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(54) Title: SAXOPHONE HAVING EXTENDED SOUND EXTENSION

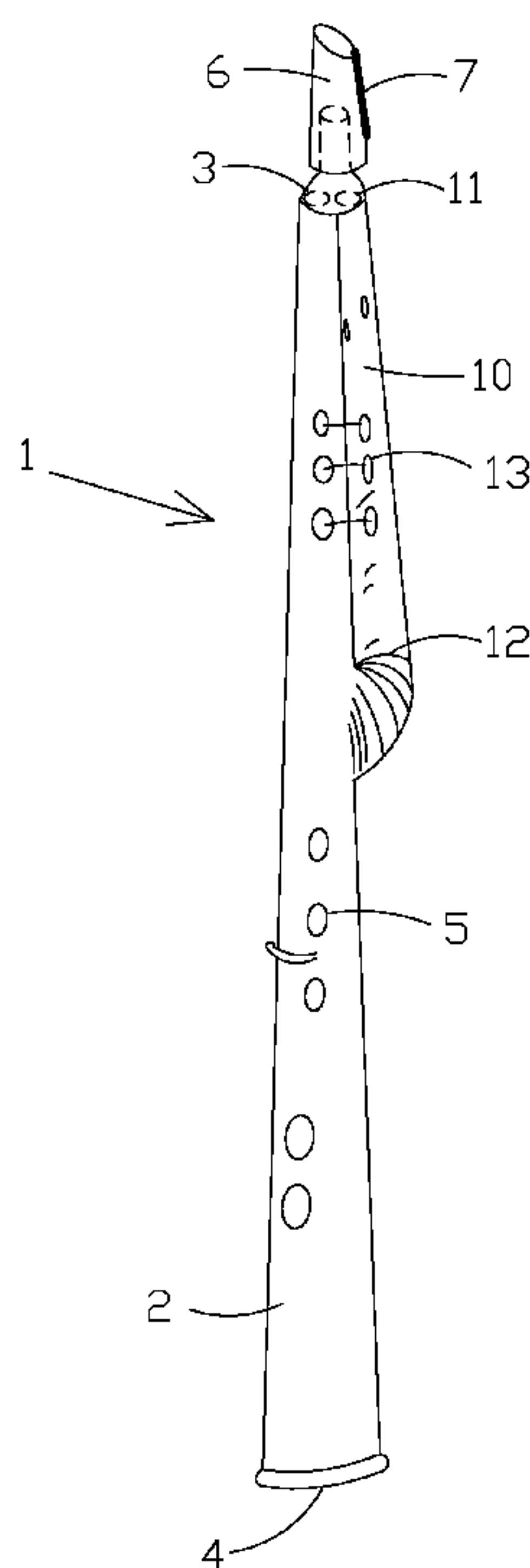


FIG. 1

(57) Abstract: The invention relates to a saxophone having an increased sound extension, which can exceed three octaves. The saxophone which is the object of the invention, unlike the known saxophones, comprises two sound cones characterized by different sound extensions, e.g. such as a soprano saxophone in the 5 key of B flat and a sopranino saxophone in the key of E flat. The two sound cones are placed next to each other. More precisely, the inlet ports of the two sound cones are placed side by side. The outlet port of the sound cone having a higher pitch extension is hermetically connected to the sound cone preferably having a lower pitch extension. A valve, qualifying as "epiglottis", can be moved by means of a lever, between a first position at which it hermetically occludes the inlet port of the lower pitch sound cone and a second position at which it hermetically occludes the inlet port of the higher pitch sound cone.

Saxophone having extended sound extensionField of application of the invention

The present invention relates to the field of wind musical instruments, in particular of the single beating reed type.

- 5 More precisely, the present invention relates to a saxophone, the central body of which comprises two sound cones, of different sizes, converging into each other.

Overview of the background art.

