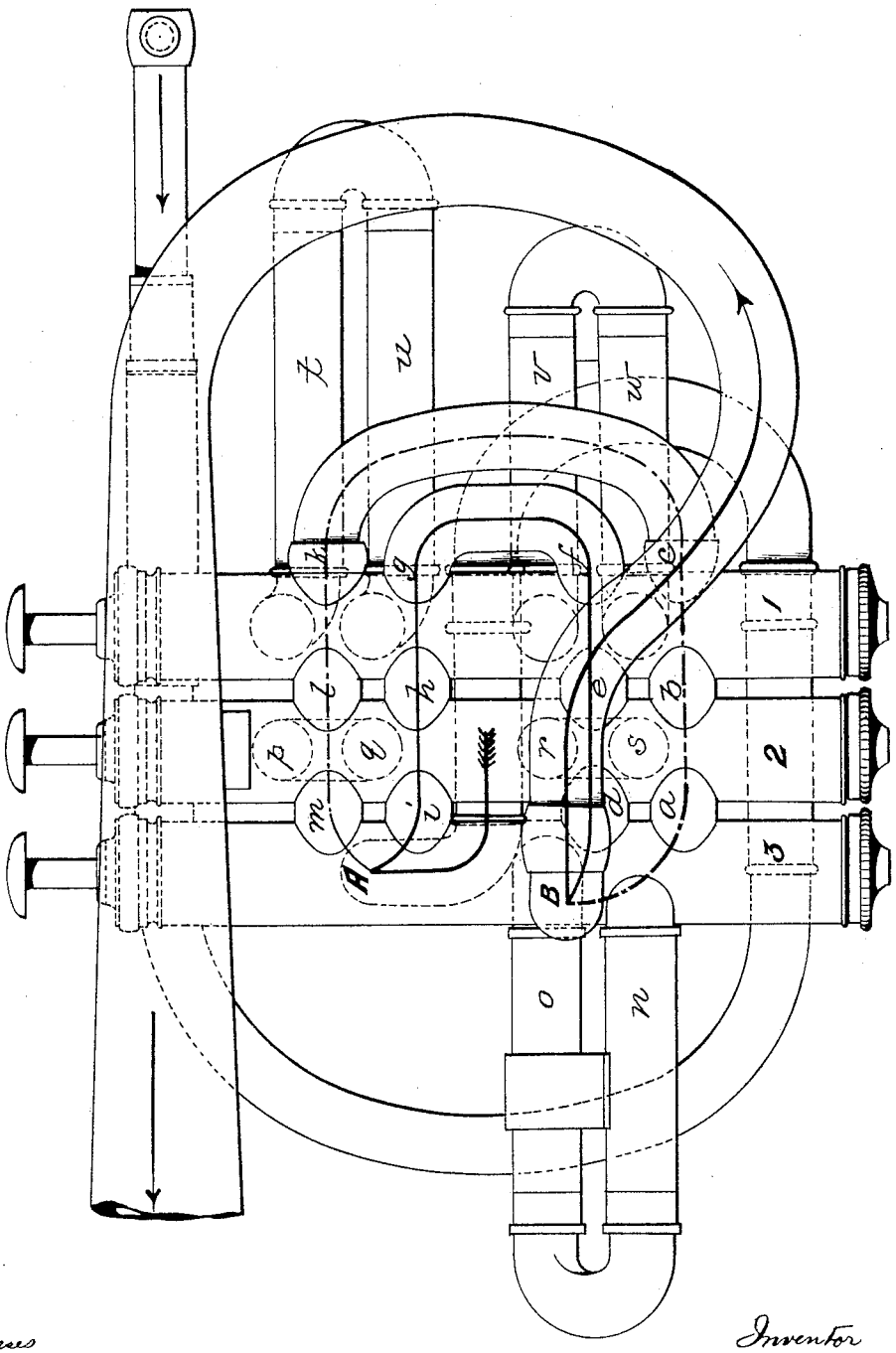
(No Model.) 8 Sheets—Sheet 1.

F. BESSON.

VALVED MUSICAL INSTRUMENT.

No. 457,337. Patented Aug. 11, 1891.

FIG. 1.



Witnesses
Chas. H. Smith
J. Stair

Inventor
Fontaine Besson
per Lemuel W. Serrell
Atty

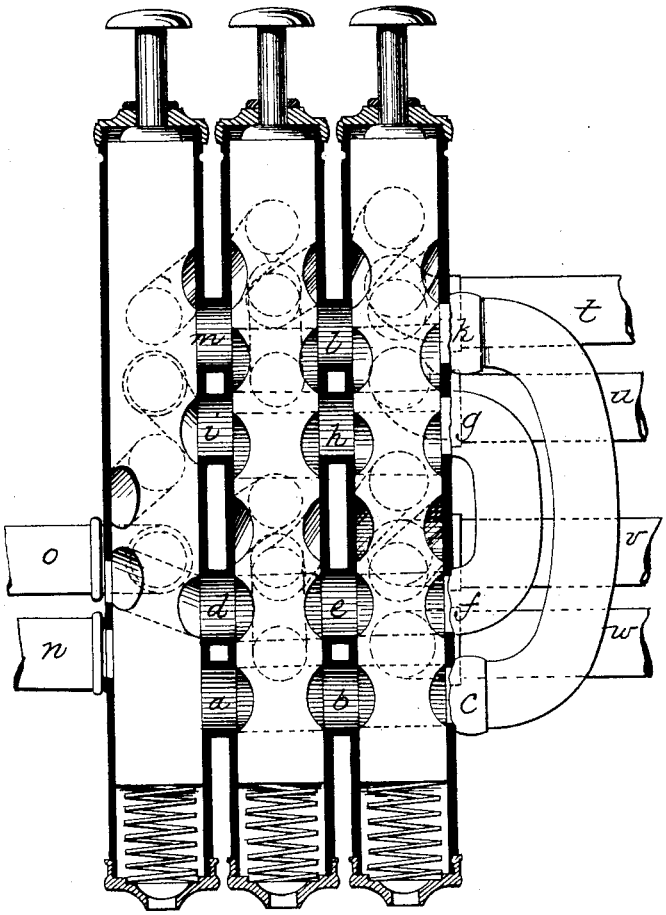
(No Model.) 8 Sheets—Sheet 2.

