PATENTS EXAMINATION BOARD

PRACTICAL LEGAL PROBLEMS

EXAMINATION PAPER:	JUNE 2021
EXAMINERS:	J WHITTAKER
	D DOHMEN
MODERATOR:	H MOUBRAY
DURATION:	READING TIME - **1 HOUR**
	EXAMINATION TIME - **4 HOURS**
	TOTAL - **5 HOURS**

NOTES TO CANDIDATES:

1. Attached to the paper are copies of the following documents:

   (i) A copy of the Patents Act No. 57 of 1978;

   (ii) A copy of the Patent Regulations 1978; and

   (iii) A copy of the Uniform Rules of the High Court under the Superior Courts Act 10 of 2013 (Rules 6, 14, 17, 18, 19, 21, 22, 23, 24, 25, 30, 35, 36 and 37).

2. Each candidate is also allowed access to one dictionary during the Exam.

3. This paper consists of 6 pages and includes three questions for a total of 100 marks.

4. This paper also includes five annexures, namely:

(i) Annexure A – Particulars of Plaintiff's Claim (4 pages);

(ii) Annexure B – ZA 2011/01456 (7 pages);

(iii) Annexure C – Tax Invoice (1 page);

(iv) Annexure D – US 1,588,046 (2 pages); and

(v) Annexure E – US 3,994,312 (4 pages).

5. Prior to the hand out of the answer papers, candidates will have an opportunity to read the above documents and make notes for 60 minutes.

6. Where appropriate, reference should be made to case law, and conclusions should be supported by reasons and arguments.

Your client writes to you as follows:

"*Dear Patent Attorney,*

*Yesterday I received a summons from the Sheriff who advised me that legal proceedings have been instituted against my company, Awesome Valves (Pty) Ltd, which manufactures and supplies various different types of valves in South Africa. A copy of the particulars of claim is attached marked "**Annexure A**" from which you will see that Patented Products (Pty) Ltd claims that Awesome Valves has infringed South African patent 2011/01456 ("**the SA patent**"). A copy of the SA patent is attached to the particulars of claim and is marked "**Annexure B**".*

*More specifically, Patented Products claims that one of our pressure relief valves ("**our PR valve**") falls within the scope of each of claims 1 to 7 of the SA patent. We designed our PR valve about six months ago, after realising that there was a need in the South African market for a simple, relatively cheap, pressure relief valve to facilitate the inflation of a bicycle tire to a predetermined pressure. In this regard, many cyclists use service station air hoses to inflate their tires. Since bicycle tires are much smaller than automobile tires, they cannot take the pressures applied to conventional automobile tires. To avoid over-inflation of a bicycle tire at a service station, it is preferable to use a pressure relief valve which can regulate the maximum pressure applied to such a tire during inflation.*

Our PR valve, which we started selling in South Africa four months ago, is illustrated in FIGS. 1 to 3 of the drawings below (see the following page). FIG. 1 is a side view, in cross section, of our PR valve mounted on a valve stem extending from a bicycle tire; FIG. 2 is a cross section, taken along the line 2-2 of FIG. 1; and FIG. 3 is a cross section, similar to that of FIG. 2, showing the PR valve in a different condition.

FIG. 1 of the drawings shows a portion of a bicycle tire 1 having a conventional valve 2 which is externally threaded, as shown. Our PR valve consists of a tubular member 3, which defines an axial air passageway 4 in which a plunger 5 is mounted. An annular flange 6 on the plunger 5 reciprocates in an enlarged chamber 7 of the air passageway 4. A lower end

of the chamber 7 forms a shoulder 8 against which a lower end of a spring 9 abuts, and an upper end of the chamber 7 forms a shoulder 10 against which the annular flange 6 on the plunger 5 may abut. An upper end of the spring 9 engages a lower surface of the annular flange 6 thereby to bias the flange 6 against the shoulder 10 in a closed condition of the plunger 5.