- As known, saxophones comprise a central body including a tubular wall substantially shaped as a frustum of a cone, usually called "body" or "sound cone", extending between an inlet port and an outlet port located at the bases of the frustum of a cone, respectively. Said tubular wall has multiple through-holes which can be hermetically and reversibly occluded by the respective valves generally named "keys". Incidentally, by saying that a hole can be reversibly occluded by a key, it is meant that the key can be moved between at least one first position at which it (hermetically) occludes the hole and a second position at which it does not occlude the hole.
- 10
15

- The saxophone further comprises a mouthpiece at which a person places their lips to play the saxophone. The mouthpiece is generally connected to a short tubular element, usually called a "neck", communicating with the inlet port of the sound cone. The neck acts as a connecting element of the mouthpiece to the sound cone. A reed is connected to the mouthpiece, below the mouthpiece, by
- 20

means of one or more clamps that allow the reed to vibrate when a person appropriately blows into the mouthpiece.

In saxophones which have lower pitch musical extensions, the sound cone, at the outlet port, is connected to a curved tubular element, generally called "bow",
5 which joins the sound cone to a further tubular element substantially shaped as a frustum of a cone and generally known as "bell". It is the bow and the bell, together with the sound cone, that give a saxophone the shape that, in the collective imagination, is usually associated with this instrument.

Regretfully, saxophones have a sound extension of only two and a half octaves.
10 As a result, musical composers, arrangers, orchestrators, and scholars have not been able to create a suitable musical methodology and literature for saxophones. In other words, the limited sound extension has meant that the use of the saxophone in classical music has always been almost marginal.

Object of the invention

15 It is the object of the present invention to overcome the aforesaid drawbacks by indicating a saxophone with an increased sound extension.

Summary of the invention

The object of the present invention is a wind musical instrument of the single beating reed type,

20 said musical instrument comprising:

- a first saxophone including:
 - a first tubular wall substantially shaped as a first frustum of a cone, said first tubular wall acting as the sound cone of said first saxophone and extending between an inlet port located at the minor base of said first frustum of a cone and an outlet port located at the major base of said first frustum of a cone;
25
 - a first plurality of through holes made in said first tubular wall in intermediate positions between said inlet and outlet ports;
 - for each hole of said first plurality, a first valve movable between a first closing position, at which said first valve hermetically occludes said hole,
30 and a second opening position, at which said first valve does not occlude said hole;

- for each of said first valves, first moving means of said first valve between said first and second position,
said first moving means being manually actuatable by a person;
 - a mouthpiece connected to said first tubular wall at said inlet port,
5 said mouthpiece being adapted to convey into said first tubular wall, through said inlet port, air blown into said mouthpiece by a person after placing their lips, at least partially, on said mouthpiece;
 - a reed connected to said mouthpiece so as to be able to vibrate upon blowing into said mouthpiece by a person,
- 10 wherein, according to the invention, said musical instrument further comprises:
- a second tubular wall substantially shaped as a second frustum of a cone and extending between an inlet port located at the minor base of said second frustum of a cone and an outlet port located at the major base of said second frustum of a cone,
- 15 said second tubular wall having a longitudinal extension smaller than the longitudinal extension of said first tubular wall,
- said second tubular wall, at the first inlet port thereof, being connected to said mouthpiece so that the latter is adapted to convey also into said second tubular wall, through said inlet port thereof, air blown into said mouthpiece by a
- 20 person after placing their lips, at least partially, on said mouthpiece;
- said second tubular wall, at the outlet port thereof, being hermetically connected to said first tubular wall at an opening of the latter made in an intermediate position between said inlet and outlet ports of said first tubular wall, so that when air is blown into said second tubular wall by means of said
- 25 mouthpiece, the air flows from said second tubular wall into said first tubular wall crossing said outlet port of said second tubular wall and said opening of said first tubular wall,
- said second tubular wall being a sound cone stretch of a second saxophone having a different sound extension from that of said first saxophone;
- 30 • a second plurality of through holes made at said second tubular wall in intermediate positions between said inlet and outlet ports thereof;
- for each hole of said second plurality, a second valve movable between a

first closing position, at which said first valve hermetically occludes said hole, and a second opening position, at which said first valve does not occlude said hole;

- for each of said second valves, the first moving means of said second valve
5 between said first and second position,
said second moving means being manually operated by a person;
- a third valve movable between:
 - a first position at which said third valve hermetically separates said first
tubular wall from said mouthpiece so as to make any air blown into said
10 mouthpiece flow exclusively into said second tubular wall,
and
 - a second position at which said third valve hermetically separates said
second tubular wall from said mouthpiece so as to make any air blown into
said mouthpiece flow exclusively into said first tubular wall;
- 15 • third moving means of said third valve between said first and second position,
said third moving means being manually actuable by a person.

