

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
19 February 2004 (19.02.2004)

PCT

(10) International Publication Number
WO 2004/014498 A1

(51) International Patent Classification⁷: **A63B 69/40**

(21) International Application Number:
PCT/GB2003/003405

(22) International Filing Date: 6 August 2003 (06.08.2003)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
0218537.9 9 August 2002 (09.08.2002) GB

(71) Applicant and

(72) Inventor: **REES, Colin** [GB/GB]; Prospect Cottage,
Oxwich Green, Slade, Gower, Swansea SA3 1NA (GB).

(74) Agent: **STRACHAN, Victoria, Jane**; Urquhart-Dykes &
Lord, Alexandra House, 1 Alexandra House, Swansea SA1
5ED (GB).

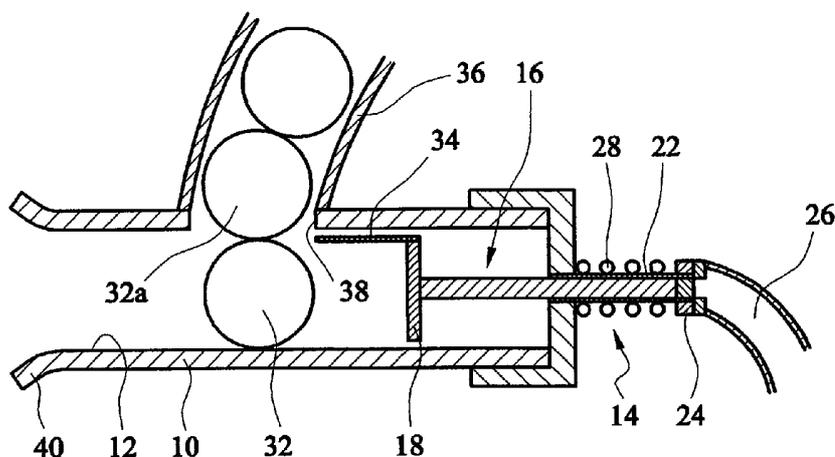
(81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— with international search report

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: BALL SHOOTING APPARATUS



(57) Abstract: Apparatus for shooting a plurality of balls toward a target, such as a goal mouth or the like, the apparatus comprising a plurality of delivery tubes (10) mounted in spaced apart relation within a housing (50). A pneumatic or hydraulic propulsion arrangement is provided for each of the delivery tubes (10). Each propulsion arrangement comprises an arrangement (16) which extends into the respective delivery tube (10) and is movable between a contracted configuration and an extended configuration in which it contacts a ball (32) located within the tube (10) and causes it to be propelled out of the open end (12) of the delivery tube (10). A single compressor and control system (not shown) are provided to selectively operate each of the delivery tubes (10) individually. The apparatus may be operated remotely via a remote control panel (56).

WO 2004/014498 A1

Ball Shooting Apparatus

This invention relates to apparatus for shooting balls, and more particularly to apparatus for propelling one or more balls in selected directions with minimal user intervention being required, for use in football training and the like.

In football training, it is necessary for the goal keeper of a team, in particular, to practice preventing balls propelled from various angles relative to the goal mouth from entering the goal. In many cases, such goal keeping training is carried out by one or more other members of a team firing balls at the goal mouth from various angles. However, this method, although commonly used, is not always ideal, for many reasons.

Many different types of ball shooting apparatus have been proposed in the past, for use in football, tennis and baseball. However, such systems are often very complex and do not adequately simulate ball shooting as it would be performed by a human.

I have now devised an improved arrangement which is relatively simple and can accurately shoot one or more balls toward a chosen target with minimal user intervention being required.

In accordance with the present invention, there is provided apparatus for propelling a ball toward a target, the apparatus comprising a delivery tube defining a channel for receiving a ball, and propulsion means which is hydraulically or pneumatically operable to propel said ball out of an end of said delivery tube by movement between a contracted position and an extended position in which it contacts the ball, the line of movement of said propulsion means being substantially parallel to at least a portion of said channel of said delivery tube.

Also in accordance with the present invention, there is provided apparatus for propelling a plurality of balls toward one or more selected targets, the apparatus comprising means for holding a plurality of balls, a plurality of respective hydraulic or pneumatic propulsion means for propelling each of said plurality of balls toward said one or more selected targets, and a

-2-

single hydraulic or pneumatic source and control means for selectively operating all of said plurality of hydraulic or pneumatic propulsion means.

In contrast to conventional arrangements, the apparatus according to the present invention provides a simple, accurate and versatile system for shooting balls toward a target. A sight or view finding type arrangement may be provided to allow a user to preview the exact target at which a delivery tube is aimed, so as to accurately set the apparatus, as required.

A mechanical bias means, such as a spring or the like is preferably provided to cause the propulsion means to return to its starting position once the ball has been propelled out of a delivery tube. An angular lip or flange is preferably provided at the end of the delivery tube from which the ball is propelled out. A deflection member may also be provided to deflect the ball as it is propelled out of the delivery tube, so as to cause it to spin. Alternatively, or in addition, the delivery tube may comprise two tubular sections, disposed at an angle (which may be variable) to each other, the propulsion means being operable to propel a ball from the first section, into the second section and out of the delivery tube.