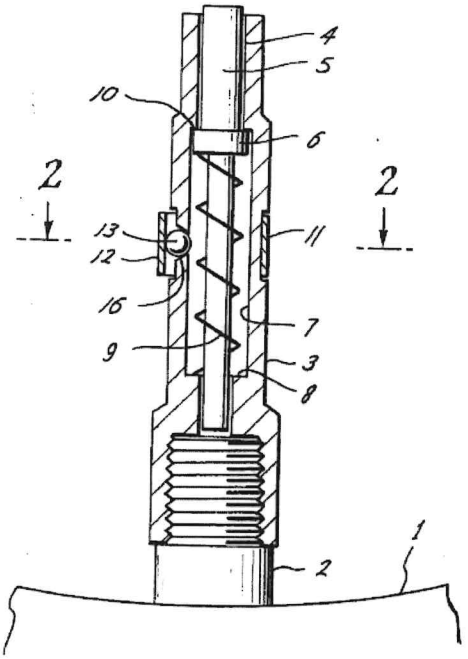


FIG 1

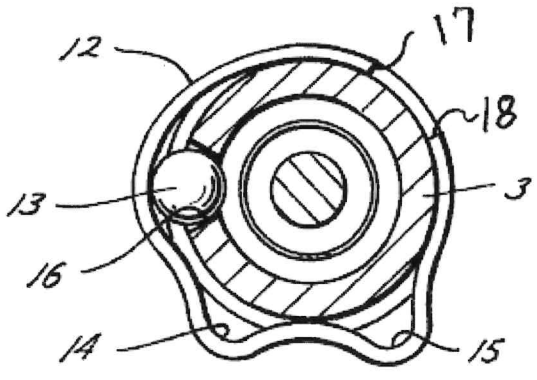


FIG 2

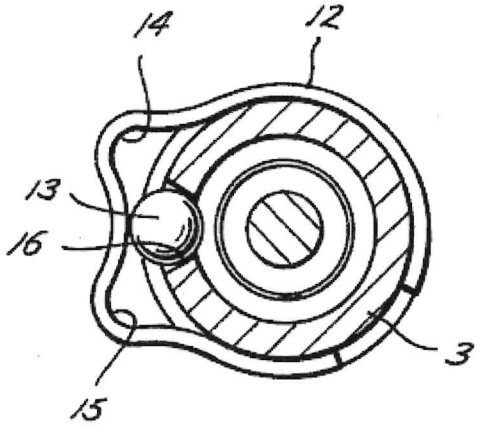


FIG 3

The plunger 5 extends downwardly through the passageway 4, and is configured to contact a valve stem (not shown) of the valve 2, in use. An outer wall of the tubular member 3 includes an annular groove 11 which is sized to receive a band 12 having two indentations 14 and 15 of different sizes (see FIGS. 2 and 3). A passageway 16, formed in the side wall of the tubular member 3, extends from the passageway 4 to the annular groove 11. The band 12 biases a ball 13 into a closed position, as shown in FIG. 1, in which the ball 13 seats in the passageway 16 to prevent airflow through this passageway. The band 12 is formed from a flexible material, and typically consists of a flat metal band with a spring tension and two spaced, opposed ends 17 and 18 which allow the band 12 to rotate between different positions within the annular groove 11.

In use, the tubular member 3 is mounted on the thread of the valve 2, as shown in FIG. 1, with the lower end of the plunger 5 adjacent an upper end of the valve stem of the valve 2. The band 12 is then rotated into a desired position, for example the position illustrated in FIG. 2 of the drawings. This position allows for the highest predetermined pressure of our PR valve, with lower predetermined pressures being achievable by rotating the band 12 into different positions with the ball 13 located in one of the indentations 14 and 15. When an air hose (not shown) is connected to the upper end of the tubular member 3, the plunger 5 is depressed, in turn depressing the valve stem of the valve 2, and permitting air to flow into the tire 1. When the selected predetermined pressure is reached, the ball 13 is forced outwardly against the bias of the band 12, away from the closed position, allowing excess pressurized air to escape through the passageway 16 to the atmosphere, thereby preventing any further inflation (i.e. over-inflation) of the bicycle tire 1.

Our PR valve has been well received in the market. In fact, the demand for our PR valve is so high that it has necessitated an expansion of our factory for the manufacture of the required volumes.

We therefore do not want to stop manufacturing and selling our PR valve, and would like you to assist us in defending the action taken by Patented Products. Please advise us as to our position and the best way forward.

Yours faithfully,

Awesome Valves (Pty) Ltd"

You conduct some background checks and establish that:

(a) ZA 2011/01456 [**Annexure B**] was filed on 24 February 2011 claiming priority from an earlier South African patent application which was filed on 3 March 2010;

(b) All formalities in respect of ZA 2011/01456 were correctly complied with; and

(c) ZA 2011/01456 is currently in force.

You also conduct a prior art search which locates the following documents:

(i) US 1,588,046 [**Annexure D**]; and

(ii) US 3,994,312 [**Annexure E**].

QUESTION 1 **(35 marks)**

Please provide your client with detailed advice on whether or not the manufacture and sale of the PR valve by your client amounts to infringement of the claims of ZA 2011/01456.

QUESTION 2 **(35 marks)**

Please provide your client with detailed advice on the validity of ZA 2011/01456 in light of US 1,588,046 and US 3,994,312.

QUESTION 3 **(30 marks)**

Please prepare a plea to the particulars of claim and, if appropriate, a counterclaim for the revocation of ZA 2011/01456.

ANNEXURE A

PARTICULARS OF PLAINTIFF'S CLAIM

1. The Plaintiff is PATENTED PRODUCTS (PTY) LTD, a private company incorporated according to the laws of the Republic of South Africa, having its registered office address at 120 Keyes Avenue, Centurion, Gauteng, Republic of South Africa.

2. The Defendant is AWESOME VALVES (PTY) LTD, a private company incorporated according to the laws of the Republic of South Africa, having its registered office address at 5 Binder Street, Pretoria, Gauteng, Republic of South Africa.

3. The Defendant manufactures and sells valves, including pressure relief valves, in South Africa.

4. The Plaintiff is the registered proprietor of South African patent 2011/01456 entitled "PRESSURE RELIEF VALVE" ("**the patent**").

5. The patent is valid and in full force and effect.

6. A copy of the specification of the patent is attached marked "**Annexure B**".

ANNEXURE A

7. From a date which presently is unknown to the Plaintiff, the Defendant has, without the authority of the Plaintiff, manufactured, sold and/or offered for sale, in the Republic of South Africa, a pressure relief valve for use in regulating the maximum pressure of a bicycle tyre during inflation.

8. The Defendant's pressure relief valve ("**the Defendant's valve**") falls within the scope of each of claims 1 to 7 of the patent.

9. In order to prove infringement, the Plaintiff will rely on a purchase of 50 of the Defendant's valves on 24 May 2021. A copy of an invoice evidencing the sale referred to immediately above is attached marked "**Annexure C**".

10. Accordingly, the manufacture, sale and/or offering for sale of the Defendant's valve amounts to an infringement of the patent.

11. The Plaintiff apprehends upon reasonable grounds that the Defendant will not desist from its infringement of the patent unless restrained by an order of the above Honourable Court.

ANNEXURE A

12. As a result of the Defendant's infringement of the patent, the Plaintiff has suffered, and will continue to suffer, damages in an amount which the Plaintiff is at present unable to quantify.