Incidentally, the longitudinal extension of the first or second tubular wall substantially corresponds to the height of the first or second truncated cone, respectively.
20

The musical instrument that is the object of the invention corresponds to a saxophone with a sound extension which can advantageously exceed three octaves.

Other innovative features of the present invention are illustrated in the description which follows and mentioned in the dependent claims.
25

According to an aspect of the invention, said inlet ports of said first and second tubular walls are placed side by side,
said musical instrument further comprising a hollow element connecting said mouthpiece and said first and second tubular wall,
30 said connecting element being communicating:

- at one of its first ends, with said mouthpiece
and

- at its second end opposite to its first end, with said first and second tubular wall at said inlet ports thereof

so that, when air is blown into said mouthpiece, the air can flow, through said connecting element, from said mouthpiece into said first or second tubular wall.

- 5 According to another aspect of the invention, said third moving means comprise a first class lever, the fulcrum of which is connected to said first or second tubular wall and/or to said connecting element,

said lever being connected to said valve at a first end thereof, and being graspable by a person at its second end opposite to its first end and protruding from
10 said first or second tubular wall and/or from said connecting element, so that said third valve can be rotated, about said fulcrum, at least between said first and second position.

According to another aspect of the invention, said first and second tubular walls are arranged so that the two heights of said first and second frustum of a cone
15 are coplanar.

According to another aspect of the invention, said first and second tubular walls are placed side by side.

According to another aspect of the invention, for at least one of said first valves said first moving means also act as said second moving means of at least one
20 of said second valves so that:

- an actuation of said first moving means in order to move said first valve from said first position to said second position also determines an actuation of said second valve from said first position to said second position
and
- 25 • an actuation of said first moving means in order to move said first valve from said second position to said first position also determines an actuation of said second valve from said second position to said first position.

According to another aspect of the invention, for each of said second valves, said first moving means of at least one of said first valves also act as said second moving means of said second valve.
30

According to another aspect of the invention, said first saxophone is a soprano saxophone in the key of B flat, and said second saxophone is a sopranino sax-

ophone in the key of E flat.

Brief description of the figures

Further objects and advantages of the present invention will be apparent from the following detailed description of an example of embodiment of the same and
5 from the accompanying drawings exclusively provided by way of non-limiting example, in which:

- **figure 1** shows a diagrammatic perspective view of a musical instrument according to the present invention;
- **figure 2** shows a diagrammatic straight section view of a detail of the musical
10 instrument in figure 1.

Detailed description of preferred embodiments of the invention

Hereinafter in the present description, a figure may be illustrated also with reference to elements not expressly indicated therein but indicated on other figures instead. The scale and proportions of the various illustrated elements do
15 not necessarily correspond to the real values.

Figure 1 shows a musical instrument 1, which is the object of invention, of the "wind" type and, more precisely, of the "single beating reed" type. The instrument 1 comprises a first saxophone, preferably belonging to the family of soprano saxophones in the key of B flat, including a second tubular wall 2 substantially shaped as a second frustum of a cone and extending between an inlet
20 port 3 located at the minor base of the aforesaid frustum of a cone, and an outlet port 4 located at the major base of said frustum of a cone. The wall 2 was previously qualified as "first tubular wall" and the frustum of a cone like which the wall 2 is substantially shaped was previously qualified as "first frustum of a
25 cone". Incidentally, the larger the inner diameter of the sound cone of a saxophone, the lower the pitch of the sound emitted by the saxophone.

The wall 2 is the sound cone of the aforementioned first saxophone and comprises a plurality of through holes 5 made in intermediate positions between the ports 3 and 4. The plurality of holes 5 was previously named "first plurality". For
30 each hole 5, the instrument 1 comprises a valve (not shown in the figures) which can be moved between a first closing position, at which said first valve hermetically occludes the hole 5, and a second opening position, at which the

first valve does not occlude the hole 5. The hole occlusion valves 5 are the keys to the aforesaid first saxophone. More precisely, each of said valves, previously named "first valves", can be moved between the closing and the opening position by means of an appropriate lever, usually of the first class, which can be operated manually by a person by pressing an appropriate "key" with a finger. The levers connected to the occlusion valves of the holes 5 are part of the previously mentioned "first moving means".