A ball feeding apparatus is preferably provided to feed another ball into a delivery tube after a ball has been propelled therefrom. The ball feeding apparatus preferably comprises a flexible feed channel communicating with an opening in the or each delivery tube, which channel has a plurality of balls therein, resting one on top of the other. The next ball to be fed to the delivery tube preferably rests on the ball actually located in the delivery tube, and the propulsion arrangement beneficially includes a closing member, operable when the propulsion arrangement is operated, to temporarily close the opening in the delivery tube so as to prevent the next ball from dropping into the delivery tube until after the current ball has been propelled from the tube. In an alternative embodiment, a closure member may be provided in respect of the opening in each delivery tube, which closure may be manually or remotely operable to permit the next ball to drop into the delivery tube, as required.

The ball shooting apparatus of the present invention preferably comprises a plurality of delivery tubes and associated propulsion arrangements mounted within a housing. A

-3-

compressor or similar pneumatic source is beneficially mounted in or on the housing. The housing may be mounted on one or more rollers or wheels to enable the apparatus to be conveniently moved to any required position. The housing is beneficially provided with an opening for feeding balls into the apparatus, the opening communicating with the inlet of a respective feed channel communicating with each of the delivery tubes. A sensor may be provided, beneficially as part of the propulsion apparatus, for providing an indication in the event that no ball is located in a delivery tube.

The apparatus preferably comprises a remote control arrangement for initiating operation thereof. The apparatus may also be provided with a security system for preventing unauthorised use thereof.

The angle and/or orientation of the or each delivery tube or barrel is preferably adjustable, manually or otherwise, as required. Locking means may be provided to lock a delivery tube in a desired position after adjustment thereof.

Embodiments of the present invention will now be described by way of examples only and with reference to the accompanying drawings, in which:

Figures 1a, 1b and 1c are simplified schematic cross-sectional side views of ball shooting apparatus according to a first exemplary embodiment of the present invention;

Figures 2a, 2b and 2c are simplified schematic cross-sectional side views of ball shooting apparatus according to a second exemplary embodiment of the present invention;

Figure 3 is a schematic front view of a ball shooting system according to an exemplary embodiment of the present invention;

Figure 4 is a schematic side view of the ball shooting system of Figure 3;

-4-

Figure 5 is a schematic partial cross-sectional view of a delivery tube or barrel for use in ball shooting apparatus according to an exemplary embodiment of the present invention;

Figure 6 is a schematic plan view of the ball shooting system of Figure 3; and

Figure 7 is a schematic cross-sectional view through line A-A of the ball shooting system of Figure 3.

Referring to Figures 1a, 1b and 1c of the drawings, ball shooting apparatus according to a first exemplary embodiment of the present invention comprises a delivery tube 10 having an open end 12. Mounted at the opposite end of the tube 10 is a propulsion system denoted generally at 14. The propulsion system 14 comprises a cylinder or piston 16 (which may be partially or substantially wholly made of nylon or similar material) which extends into the delivery tube 10 and includes an end plate 18. At the opposite end of the cylinder 16 to the end plate 18, there is provided a chamber 22, the cylinder or piston 16 being slidably mounted within the chamber 22 by means of an air-tight cylinder or connector 24, the other end of the chamber 22 being connected to a flexible hose 26 by means of which air is supplied to the arrangement from a compressor (not shown). A spring 28 is connected between the connector 24 and the flexible hose 26, as shown, and a stop member 30 is provided at the point where the piston or cylinder 16 enters the delivery tube 10. A ball 32 is located within the delivery tube 10, as shown. A view finding or sight arrangement 70, comprising (in its simplest form) a reflector 72 and a lens 74, may be provided to enable a user to preview and set the desired target.

In use, when it is required to propel the ball 32 out of the delivery tube 10 through the open end 12, a pulse of air is supplied under pressure to the propulsion apparatus 14 via the flexible hose 26. The pulse of air travels through the chamber 22 to the air-tight cylinder or connector 24. The force created by the air against the connector 24 causes the piston arm 20 to move, extending further into the delivery tube 10, until the connector 24 hits the stop member 30. This movement of the cylinder 16 causes the end plate 18 to contact the ball 32 with a substantial force to propel the ball 32 through the delivery tube 10 and out of its open end 12. Furthermore, as the end plate 18 moves, the spring 28 is extended, thereby applying a spring

-5-

bias to the arrangement, such that, when the force from the pulse of air from the compressor has been translated into mechanical movement of the end plate 18 and discharged through contact with the ball 32, the spring 28 contracts and pulls the arrangement back to its starting position, as shown in Figure 1c.

Referring to Figures 2a, 2b and 2c of the drawings, ball shooting apparatus according to a second exemplary embodiment of the present invention is similar in many respects to the embodiment described above with respect to Figures 1a, 1b and 1c, and like components are denoted by the same reference numerals. However, in this case, the spring 28 is connected between the connector 24 and the point at which the piston or cylinder 16 enters the delivery tube 10, as shown, such that, when a pulse of air from the compressor causes the end plate 18 to extend further into the delivery tube 10, the spring 28 is compressed to create a spring bias for causing the piston to return to its starting position when the force from the pulse of air has been discharged by propelling the ball 32 out of the tube 10. In addition, the open end 12 of the delivery tube 10 is provided with an outwardly curved lip 40. This lip may be formed integrally with the end of the tube 10, or may be provided as a separate component which can be fitted over the end of the tube 10, as required.

Furthermore, connected at the top of the end plate 18 is a cover member 34 which is substantially perpendicular to the end plate 18. The apparatus includes a ball feeding apparatus comprising a flexible feed channel 36 communicating with an opening 38 in the delivery tube 10. A number of balls 32 are lined up in the feed channel 36, and the next ball 32a to be fed to the apparatus rests on the ball 32 currently lined up to be shot. Referring to Figure 2b of the drawings, when the piston is actuated and the current ball 32 is shot out of the delivery tube 10, the cover member 34 moves across the opening 38 in the delivery tube 10 to prevent the next ball 32a from dropping into the tube 10. When the propulsion arrangement returns to the starting position, the cover member 34 moves away from the opening 38 and permits the next ball 32a to drop down into the tube 10 ready to be shot, as shown in Figure 2c of the drawings.