WHEREFORE the Plaintiff claims:

(a) an interdict restraining the Defendant from infringing South African patent 2011/01456;

(b) an order directing the Defendant to deliver up to the Plaintiff for destruction all infringing valves in the Defendant's possession or under its control;

(c) an order directing:

(i) an enquiry be held into any damages suffered by the Plaintiff as a result of the Defendant's infringement of the patent and/or as to what is a reasonable royalty; and

(ii) the Defendant to make payment to the Plaintiff of any damages found to have been suffered by the Plaintiff pursuant to such enquiry;

ANNEXURE A

(d) in the event of an enquiry in terms of sub-paragraph (c)(i) above being ordered and the parties being unable to reach agreement as to the future pleadings to be filed and as to discovery, inspection and/or other matters of procedure in relation to the enquiry, an order authorising either the Plaintiff or the Defendant to make application to the above Honourable Court for directions in regard thereto;

(e) an order that the costs of the action be paid by the Defendant, including the costs of two counsel and the qualifying fees of the Plaintiff's expert witness;

(f) further and/or alternative relief.

SIGNED AT PRETORIA THIS 14TH DAY OF JUNE 2021.

Cost a Lot

COSTALOT
Plaintiff's Patent Attorneys
PRETORIA

ANNEXURE B

ZA 2011/01456

PRESSURE RELIEF VALVE

BACKGROUND OF THE INVENTION

This invention relates to the inflation of pneumatic tires and more particularly to a pressure relief device to prevent over-inflation of pneumatic bicycle tires.

During the inflation of pneumatic tires, care must be taken not to over-inflate the tires. For example, the tires of bicycles require a relatively high air pressure but a low volume of air. If such bicycle tires are inflated with any device other than a hand pump, a possibility exists that the tires will rupture, thereby requiring tube and possibly tire replacement, as well as possibly resulting in bodily injury.

SUMMARY OF THE INVENTION

In accordance with the present invention, a pressure relief valve is provided which is particularly advantageous for use with bicycle tires and the like due to its low cost, ease of use and ruggedness of construction.

The pressure relief valve according to the invention includes a body having a primary passageway extending therethrough. A first end of the body is configured to be connected to the end of a pressurized air hose, and the second end of the body is configured to be connected to a valve stem of a pneumatic tire. A primary valve closure is displaceable within the primary passageway between an open position, in which it allows airflow through the primary passageway, and a closed position in which it prevents airflow through the primary passageway. A secondary passageway extends from the primary passageway to an outlet for discharging excess pressurised air. A secondary valve closure is displaceable, against the bias of a spring, from a closed position, in which it prevents airflow through the secondary passageway, to an open position for allowing excess pressurised air to discharge from the valve when the air pressure within the primary passageway reaches a predetermined magnitude.

ANNEXURE B

ZA 2011/01456

Further features of the invention are set out in the appended claims.

DESCRIPTION OF THE DRAWINGS

For a more complete understanding of the present invention, reference is made to the following description taken in conjunction with the accompanying drawings, in which:

FIG. 1 is a perspective view of the pressure relief valve of the invention when attached to a bicycle tire; and

FIG. 2 is a sectional view taken through the pressure relief valve shown in FIG. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENT

FIG. 1 illustrates the pressure relief valve 10 of the invention attached to a valve stem 12 of a conventional bicycle tire 14. The pressure relief valve 10 comprises a body 16 having a somewhat triangular configuration, with a cylindrical extension 18 at a first end of the body. Exterior threads 20 are formed about the extension 18 for threaded connection to an end 22 of a conventional pressurized air hose 24. It should however be understood that the present device 10 may be used with the type of air hose generally found in service stations and the like in which case the threads 20 would not be necessary. A first valve closure in the form of a plunger 26, to be subsequently described, is disposed through the extension 18 and extends through the body 16, in use, to open the Schrader valve normally found in the valve stem of a bicycle tire.

The width of the body 16 is relatively narrow and is narrower than the rim 30 of the bicycle tire 14 in order that the device 10 may be disposed between the spokes 28 and attached to the valve stem 12 during use of the bicycle, if desired. A relief slot 32 is formed along one edge of the body 16 to vent excess pressurized air to the atmosphere, preventing over-inflation of the tire 14.

ANNEXURE B

ZA 2011/01456

The body 16 may be economically constructed by injection moulding or the like from a thermoplastic material such as Noryl. As will be subsequently described, the remaining components of the device may be inexpensively made and provide a very rugged construction to enable use of the device during normal operation of a bicycle.

FIG. 2 illustrates in detail the interior construction of the device 10. A primary passageway 34 extends through the body 16 and includes a counter bore 36 formed at an upper end of the passageway in the extension 18. Vent slots 38 are formed in the bottom of the counter bore 36, and an enlarged section 40 of the plunger 26 abuts with an annular shoulder formed by the counter bore 36 to retain and limit the downward travel of the plunger 26. The vent slots 38 enable the passage of pressurized air through the passageway 34, from the counter bore 36, when the plunger 26 is fully downwardly depressed.

A second counter bore 42 is formed in the lower region of the passageway 34, and a set of interior threads 44 allow for connection of the device 10 to a threaded end of the valve stem 12 on the bicycle tire 14. The plunger 26 includes an enlarged portion 46 which abuts with an annular shoulder formed by the counter bore 42 to limit the upward travel of the plunger 26. As can be seen, the plunger 26 is thus freely displaceable along the passageway 34, but is limited in travel by the enlarged portions 40 and 46. The plunger 26 is of sufficient length that, when it is depressed by connection of the end of the pressurized air hose 24 to the extension 18, it causes the lower portion 48 thereof to open the Schrader valve in the valve stem 12 of the bicycle tire 14, thereby enabling inflation of the bicycle tire.

A secondary passageway 50 communicates at one end with the primary passageway 34 and includes a counter bore 52, as shown. Interior threads 54 are defined at the end of the secondary passageway 50 to enable attachment of a relief set screw 56 therein. A projection 58 of the set screw 56 maintains a spring 60 in place within the counter bore 52. The spring 60 biases a secondary valve closure, in the form of a ball 62, against an annular shoulder of the counter bore 52 to close the secondary passageway 50. As can be seen, the relief slot 32 provides a pathway for air to flow from the secondary passageway 50 to the atmosphere.