The instrument 1 comprising a mouthpiece 6 connected to the wall 2 at the port 3. The mouthpiece 6 is the mouthpiece of the aforesaid first saxophone and is suited to convey into the wall 2, through the mouthpiece 3 air blown by a person into the mouthpiece 6 (after having placed, at least partially, their lips on said mouthpiece 6).

The instrument 1 further includes a reed 7 connected to the mouthpiece 6 to be able to vibrate upon blowing into said mouthpiece 6 by a person. The reed 7 is the simple beating reed of the aforesaid first saxophone.

By blowing appropriately into the mouthpiece 6, the reed 7 vibrates, and said vibration determines the emission of a sound from port 4 of the wall 2. The pitch of the sound produced depends on the length of the vibrating air column which is adjustable by opening holes 5.

The characteristics described above of the aforesaid first saxophone, included in instrument 1, are known. Therefore, no further details will be provided.

The instrument 1 differs from the known saxophones in that it comprises a second tubular wall 10 also substantially shaped as a frustum of a cone and extending between an inlet port 11 located at the minor base of said frustum of a cone, and an outlet port 12 located at the major base of said frustum of a cone. The wall 10 was previously qualified as "second tubular wall" and the frustum of a cone like which the wall 10 is substantially shaped was previously qualified as "second frustum of a cone".

The wall 10 has a longitudinal extension smaller than the longitudinal extension of the wall 2 and is a section of a sound cone of a second saxophone having a sound extension different from that of said first saxophone. Incidentally, by saying that two saxophones have different sound extensions, it is meant that the

two saxophones play in different registers, i.e. that the sounds emitted by the first fall within a first range delimited inferiorly by a lower pitch note and superiorly by a higher pitch note different from the lower pitch note and the higher pitch note delimiting, inferiorly and superiorly respectively, the second range within which the sounds emitted by the second saxophone fall. Preferably, said second saxophone belongs to the family of sopranino saxophone in the key of E flat. Like the wall 2, the wall 10 comprises a plurality of through holes 13 made in intermediate positions between the ports 11 and 12. The plurality of holes 13 was previously named "second plurality". For each hole 13, the instrument 1 comprises a valve (not shown in the figures) which can be moved between a first closing position, at which said first valve hermetically occludes the hole 13, and a second opening position, at which the first valve does not occlude the hole 13. The hole occlusion valves 13 are the keys of the sound cone of the aforesaid second saxophone. More precisely, each of said valves, previously named "second valves", is movable between the closing position and the opening position by means of an appropriate lever, usually of the first class, which can be operated manually by a person by pressing an appropriate "key" with a finger. The levers connected to the occlusion valves of the hole 13 are part of the previously mentioned "second moving means".

Preferably, but not necessarily, at least one moving lever of the occlusion valve of a hole 5 also acts as a moving lever of the occlusion valve of a hole 13 so that an actuation of said lever to move said occlusion valve of a hole 5 from the closing position to the opening position also results in a movement of said occlusion valve of a hole 13 from the closing position to the opening position, and an actuation of said lever to move said occlusion valve of a hole 5 from the opening position to the closing position also determines a movement of said occlusion valve of a hole 13 from the opening position to the closing position. Advantageously, in this case, the instrument 1 comprises a single key for moving two occlusion valves of a hole 5 and a hole 13, respectively.

More preferably, for each hole 13, a moving lever of the occlusion valve of a hole 5 also serves as a moving lever of the occlusion valve of said hole 13. Advantageously, in this case, the instrument 1 does not comprise any additional

key to move the hole occlusion valves 13 with respect to the keys possessed by the aforesaid first saxophone for moving the occlusion valves of the holes 5.

As can be observed in figure 1, the walls 2 and 10 are preferably placed side by side, more preferably so that the heights of the two frustums of a cone are co-planar, like which frustums of a cone the walls 2 and 10 are substantially re-
5 spectively shaped. Even more preferably, the walls 2 and 10 are arranged so that the ports 3 and 11 are placed side by side.

