structure according to claim **2,** which includes shank means reciprocably guided in said second valve body and having one end connected to said adjusting means whereas its other end is connected to said control means.

4. A filling structure according to claim **3,** in which said adjusting means includes sleeve means connected to said second valve body, and hand wheel means connected to said sleeve means, said shank means being coupled to said sleeve means.

* * * * *

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,779,293 Dated December 18, 1973

Inventor(s) Klaus Kaiser

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

On the cover sheet Item [73] should read:

-- [73] Assignee: Seitz-Werke G.m.b.H., Bad Kreuznach, Germany --.

This certificate supersedes Certificate of Correction issued October 8, 1974.

Signed and sealed this 15th day of April 1975.

(SEAL)
Attest:

RUTH C. MASON
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents
and Trademarks

FORM PO-1050 (10-69)

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U.S. GOVERNMENT PRINTING OFFICE: 869-930

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,779,293 Dated December 18, 1973

Inventor(s) Klaus Kaiser

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Item [73] line 2, "Strauss" should read -- Strasse --.

Signed and sealed this 8th day of October 1974.

(SEAL)
Attest:

McCOY M. GIBSON JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents

FORM PO-1050 (10-69)

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