ANNEXURE B

ZA 2011/01456

At a predetermined maximum air pressure in the primary passageway 34, the ball 62 is displaced, against the bias of the spring 60, to vent excess pressurized air through the secondary passageway 50 and out the relief slot 32 to the atmosphere. The relief set screw 56 may be adjusted along the threads 54 in order to predetermine the magnitude of air pressure required to displace the ball 62 against the bias of the spring 60.

The secondary passageway 50 is disposed at an acute angle relative to the primary passageway 34 to enable the use of a relatively long spring 60. If the secondary passageway 50 were disposed at a right angle to the passageway 34, the passageway 50 and the spring 60 would be relatively short, making it difficult during mass production to maintain the necessary tolerances required for the correct spring characteristics. In other words, the longer secondary passageway 50, as shown in FIG. 2, facilitates mass production of the device 10.

In operation of the device 10, the threaded portion 44 of the body 16 is screwed onto the end of the valve stem 12 so that the device is firmly connected to the bicycle tire 14 and may be maintained in place during normal operation of the bicycle. When it is desired to inflate the tire 14, the end of a pressurized air hose is connected to the extension 18, forcing the plunger 26 downwardly and actuating the Schrader valve within the valve stem 12 of the tire 14. Pressurized air from the air hose then passes through the primary passageway 34 to inflate the tire 14. When a predetermined pressure is reached, as determined by the setting of the relief set screw 56, the ball 62 is displaced out of abutment with the annular shoulder of the counter bore 52, thereby venting excess pressurized air through the secondary passageway 50 and out the relief slot 32 to the atmosphere. With the tire 14 inflated to the desired pressure, the air hose may be disconnected from the device 10.

ANNEXURE B

ZA 2011/01456

CLAIMS

1. A pressure relief valve for attachment to a valve stem on a bicycle tire to prevent pressurization of the bicycle tire above a predetermined pressure, the pressure relief valve including:

   (a) a body having a first end and a second end;

   (b) the first end of the body being connectable to a source of pressurised air;

   (c) the second end of the body being connectable to the valve stem of the bicycle tire;

   (d) a primary passageway extending from the first end of the body to the second end of the body;

   (e) a primary valve closure which is displaceable within the primary passageway between an open position, in which it allows airflow through the primary passageway, and a closed position in which it prevents airflow through the primary passageway;

   (f) a secondary passageway extending from the primary passageway to an outlet;

   (g) a secondary valve closure which is displaceable between an open position, in which it allows airflow through the secondary passageway, and a closed position in which it prevents airflow through the secondary passageway; and

   (h) biasing means for biasing the secondary valve closure into the closed position.

2. A pressure relief valve according to claim 1, wherein the primary valve closure comprises a plunger having at least one enlarged portion which abuts an annular shoulder to limit displacement of the plunger within the primary passageway.

ANNEXURE B

ZA 2011/01456

3. A pressure relief valve according to either claim 1 or claim 2, wherein the secondary passageway is disposed at an acute angle relative to the primary passageway.

4. A pressure relief valve according to any one of the preceding claims, wherein the secondary valve closure comprises a ball which is arranged to seat against a formation in the secondary passageway in the closed position.

5. A pressure relief valve according to any one of the preceding claims, including adjustment means for adjusting the bias of the biasing means.

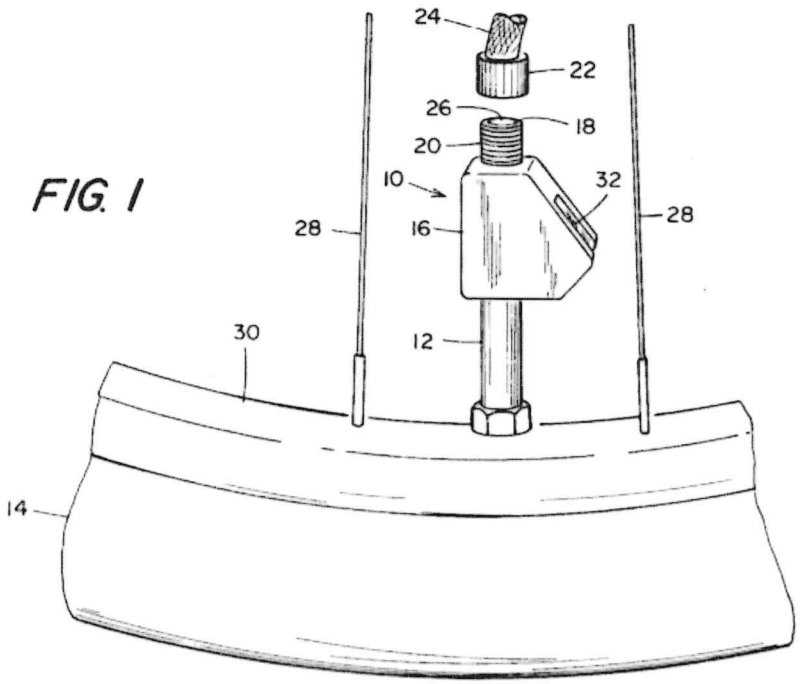
6. A pressure relief valve according to claim 5, wherein the adjustment means comprises a relief set screw.

7. A pressure relief valve according to any one of the preceding claims, wherein the biasing means comprises a coil spring.