The wall 10, at the first inlet port 11 thereof, is connected to the mouthpiece 6 so that the latter is suited to convey also into the wall 10, through the port 11, air
10 blown into the mouthpiece 6 by a person (after placing their lips, at least partially, on said mouthpiece 6). More precisely, the connection between the walls 2 and 10 and the mouthpiece 6 is preferably made by means of a hollow element 14 communicating with the mouthpiece 6 at a first end thereof, and with the
15 ports 3 and 11 at a second end thereof opposite to its first end so that, when air is blown into the mouthpiece 6 it can flow through said connection element 14 from the mouthpiece 6 into the wall 2 or 10.

The wall 10, at the port 12, is hermetically connected to the wall 2 at an opening in the latter made in an intermediate position between the ports 3 and 4 so that
20 when air is blown into the wall 10 from the mouthpiece 6 (through the connecting element 14), the air flows from the wall 10 into the wall 2 crossing the port 12 and the aforesaid opening made in the wall 10.

With reference to **figure 2** it can be observed that the instrument 1 comprises a valve 15, previously named "third valve", preferably housed in the connection
25 element 14. The valve 15 can be moved between a first position at which it hermetically separates the wall 2 from the mouthpiece 6 (preferably by hermetically occluding the port 3) so that any air blown into the mouthpiece 6 flows exclusively into the wall 10, and a second position at which the valve 15 hermetically separates the wall 10 from the mouthpiece 6 (preferably by hermetically
30 occluding the mouthpiece 3) so that any air blown into the mouthpiece 6 flows exclusively into the wall 2. The valve 5 can be moved between the aforesaid first and second positions preferably by means of an appropriate lever 16 of the first class, which can be operated manually by a person. The lever 16, shown,

only in figure 2 for the sake of simplicity, is part of the previously mentioned "third moving means" and is connected at its fulcrum 17 to the wall 2 or 10 and/or the connecting element 14. The lever 16 is connected to the valve 15 at a first end thereof, and is graspable by a person at its second end opposite to
5 its first end and protruding from the wall 2 or 10 and/or from the connecting element 14, so that the valve 15 can be rotated, about the fulcrum 17, at least between said first and second position.

When air is blown into the port 6, the air passes through connection element 14 and, depending on the position of valve 15, flows into the wall 2 or 10.

10 In light of the above, the instrument 1 substantially corresponds to a saxophone having an increased sound extension, which can exceed three octaves. In brief, the instrument 1 substantially corresponds to a new type of saxophone which, unlike the known saxophones, comprises two sound cones 2 and 10 characterized by different sound extensions, e.g. such as a soprano saxophone in the
15 key of B flat and a sopranino saxophone in the key of E flat. The two sound cones 2 and 10 are preferably placed next to each other. More precisely, the inlet ports 3 and 10 of the two sound cones 2 and 10 are preferably placed side by side. The outlet port 12 of the sound cone 10 (i.e. of the sound cone with a preferably higher pitch sound extension) is hermetically connected to the sound
20 cone 2 (i.e. the sound cone having a preferably lower pitch sound extension). A valve 15, qualifying as "epiglottis", can be moved, preferably by means of a lever 16, between a first position in which the valve 15, preferably, hermetically occludes the inlet port 3 (of the preferably lower pitch sound cone 2), and a second position in which the valve 15, preferably, hermetically occludes inlet port
25 11 (of the preferably higher pitch sound cone 10).

In the present description, for ease of presentation, reference was made only to a preferred example of implementation of the invention in which the aforesaid first saxophone is a soprano saxophone in the key of B flat and the aforesaid second saxophone is a sopranino saxophone in the key of E flat. However, the
30 musical instrument which is the object of the invention is not limited to the aforesaid example. Indeed, the first and second saxophone may belong to other families. In particular, the first saxophone could include a bow and a bell in addi-

tion to the wall 2.

Based on the provided description of a preferred embodiment, it is apparent that changes may be introduced by a person skilled in the art without because of this departing from the scope of protection of the invention as defined by the following claims.