-6-

It will be appreciated that the pneumatic cylinder 16 described above in relation to Figures 1 and 2 of the drawings, may be replaced by, for example, a hydraulically or pneumatically operable piston arrangement or the like.

Referring to Figures 3, 4 and 6 of the drawings, a ball shooting system according to an exemplary embodiment of the present invention comprises a plurality of delivery tubes or barrels 10 mounted in spaced-apart arrangement within a housing 50, each of said barrels being provided with a propulsion arrangement (not shown), such as that described with reference to Figures 1a - 1c or 2a - 2c. A compressor (not shown) is mounted at the rear of the housing 50 beneath a protective cover 52. The housing 50 is provided with elongate rollers 54 to enable the arrangement to be conveniently moved to one of a number of desired positions around a goal mouth.

A remote control panel 56 including a receiver (not shown) is mounted on the top of the housing 50 and an opening 58 is provided to enable balls to be fed into the system.

The remote control panel is linked to a control system (not shown) provided within the housing, which selectively (and preferably randomly) operates a plurality of valves (not shown), one for each of the propulsion arrangements associated with the respective delivery tubes or barrels 10. A user initiates operation of the system by transmitting a signal from a remote control unit (not shown) to the remote control panel 56. The system may be provided with a security system (not shown) requiring a user to enter a code or password before operation of the system can be initiated, for safety. Once operation of the system is initiated, the control system selectively opens and closes a valve so as to operate the associated propulsion arrangement and cause a ball to shoot out of the respective barrel 10. It will be appreciated that, in a preferred embodiment, the valves associated with the delivery tubes are normally closed, and are individually selectively opened to operate a particular propulsion arrangement.

The face of the piston forming part of the propulsion arrangement for at least one or more of the barrels 10 may be adjustable so as to cause the ball to spin upon impact. However, in

-7-

another arrangement, as shown in Figure 5 of the drawings, a resiliently flexible deflection member 62 may be provided at the open end 12 of one or more of the barrels 10, so as to cause the ball to spin as it is shot out of the barrel 10, and thereby vary the angle at which it travels toward the goal mouth. Furthermore, at least one or more of the barrels 10 may be provided with an adjustable lens (not shown) and/or a knuckle joint (not shown) or the like to enable its angle and/or orientation to be adjusted, as required. A locking mechanism (not shown) may be provided to lock the barrel 10 in the required position after adjustment thereof.

It will be appreciated that a ball shooting system according to the invention may be provided with any number of barrels 10 arranged in any one of a number of patterns, according to user requirements.

Referring to Figure 7 of the drawings, the system comprises a ball feeding arrangement which feeds balls to each of the barrels 10, as required. The feeding arrangement comprises a funnel-like apparatus having a relatively large holding area 60 for receiving balls fed to the ball shooting system via opening 58 in the housing 50, the holding area 60 feeding balls to each of a plurality of feed channels 36 connected to the respective delivery barrels 10. A sensor (not shown) may be provided as part of the respective propulsion arrangements to provide an indication or warning to a user that there is no ball within the associated delivery tube 10 prior to operation thereof.

Embodiments of the present invention have been described above by way of example only, and it will be appreciated by a person skilled in the art that modifications and variations can be made to the described embodiments without departing from the scope of the invention as defined by the appended claims.

Claims:

1. Apparatus for propelling a ball toward a target, the apparatus comprising a delivery tube defining a channel for receiving a ball, and propulsion means which is hydraulically or pneumatically operable to propel said ball out of an end of said delivery tube by movement between a contracted configuration and an extended configuration in which it contacts the ball, the line of movement of said propulsion means being substantially parallel to at least a portion of the channel of said delivery tube.
2. Apparatus for propelling a plurality of balls toward one or more selected targets, the apparatus comprising means for holding a plurality of balls, a plurality of respective hydraulic or pneumatic propulsion means for propelling each of said plurality of balls from said holding means, an a single hydraulic or pneumatic source and control means for selectively operating all of said plurality of hydraulic or pneumatic propulsion means.
3. Apparatus according to claim 2, wherein each of said holding means comprises a delivery tube defining a channel for receiving a ball, said hydraulic or pneumatic propulsion means being arranged to propel said ball from an end of said delivery tube.
4. Apparatus according to claim 3, wherein said propulsion means comprises a piston or pneumatic cylinder including means movable between a contracted configuration and an extended configuration in which it contacts the ball.
5. Apparatus according to claim 4, wherein the line of movement of said propulsion means is substantially parallel to at least a portion of said channel of said delivery tube.

6. Apparatus according to claim 1, comprising a plurality of delivery tubes and respective propulsion means, and a single hydraulic or pneumatic source and control means for selectively operating all of said propulsion means.
7. Apparatus according to claim 1 or claim 4, comprising mechanical bias means operable to cause said propulsion means to return to said contracted configuration from said extended configuration after a ball has been propelled out of said delivery tube.
8. Apparatus according to claim 1, claim 3 or claim 7, wherein the end of said delivery tube out of which said ball is propelled is provided with a lip or flange.
9. Apparatus according to any one of the preceding claims, comprising deflection means for deflecting a ball as it is propelled from the apparatus and causing it to spin.
10. Apparatus according to claim 1 or claim 3, wherein the angle and/or orientation of at least part of said delivery tube is adjustable.
11. Apparatus according to claim 10, comprising locking means for locking said delivery tube in a required position after adjustment thereof.
12. Apparatus according to any one of the preceding claims, comprising ball feeding apparatus arranged to feed a second ball into the holding means or delivery tube after a first ball has been propelled therefrom.
13. Apparatus according to claim 12, wherein said ball feeding apparatus comprises a plurality of channels, each communicating with a respective delivery tube or holding means, said channels holding one or more balls to be fed into said holding means or delivery tube after said first ball has been propelled therefrom.