ANNEXURE B

ZA 2011/01456

FIG. 1



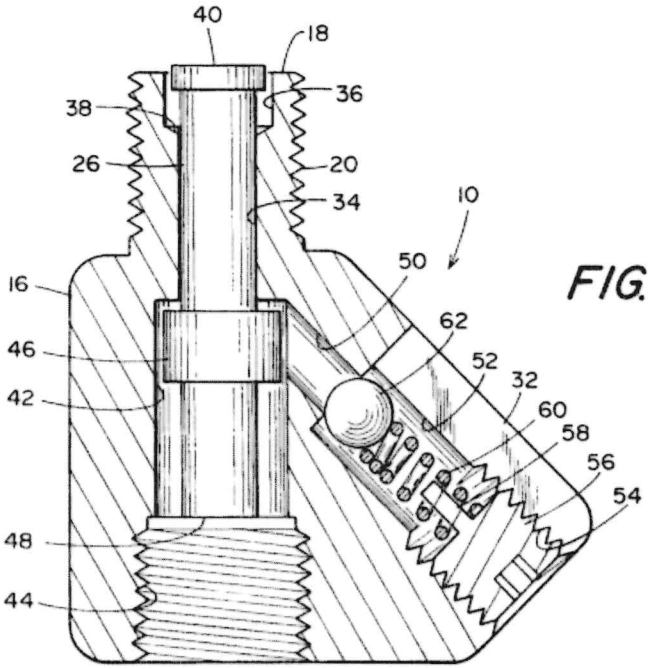


FIG. 2

ANNEXURE C

TAX INVOICE

Awesome Valves (Pty) Ltd
5 Binder Street
Pretoria
0001

Reg. No. 2001/224096/22
Vat Registration: 3441283636

Tel: (012) 314 3321

Date: 24 May 2021

Invoice No.: IN0223

To: Mr G Smith
24 6th Street
Houghton
Johannesburg

Code	Description	Quantity	Unit Price	Tax	Net Price
015	PR Valve	50	R48.00	15.00%	R2,400.00

Sub Total:	R2,400.00
Discount:	R0.00
Amount Excl. Vat	R2,400.00
Vat:	R360.00
Total:	**R2,760.00**

ANNEXURE D

June 8 . 1926. 1.588,046

N. S. NELSON

TIRE POP VALVE

Filed July 16, 1925

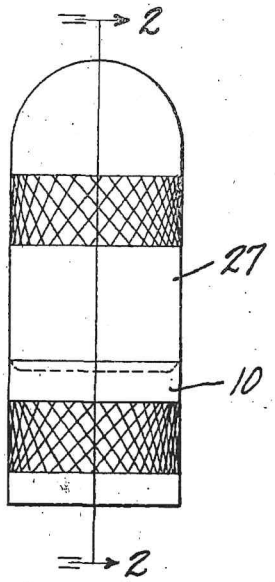


Fig. 1

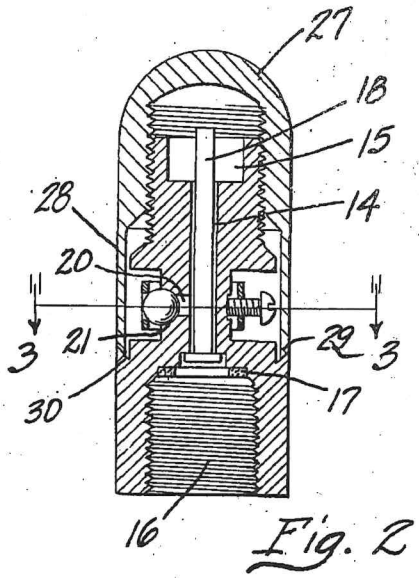


Fig. 2

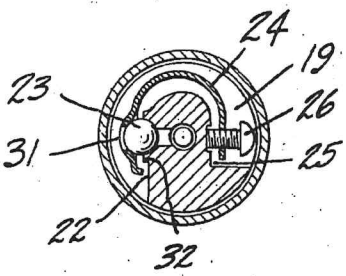


Fig. 3

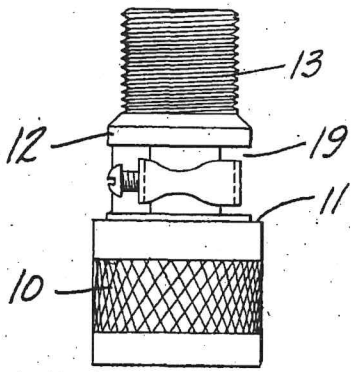


Fig. 4

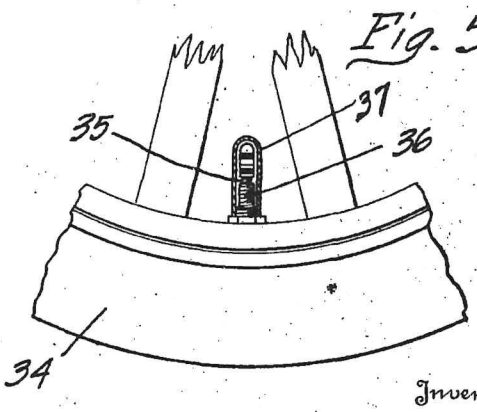


Fig. 5

Inventor

NELS S. NELSON

By J. King Harness

Attorney

ANNEXURE D

Patented June 8, 1926. 1,588,046

UNITED STATES PATENT OFFICE.

NELS S. NELSON, OF PONTIAC, MICHIGAN, ASSIGNOR OF ONE-HALF TO GEORGE A. SUTTON, OF PONTIAC, MICHIGAN.

TIRE POP VALVE.

Application filed July 16, 1925. Serial No. 43,974.

The primary object of my invention is to provide a simple and economical means to be secured to a tire inflation valve for the purpose of releasing excess air over a predetermined pressure when the tire is being inflated.

It is a further object of my invention to provide my valve with a body portion of soft metal and a cap of rigid or stiff metal so that the entire device when assembled will be air tight.