5

CLAIMS

1. A wind musical instrument (1) of the single beating reed type,
said musical instrument (1) comprising:

- a first saxophone including:

- 5 – a first tubular wall (2) substantially shaped as a first frustum of a cone,
 said first tubular wall (2) acting as the sound cone of said first saxophone
 and extending between an inlet port (3) located at the minor base of said
 first frustum of a cone and an outlet port (4) located at the major base of
 said first frustum of a cone;
- 10 – a first plurality of through holes (5) made in said first tubular wall (2) in in-
 termediate positions between said inlet and outlet ports (3, 4);
- for each hole (5) of said first plurality, a first valve movable between a first
 closing position, at which said first valve hermetically occludes said hole
 (5), and a second opening position, at which said first valve does not oc-
15 clude said hole (5);
- for each of said first valves, first moving means of said first valve between
 said first and second position,
 said first moving means being manually actuatable by a person;
- a mouthpiece (6) connected to said first tubular wall (2) at said inlet port
20 (3),
 said mouthpiece (6) being adapted to convey into said first tubular wall (2),
 through said inlet port (3), air blown into said mouthpiece (6) by a person
 after placing their lips, at least partially, on said mouthpiece (6);
- a reed (7) connected to said mouthpiece (6) so as to be able to vibrate
25 upon blowing into said mouthpiece (6) by a person,

said musical instrument (1) being characterized in that it further comprises:

- a second tubular wall (10) substantially shaped as a second frustum of a
cone and extending between an inlet port (11) located at the minor base of
said second frustum of a cone, and an outlet port (12) located at the major
30 base of said second frustum of a cone,
 said second tubular wall (10) having a longitudinal extension smaller than the
 longitudinal extension of said first tubular wall (2),

said second tubular wall (10), at the first inlet port (11) thereof, being connected to said mouthpiece (6) so that the latter is adapted to convey also into said second tubular wall (10), through said inlet port (11) thereof, air blown into said mouthpiece (6) by a person after placing their lips, at least partially, on said mouthpiece (6);

said second tubular wall (10), at the outlet port (12) thereof, being hermetically connected to said first tubular wall (2) at an opening of the latter made in an intermediate position between said inlet and outlet ports (3, 4) of said first tubular wall (2), so that when air is blown into said second tubular wall (10) by means of said mouthpiece (6), the air flows from said second tubular wall (10) into said first tubular wall (2) crossing said outlet port (12) of said second tubular wall (10) and said opening of said first tubular wall (2),

said second tubular wall (10) being a sound cone stretch of a second saxophone having a different sound extension from that of said first saxophone;

- a second plurality of through holes (13) made at said second tubular wall (10) in intermediate positions between said inlet and outlet ports (11, 12) thereof;
- for each hole (13) of said second plurality, a second valve movable between a first closing position, at which said first valve hermetically occludes said hole (13), and a second opening position, at which said first valve does not occlude said hole (13);
- for each of said second valves, the first moving means of said second valve between said first and second position, said second moving means being manually operated by a person;
- a third valve (15) movable between:
 - a first position at which said third valve (15) hermetically separates said first tubular wall (2) from said mouthpiece (6) so as to make any air blown into said mouthpiece (6) flow exclusively into said second tubular wall (10) and
 - a second position at which said third valve (15) hermetically separates said second tubular wall (10) from said mouthpiece (6) so as to make any air blown into said mouthpiece (6) flow exclusively into said first tubular wall (2);

- third moving means (16, 17) of said third valve (15) between said first and second position,

said third moving means (16, 17) being manually actuatable by a person.

2. A musical instrument (1) according to claim 1, characterized in that
5 said inlet ports (3, 11) of said first and second tubular wall (2, 10) are located side by side,

said musical instrument (1) further comprising a hollow element (14) connecting said mouthpiece (6) and said first and second tubular wall (2, 10),
said connecting element (14) being communicating:

- 10 • at one of its first ends, with said mouthpiece (6)
and
• at its second end opposite to its first end, with said first and second tubular wall (2, 10) at said inlet ports (3, 11) thereof

so that, when air is blown into said mouthpiece (6), the air can flow, through
15 said connecting element (14), from said mouthpiece (6) into said first or second tubular wall (2, 10).

3. A musical instrument (1) according to claim 2, characterized in that
said third moving means comprise a first class lever (16), the fulcrum (17) of
which is connected to said first or second tubular wall (2, 10) and/or to said
20 connecting element (14),

said lever (16) being connected to said valve (15) at a first end thereof, and being graspable by a person at its second end opposite to its first end and protruding from said first or second tubular wall (2, 10) and/or from said connecting element (14), so that said third valve (15) can be rotated, about said fulcrum (17),
25 at least between said first and second position.