-10-

14. Apparatus according to any one of the preceding claims, comprising a sensor for sensing whether or not there is a ball located in a respective holding means or delivery tube.
15. Apparatus according to any one of the preceding claims, wherein the apparatus is portable.
16. Apparatus according to claim 15, mounted on one or more rollers or wheels.
17. Apparatus for propelling one or more balls toward a target, the apparatus being substantially as herein described with reference to the accompanying drawings.

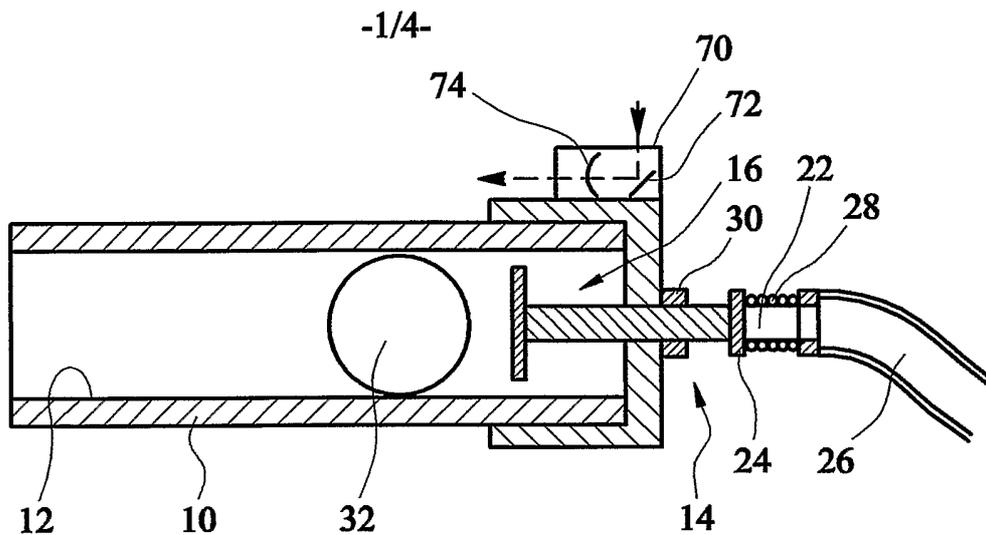


FIG. 1a

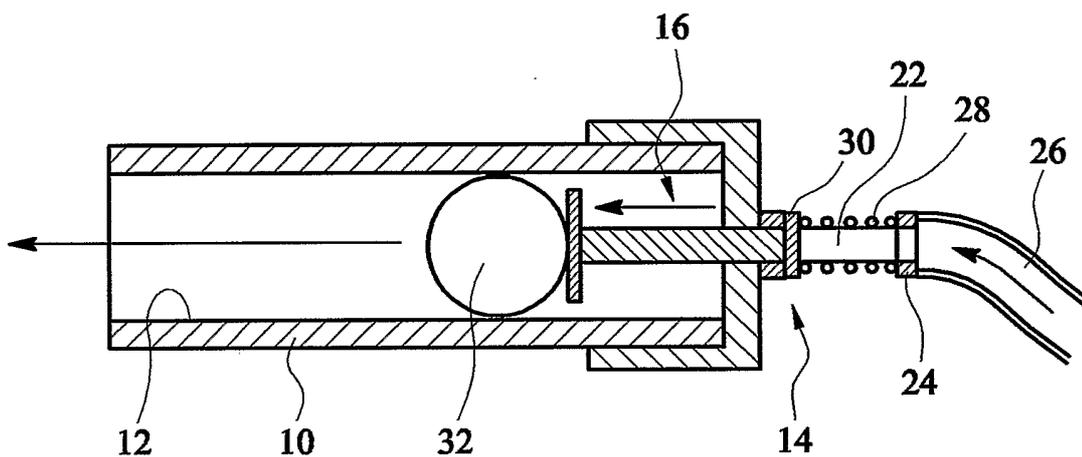


FIG. 1b

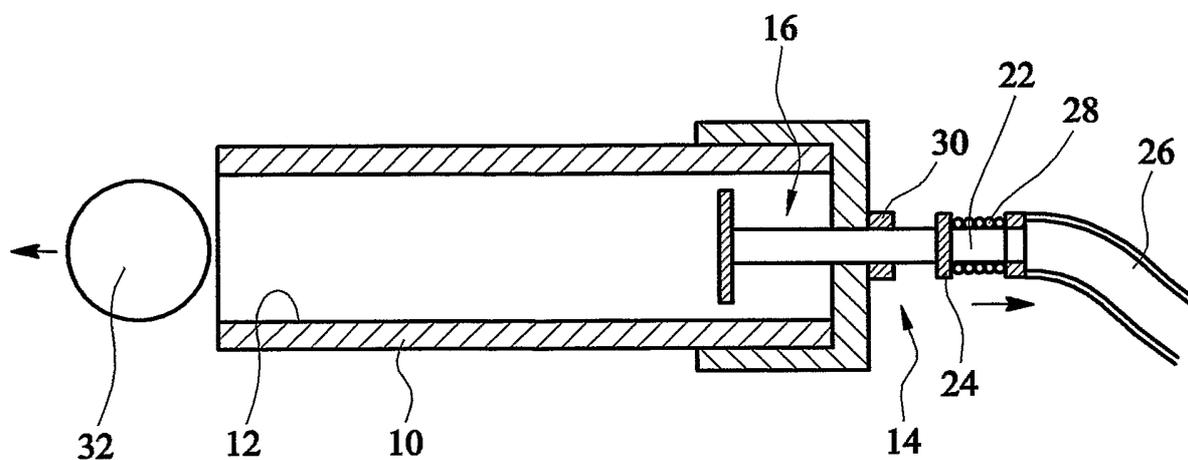


FIG. 1c

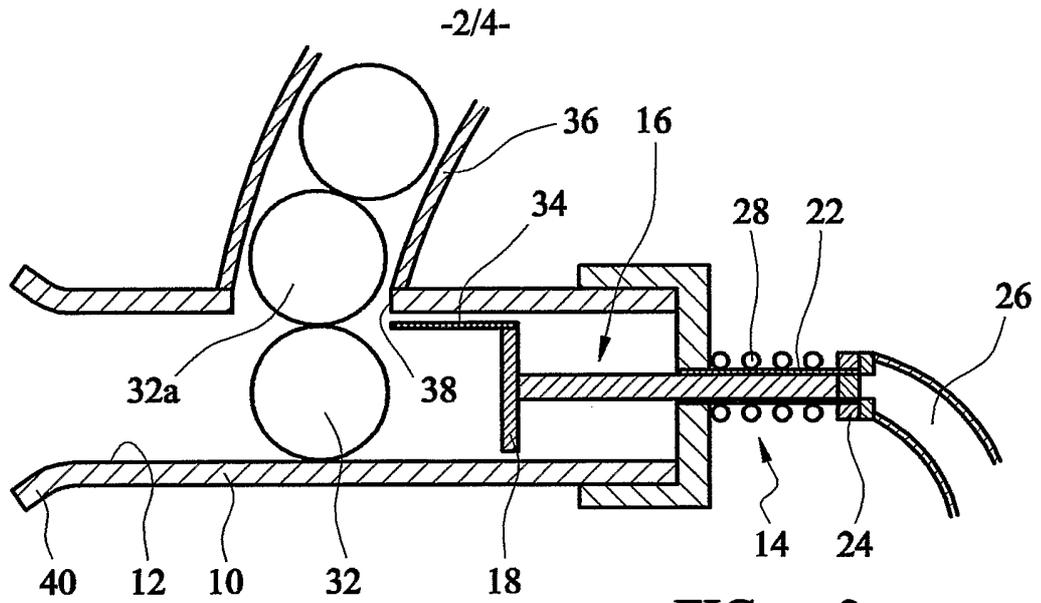


FIG. 2a

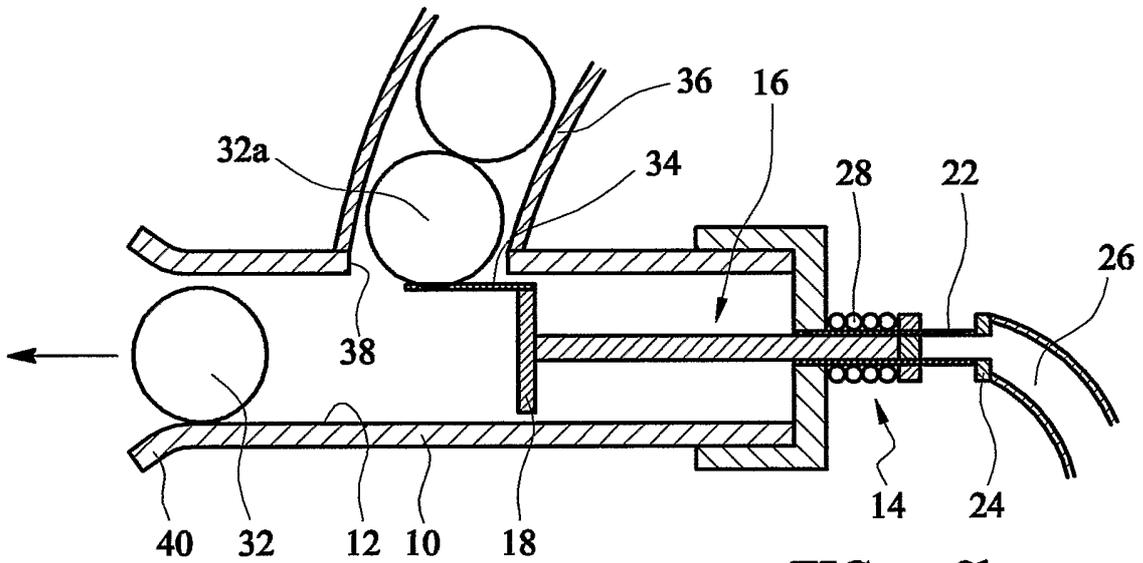


FIG. 2b

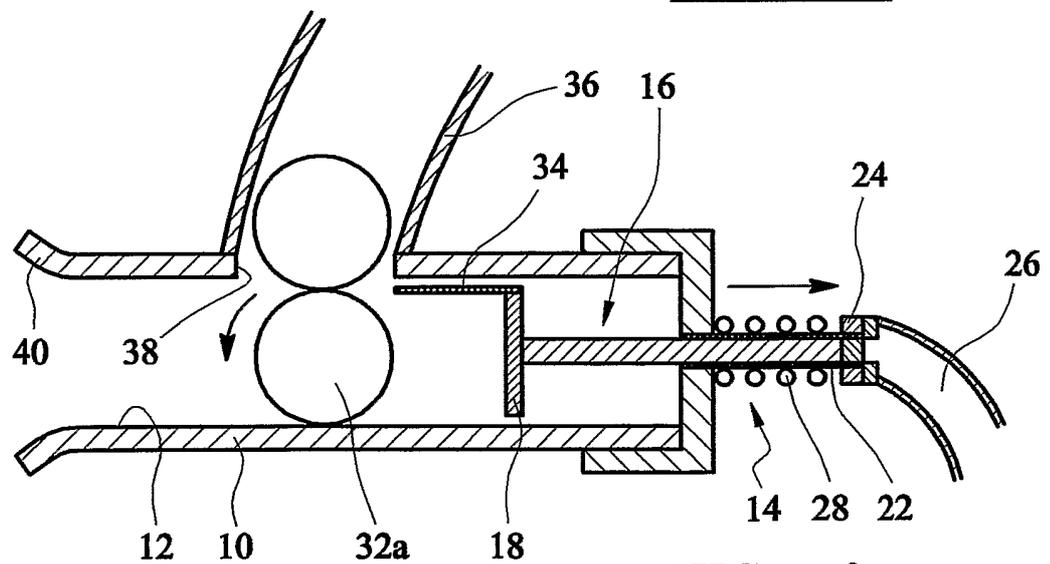


FIG. 2c

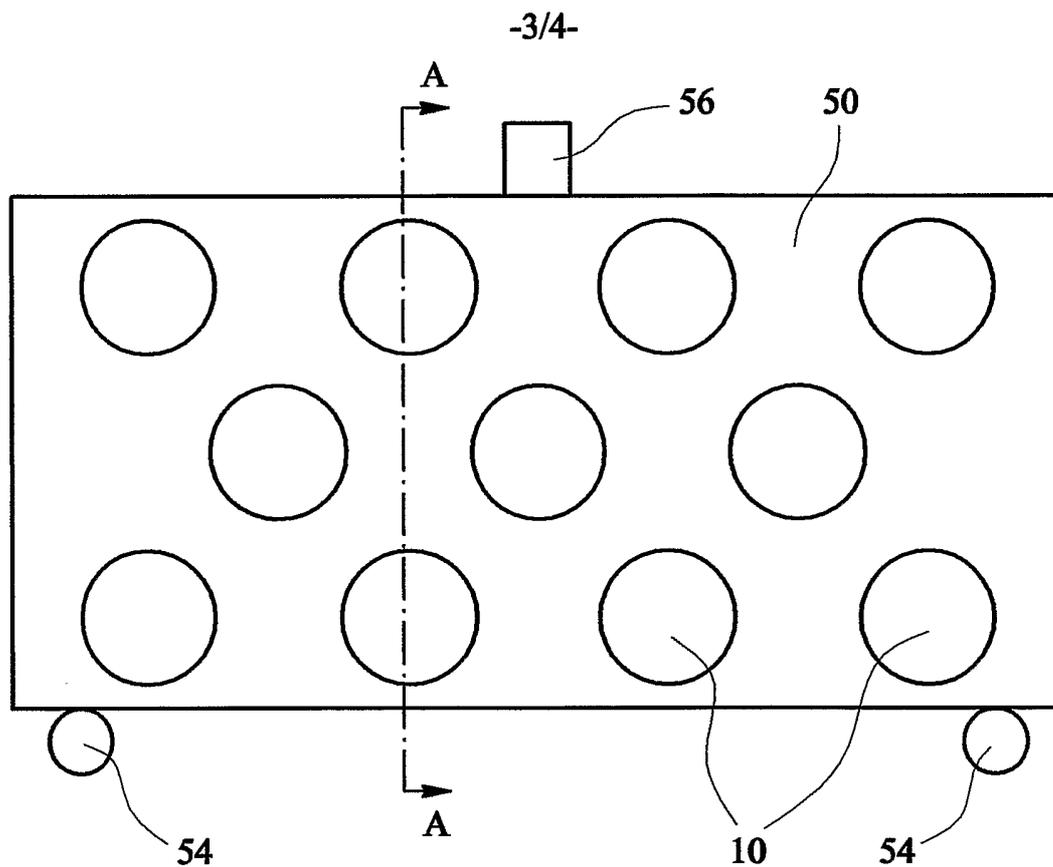


FIG. 3

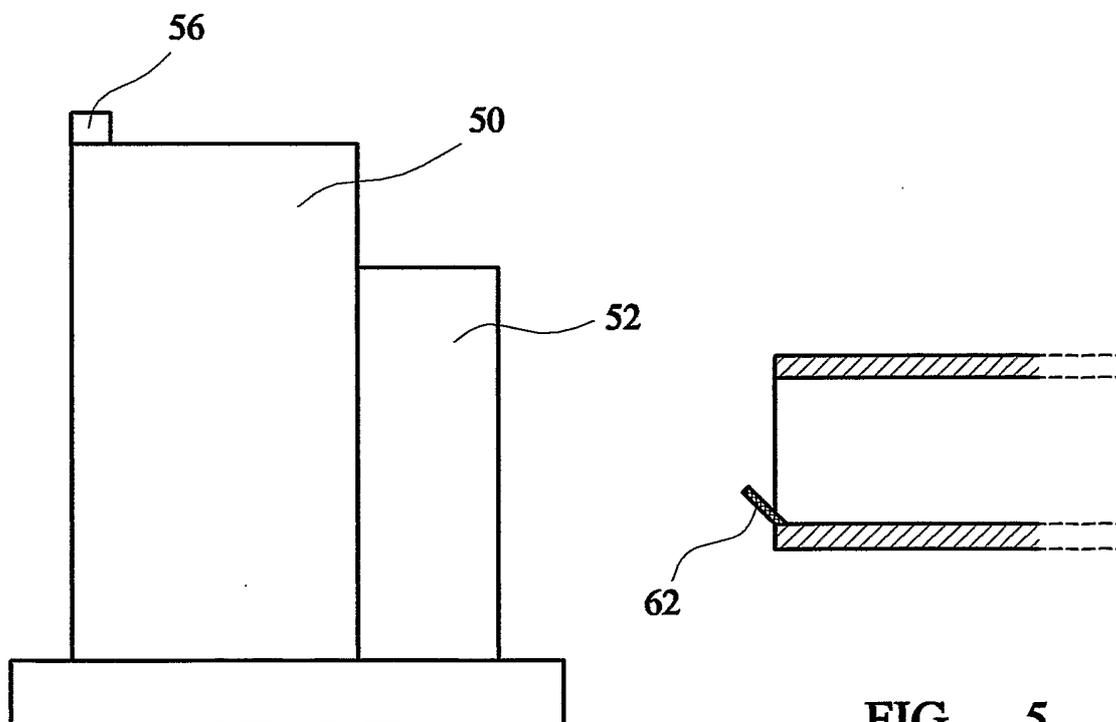


FIG. 4

FIG. 5

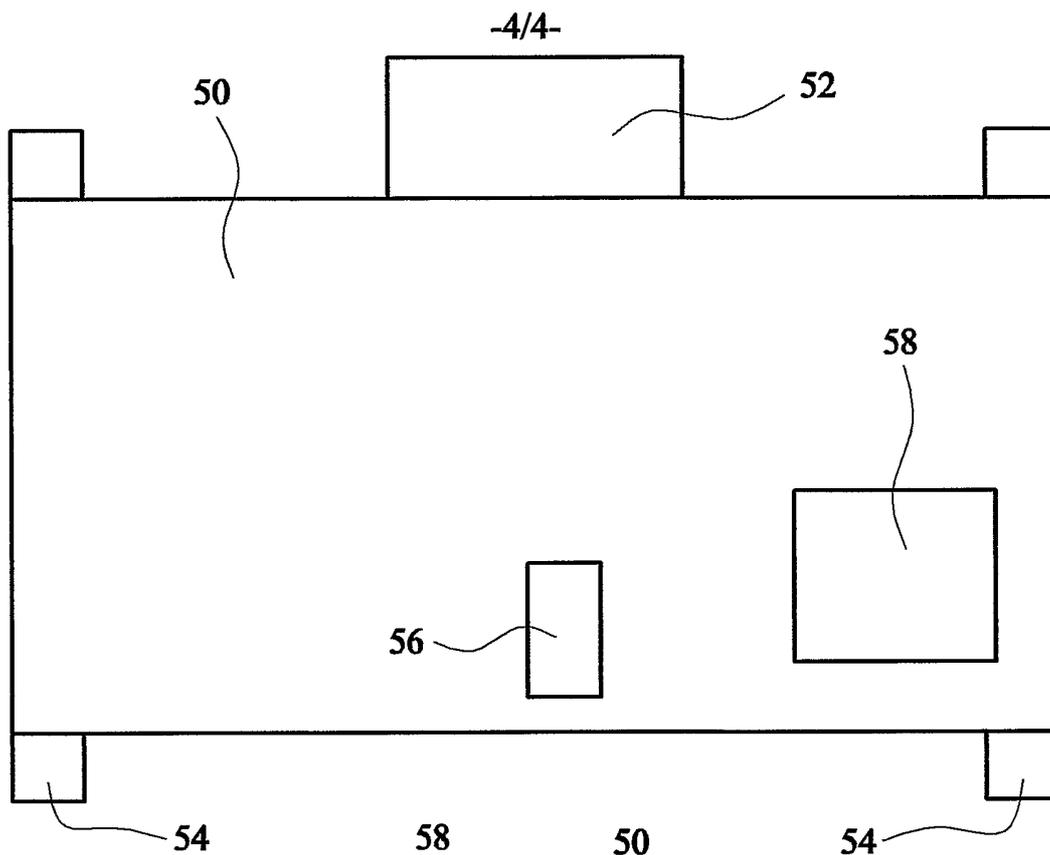


FIG. 6

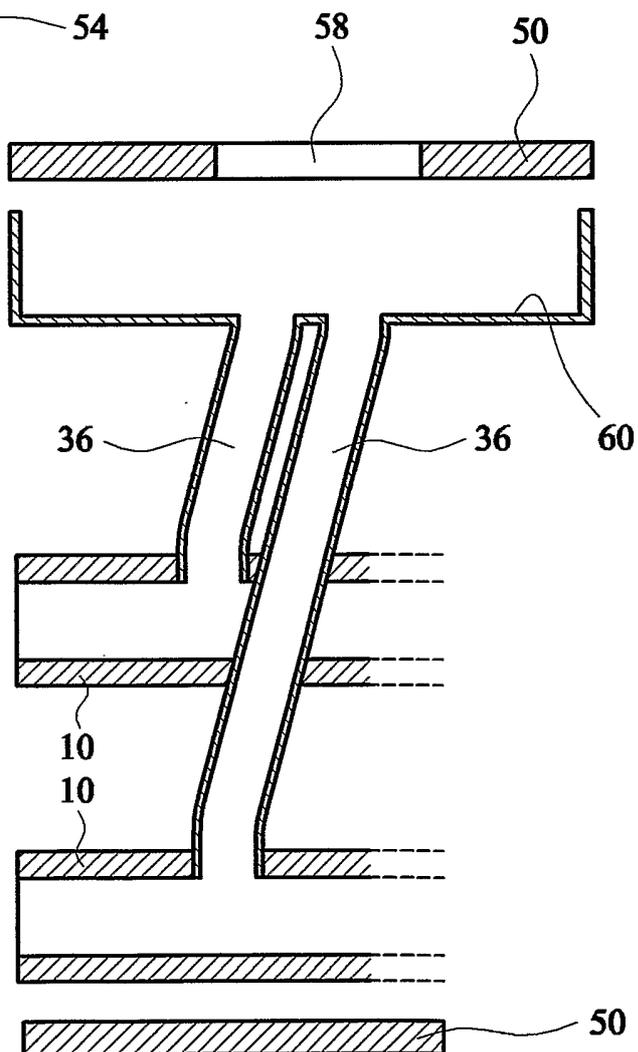


FIG. 7

INTERNATIONAL SEARCH REPORT

Internatic application No
PCT/GB 03/03405