Another object of my invention is to provide a device that can be cheaply manufactured, easily secured to a tire valve so that the valve dust cap can be fitted over the entirety, and one that will not interfere with the inflation of a tire up to a predetermined pressure.

With these and other objects in view, my invention consists in the arrangement, combination and construction of the various parts of my improved device, as described in the specification, claimed in my claim and shown in the accompanying drawing, in which:

Fig. 1 is a front elevation of my improved device.

Fig. 2 is a sectional view taken on line 2—2 of Fig. 1.

Fig. 3 is a sectional view taken on line 3—3 of Fig. 2.

Fig. 4 is a front elevation of the body portion of my improved device.

Fig. 5 is a front elevation showing my improved device attached to a tire valve.

I have shown a valve body portion 10 having a shoulder 11 and adjacent thereto a reduced top 12, from which extends a threaded stem 13. The shoulder 11 has a groove 30 extending downwardly and inwardly from its edge.

Extending through the entire body portion is an air passage 14 that has the countersunk end 15 in the stem and the opposite end enlarged and threaded, as at 16. A washer 17 is placed in the enlarged end 16 and a pin 18 extends from the enlarged end 16 through the passage and projects from the countersunk end 15 thereof.

Suitably positioned in the top 12 is a slot 19. A port 20 having the ball seat 21, with the offset shoulder 32, extends from one side 22 of the slot 19 into the air passage 14. A ball 23 is positioned in the ball seat 21 by a cupped pocket 31 in a spring clip 24 that is secured on the opposite side 25 of the slot by the tension screw 26.

An internally threaded cap 27, having a reduced lower portion 28 is tapered downwardly and inwardly at its edge 29. The body portion 10 of my device is preferably made of some soft metal as brass, and the cap is made of steel, so that when the cap is threaded onto the stem 13, the edge 29 will firmly fit into the groove 30, thus making the entire device air tight.

In the practical use of my improved device, the body portion 11 is secured to a tire 34 by threading the end 16, of the passage 14 onto a tire valve stem 35 so that the pin 18 will co-act with the pin of the tire valve 36. The tension screw 26 is then either tightened or loosened to set the amount of pressure required to release the ball 23 from its seat. Thus, in filling the tire 34 with air when the predetermined pressure is reached, the air will pass through the port 20 and partially release the ball 23 from its seat 21, the air then passes through and strikes the pocket 31 and due to the additional surface thereof the ball 23 is lifted entirely from its seat 21 for releasing the excess air.

It will be noted that my device acts as an air tight cap for the valve 36 and that the conventional type dust cap 37 as shown in Fig. 5 can be placed over my device and secured to the valve.

It is obvious that various changes may be made in the arrangement, combination and construction of the various parts of my improved device without departing from the spirit of my invention, and it is my intention to cover by my claim such changes as may be reasonably included within the scope thereof.

What I claim is:

A device of the class described comprising a body member having a slot therein, a passage extending therethrough, a pin in part of said passage, a port from said passage to said slot, a ball seat in said port, a ball positioned in said seat, a spring clip having a cupped pocket adapted to hold said ball in place until a predetermined pressure is exerted against the same, and a tension screw securing said clip on the opposite side of said ball and adapted to regulate the pressure said spring will withhold.

NELS S. NELSON.

United States Patent [19]

Tanner et al.

[11] **3,994,312**

[45] **Nov. 30, 1976**

[54] **INFLATION PRESSURE REGULATOR**

[75] Inventors: **James L. Tanner**, Reseda; **George Sanchez**, Compton, both of Calif.

[73] Assignee: **Tanner Electronic Systems Technology, Inc.**, Northridge, Calif.

[22] Filed: **May 19, 1975**

[21] Appl. No.: **578,448**

[52] **U.S. Cl.** **137/226**; 137/510; 137/543.15; 73/146.8

[51] **Int. Cl.²** **F16K 15/20**

[58] **Field of Search** 137/224, 226, 223, 230, 137/510, 228, 227, 543.15, 556; 73/146.8; 251/63

[56] **References Cited**

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3,889,530	6/1975	Bluem	137/228
3,906,988	9/1975	Mottram	137/227

FOREIGN PATENTS OR APPLICATIONS

161,145	6/1933	Switzerland	137/510

Primary Examiner—Harold W. Weakley
Attorney, Agent, or Firm—Jessup & Beecher

[57] **ABSTRACT**

An inflation pressure regulator which automatically releases pressure above a predetermined maximum. The regulator has a tubular base extending into the hollow interior of a housing. A collar slideably mounted on the tubular base is biased against the interior of the housing with a coil spring to regulate the pressure. An inflation gas is supplied through the neck of the housing which has a plunger extending through the tubular base. A threaded cavity in the base permits permanent installation on an inflation valve.

4 Claims, 2 Drawing Figures

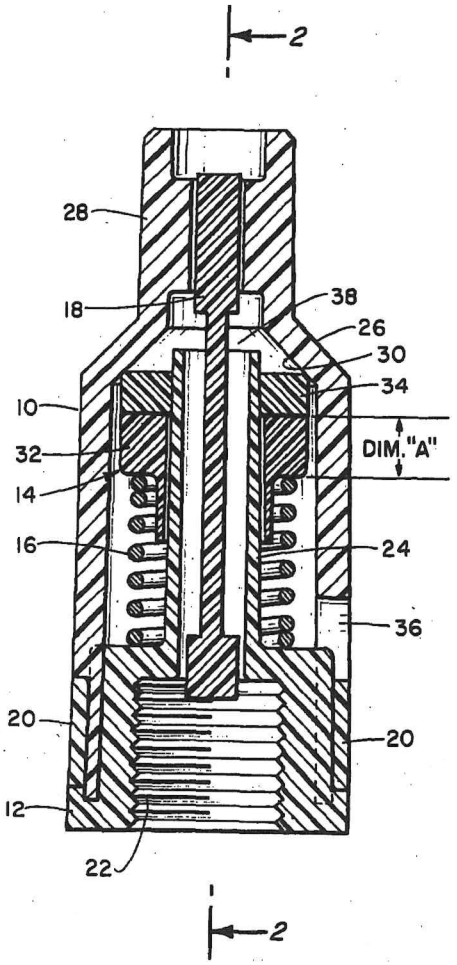


Fig. 1.