4. A musical instrument (1) according to any one of the preceding claims, characterized in that said first and second tubular wall (2, 10) are arranged so that the two heights of said first and second frustum of a cone are coplanar.

5. A musical instrument (1) according to claim 4 when dependent on
30 claim 2 or 3, characterized in that said first and second tubular walls (2, 10) are located side by side.

6. A musical instrument (1) according to any one of the preceding claims,

characterized in that, for at least one of said first valves said first moving means also act as said second moving means of at least one of said second valves so that:

- an actuation of said first moving means in order to move said first valve from
5 said first position to said second position also determines an actuation of said second valve from said first position to said second position

and

- an actuation of said first moving means in order to move said first valve from
10 said second position to said first position also determines an actuation of said second valve from said second position to said first position.

7. A musical instrument (1) according to claim 6, characterized in that, for each of said second valves, said first moving means of at least one of said first valves also act as said second moving means of said second valve.

8. A musical instrument (1) according to any one of the preceding claims,
15 characterized in that said first saxophone is a soprano saxophone in the key of B flat, said second saxophone being a sopranino saxophone in the key of E flat.

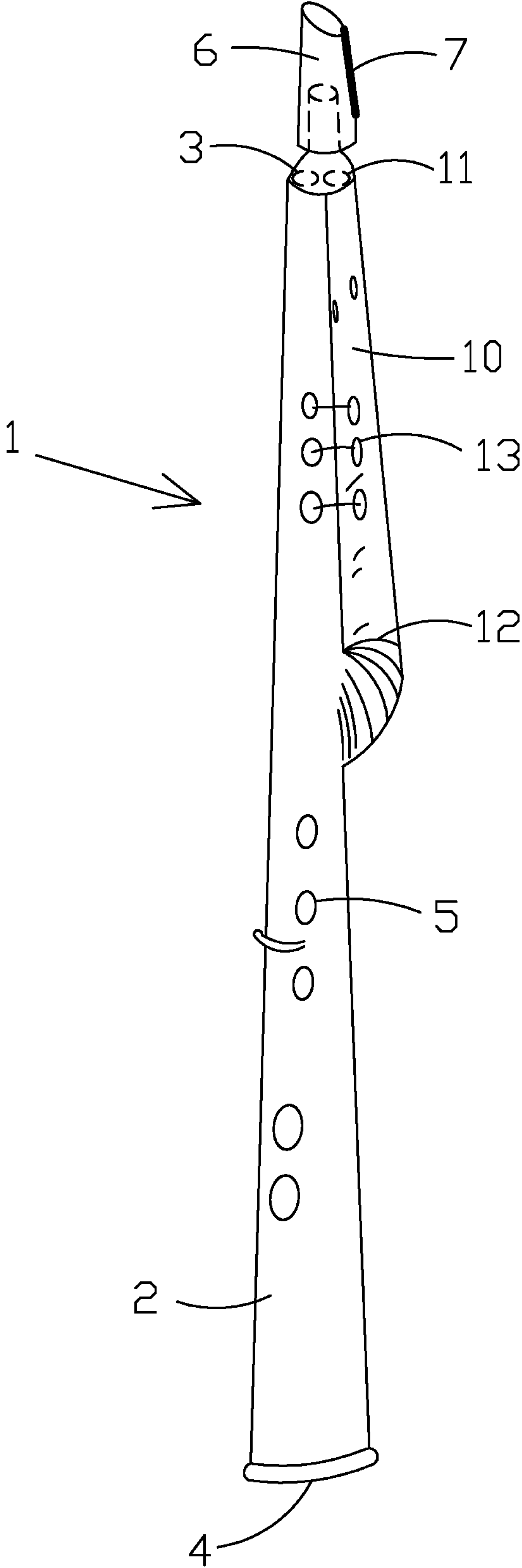


FIG. 1

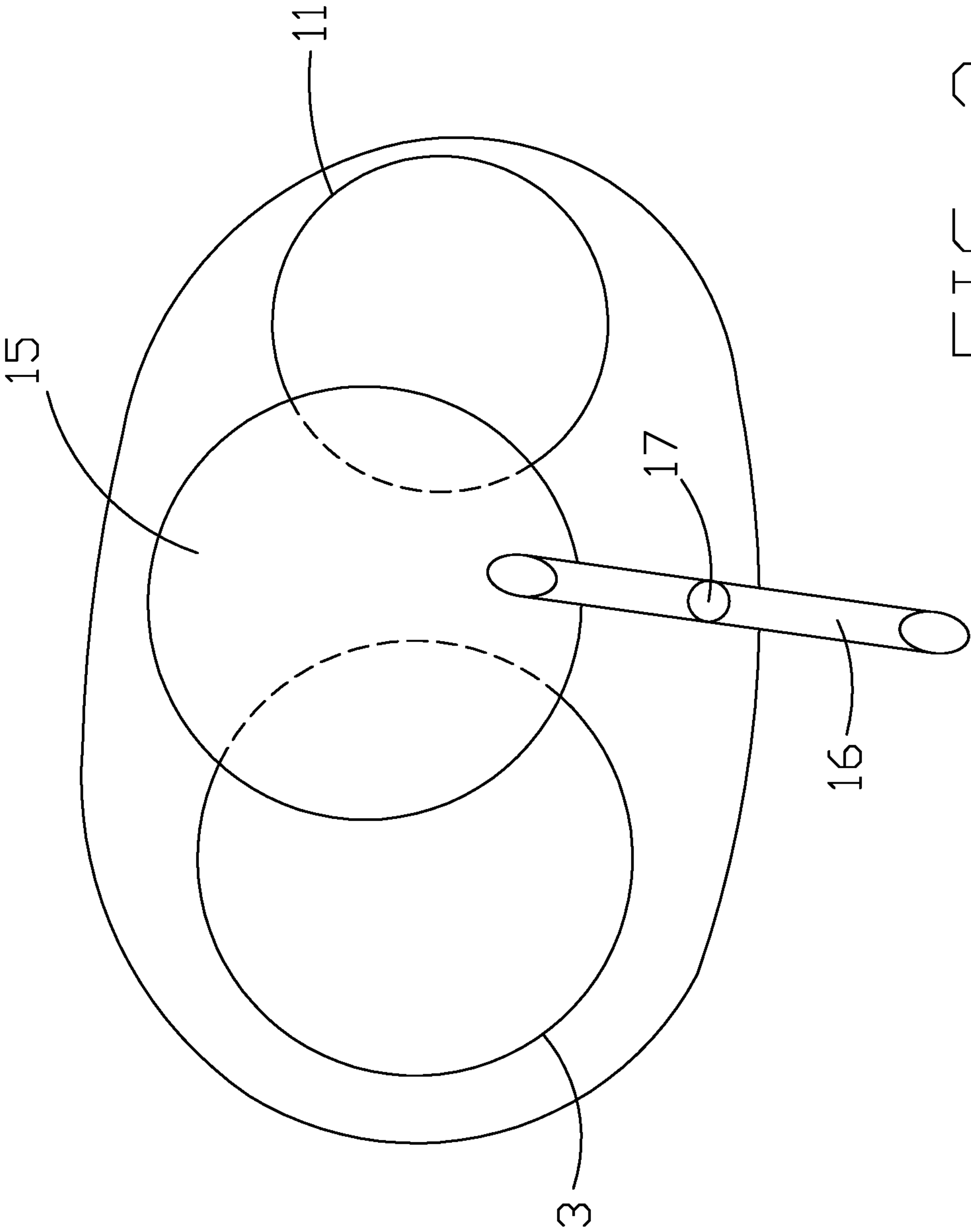


FIG. 2

INTERNATIONAL SEARCH REPORT

International application No

PCT/IT2020/050224

A. CLASSIFICATION OF SUBJECT MATTER
INV. G10D7/08 G10D15/00
ADD.

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)
G10D

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 practicable, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2003/024373 A1 (LOUIS FRANCOIS [BE]) 6 February 2003 (2003-02-06) figures 5, 8, 10 -----	1-8
A	US 4 341 146 A (MASSA LOUIS B) 27 July 1982 (1982-07-27) figures 1-5 -----	1-8
A	US 2 232 151 A (TREW BILL G) 18 February 1941 (1941-02-18) figure 1 -----	1-8



Further documents are listed in the continuation of Box C.



See patent family annex.

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Information on patent family members

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