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 A63B69/40

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED
Minimum documentation searched (classification system followed by classification symbols)
IPC 7 A63B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4 091 791 A (CASTELLI JOSEPH TOM ET AL) 30 May 1978 (1978-05-30)	1,7, 9-11,15, 16
Y	column 5, line 21 -column 8, line 5 column 8, line 43 -column 9, line 7; figures 1-7	4-6
X	US 6 167 878 B1 (ELLIS STANLEY ET AL) 2 January 2001 (2001-01-02) column 3, line 21 -column 4, line 18; figures 1-5	1,7, 10-12
X	DE 199 03 454 A (KOLBERG ERIK) 3 August 2000 (2000-08-03) column 2, line 62 -column 3, line 48; figures 1,2,5	1,7,12
	-/--	

Further documents are listed in the continuation of box C. Patent family members are listed in annex.

* Special categories of cited documents :

<p>*A* document defining the general state of the art which is not considered to be of particular relevance</p> <p>*E* earlier document but published on or after the international filing date</p> <p>*L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>*O* document referring to an oral disclosure, use, exhibition or other means</p> <p>*P* document published prior to the international filing date but later than the priority date claimed</p>	<p>*T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>*X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</p> <p>*Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>*G* document member of the same patent family</p>
--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

Date of the actual completion of the international search 25 November 2003	Date of mailing of the international search report 02/12/2003
------------------------------------------------------------------------------------------	-----------------------------------------------------------------------------

Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Authorized officer Levert, C
----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	--------------------------------------------

INTERNATIONAL SEARCH REPORT

Internati plication No

PCT/GB 03/03405

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 201 11 491 U (MACHEIN GUENTER) 24 January 2002 (2002-01-24)	2, 3, 8, 10-13, 15, 16