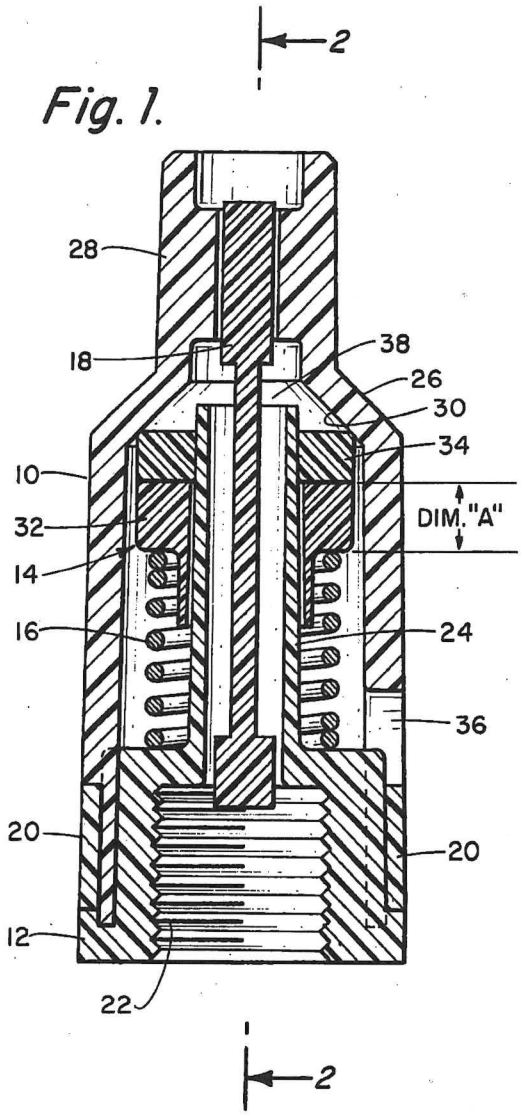
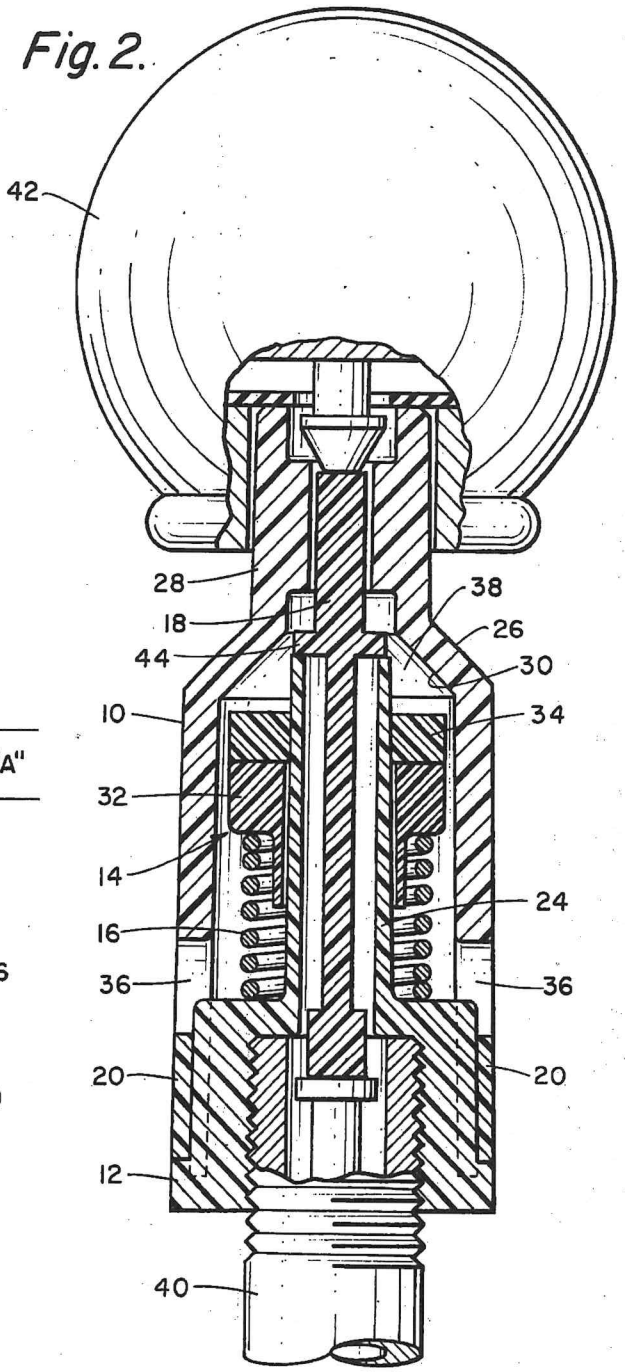

2
28
18
38
26
30
34
10
32
DIM. "A"
14
16
24
36
20
20
12
22
2

Fig. 2.


42
28
38
18
26
44
30
10
34
32
14
24
16
36
36
20
20
12
40

INFLATION PRESSURE REGULATOR

BACKGROUND OF THE INVENTION

The invention relates generally to pressure regulators and more particularly relates to devices for automatically limiting tire pressure.

Often when inflating tires, no means is readily available to indicate or limit the maximum pressure. In small tires, such as those used on bicycles, extreme caution must be exercised because maximum pressure is quickly reached. Further, tire inflation can be a nuisance because accurate pressure cannot be achieved without constant checking.