A	page 7, line 28 -page 11, line 25; figures 1-9 page 12, line 18 -page 14, line 5; figures 12, 13	1, 6
X	----- US 6 264 202 B1 (BRIGGS RICK A) 24 July 2001 (2001-07-24)	2, 3, 10-12
Y	column 18, line 31 -column 19, line 65; figures 4, 27B -----	4-6

INTERNATIONAL SEARCH REPORT
INTERNATIONAL SEARCH REPORT

International application No.
PCT/GB 03/03405

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. Claims Nos.: 17
because they relate to subject matter not required to be searched by this Authority, namely:
Rule 6.2 a) PCT - Reference to the drawings
2. Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this International application, as follows:

see additional sheet

1. As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- The additional search fees were accompanied by the applicant's protest.
- No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. Claims: 1,6-16

Apparatus for propelling a ball comprising a delivery tube and propulsion means which is hydraulically or pneumatically operable between a contracted configuration and an extended configuration in which it contacts the ball, the line of movement of said propulsion means being substantially parallel to at least a portion of the channel of said delivery tube.

2. Claims: 2,3-5,7-16

Apparatus for propelling a plurality of balls comprising means for holding a plurality of balls, a plurality of respective hydraulic or pneumatic propulsion means, a single hydraulic or pneumatic source and control means for selectively operating all of said plurality of hydraulic or pneumatic propulsion means.

INTERNATIONAL SEARCH REPORT

Information on patent family members

Internatic	plication No
PCT/GB 03/03405	

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4091791	A	30-05-1978	NONE
US 6167878	B1	02-01-2001	NONE
DE 19903454	A	03-08-2000	DE 19903454 A1 03-08-2000
DE 20111491	U	24-01-2002	DE 20111491 U1 24-01-2002
US 6264202	B1	24-07-2001	AU 6704298 A 09-09-1998 WO 9836812 A1 27-08-1998 AU 712615 B2 11-11-1999 AU 7008996 A 12-03-1997 BR 9610425 A 07-12-1999 CA 2230066 A1 27-02-1997 CN 1199351 A 18-11-1998 EP 0850096 A2 01-07-1998 JP 11504837 T 11-05-1999 KR 267840 B1 16-10-2000 NZ 318573 A 24-09-1998 PL 325116 A1 06-07-1998 WO 9706867 A2 27-02-1997 US 6283871 B1 04-09-2001 US 5853332 A 29-12-1998