There are devices available which limit tire inflation pressure but they are generally complicated devices with valves, springs, balls and vent tubes. One such device has separate supply and vent tubes and must be held in place during inflation. It would be desirable if the device could permanently be installed and automatically limit tire inflation pressure whenever a gas is supplied.

The invention disclosed provides such a solution and yet is simple in construction and easy to use. When installed on a valve, a plunger may be activated to force the valve stem down, permitting inflation. Surrounding the plunger is a vent tube and cavity between the regulator housing and vent tube. A spring-biased collar between the vent tube and housing releases excess gas when a tire is inflated to maximum pressure. The thickness of the collar determines maximum pressure by increasing the spring pressure.

It is one object of the present invention to provide an inflation pressure regulator which is simple in construction and easy to use.

Yet another object of the present invention is to provide a pressure regulator which can be permanently installed.

Still another object of the present invention is to provide a pressure regulator which can be adapted for a variety of pressures by a simple change in construction.

These and other objects will become obvious when the following disclosure is considered in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a sectional view of the inflation pressure regulator.

FIG. 2 is a sectional view of the air pressure regulator taken along line 2—2 of FIG. 1 illustrating its operation.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIG. 1, there is shown an inflation pressure regulator comprised of a housing **10**, base **12**, collar **14**, spring **16**, and plunger **18**. Around the circumference of the regulator between the base **12** and housing **10** is a ring **20** coded with color or in some other convenient manner to indicate the pressure rating of the regulator.

The tubular base **12** is constructed with a threaded cavity **22** which fits most standard valves and a vent tube **24** extending into the interior of housing **10**. Slideably mounted on the vent tube **24** is a collar **14** which controls the maximum inflation pressure.

Housing **10** narrows down at **26** to neck **28** which fits the nozzle of a standard air hose. The narrowing portion **26** provides a seat surface **30** to assure a good seal. The housing **10** and base **12** are preferably made from a non-corrosive material such as a polyvinylchloride (PVC) plastic. They are fastened to each other in any suitable fashion such as with a resin cement.

Collar **14** is comprised of a solid pressure ring **32** seated on spring **16** and a pad of resilient material **34** attached to the ring. The spring **16** between the base **12** and pressure ring **32** forces the resilient pad **34** against the seat surface **30** to seal a tire from leakage. The sealing provided by collar **14** acting against seat surface **30** closes off vent tube **24** preventing the escape of gas from a pressurized container such as a tire. Inflation pressure above a predetermined amount forces the collar **14** down, allowing excess pressure to escape through a plurality of vent holes **36** in the housing **10**. Four or more equally spaced vent holes **36** should be adequate.

An important feature of the regulator is the manner in which a variety of pressure ratings can be provided for by a simple change in construction. The pressure rating is determined very easily by the thickness (DIM "A") of pressure ring or spacer **32**. That is an increase in DIM "A" will increase the compressive force of spring **16**, permitting a higher inflation pressure. Conversely, decreasing DIM "A" will lower the maximum inflation pressure.

For permanent installation cavity **22** is threaded, permitting the regulator to be screwed on a valve. When screwed on a valve, plunger **18** lightly contacts the end of the valve stem and will allow air (or other gas) to be released through the vent tube into cavity **38** above collar **14**, if activated. As long as the tire pressure is below the rating of the regulator, no gas will escape. The manner in which neck **28** permits tire inflation while the regulator is permanently installed is illustrated in FIG. **2**.

FIG. **2** shows the regulator threaded on a valve **40**. An air hose nozzle **42**, when pressed over neck **28**, presses down on plunger **18** to release the stem of valve **40**. Extensions **44** on plunger **18** act to retain the plunger between the housing **10** and vent tube **24** of the base **12**. This allows air to flow from nozzle **42** through the regulator into a tire or other device being inflated. When the tire is inflated to the pressure rating of the regulator, collar **14** will open causing air to rush out vent holes **36**. Thus a tire can be quickly inflated by simply screwing on the regulator and applying an air hose nozzle until the user hears or feels air rushing out vent holes **36**. The regulator can then simply be unscrewed for use on another tire or left on permanently.

Obviously many modifications will become apparent to those skilled in the art in light of the above teachings. Thus, within the scope of the appended claims the invention may be practiced other than as specifically described.

What is claimed is:

1. A readily removable tire inflation regulator comprising:

a hollow housing having a cylindrical section narrowing down to a narrow neck adapted to receive an air hose nozzle at one end and at least one aperture in the cylindrical surface at the other end;

a base attached to said housing having a cylindrical threaded cavity adapted to removably attach the regulator to a tire valve;

said base having an integral elongate vent tube at the terminus of the threaded cavity extending into the hollow housing to a point near the neck;

a collar slideably fitted over said tube between the tube and the housing;

a spring biasing said collar against the inside surface of the narrowing down portion of said housing to seal the regulator preventing the escape of air from said tube below a predetermined pressure during inflation;

a plunger retained between said vent tube and said neck;

said plunger extending into said neck adapted to engage a stem in a nozzle of an air hose at one end and into the threaded cavity adapted to engage a stem in a valve at the other end; and

shoulder extension means mounted on said plunger between the end of the vent tube and the neck to retain the plunger.

2. The pressure regulator according to claim **1** wherein said collar comprises:

a pressure ring;

a resilient seal attached to said pressure ring.

3. The pressure regulator according to claim **2** wherein the maximum pressure is determined by the thickness of said pressure ring.

4. The pressure regulator according to claim **3** wherein said pressure ring comprises:

a changeable spacer for varying the force of said spring;

said spacer being comprised of a ring of solid material of selectively different thicknesses which may be inserted between the resilient seal and the spring whereby the release pressure of said regulator may be increased or decreased.

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