F. BESSON.

VALVED MUSICAL INSTRUMENT.

No. 457,337. Patented Aug. 11. 1891.

FIG. 2.



Witnesses
Chas. H. Smith
J. Stail

Inventor
Fontaine Besson
per Lemuel W. Serrell
Fairfax

(No Model.) 8 Sheets—Sheet 3.

F. BESSON.

VALVED MUSICAL INSTRUMENT.

No. 457,337. Patented Aug. 11, 1891.

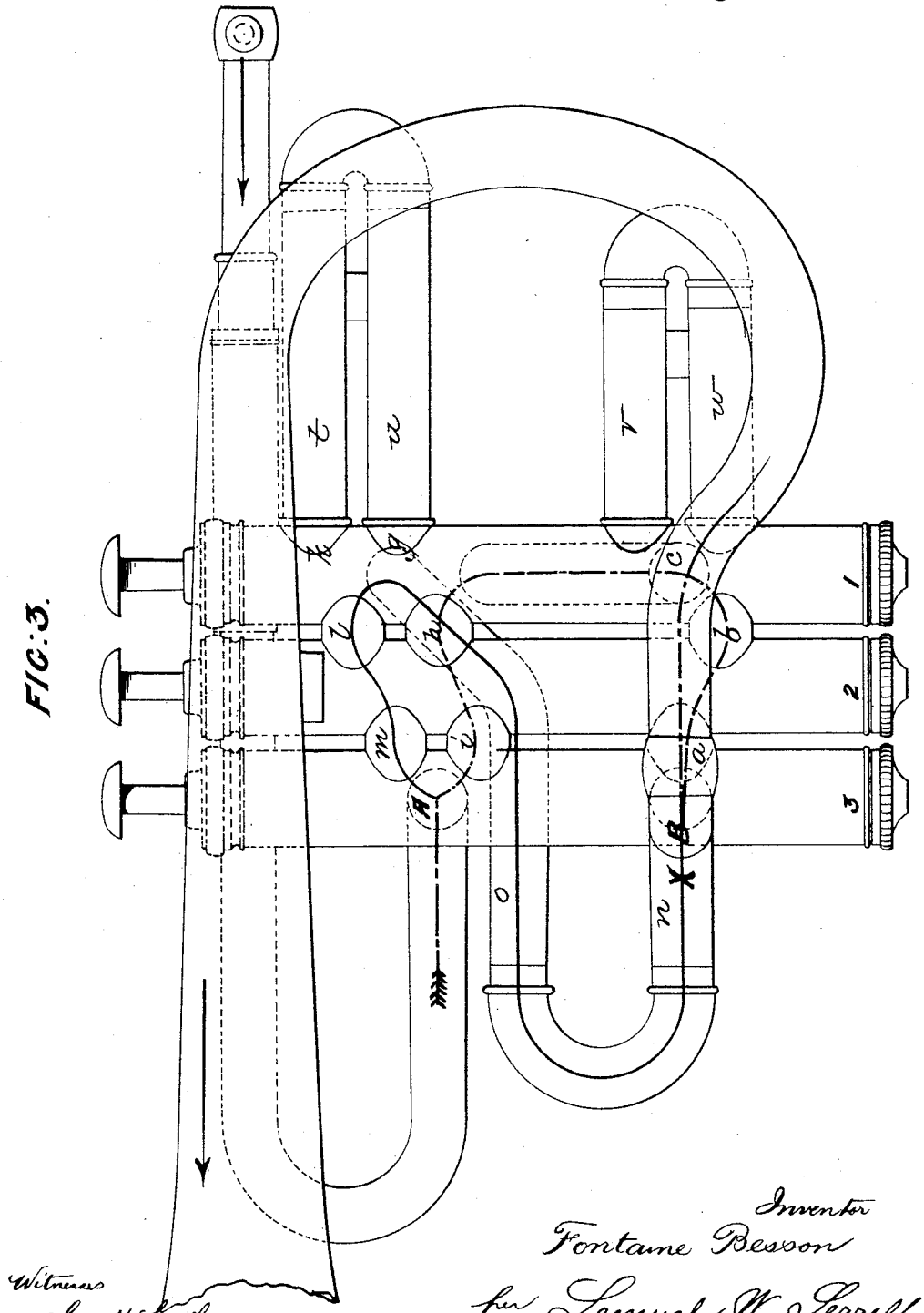


FIG. 3.

Witnesses
Chas. H. Smith
J. Stair

Inventor
Fontaine Besson
per Lemuel W. Serrell
Atty

(No Model.) 8 Sheets—Sheet 4.

F. BESSON.

VALVED MUSICAL INSTRUMENT.

No. 457,337. Patented Aug. 11, 1891.

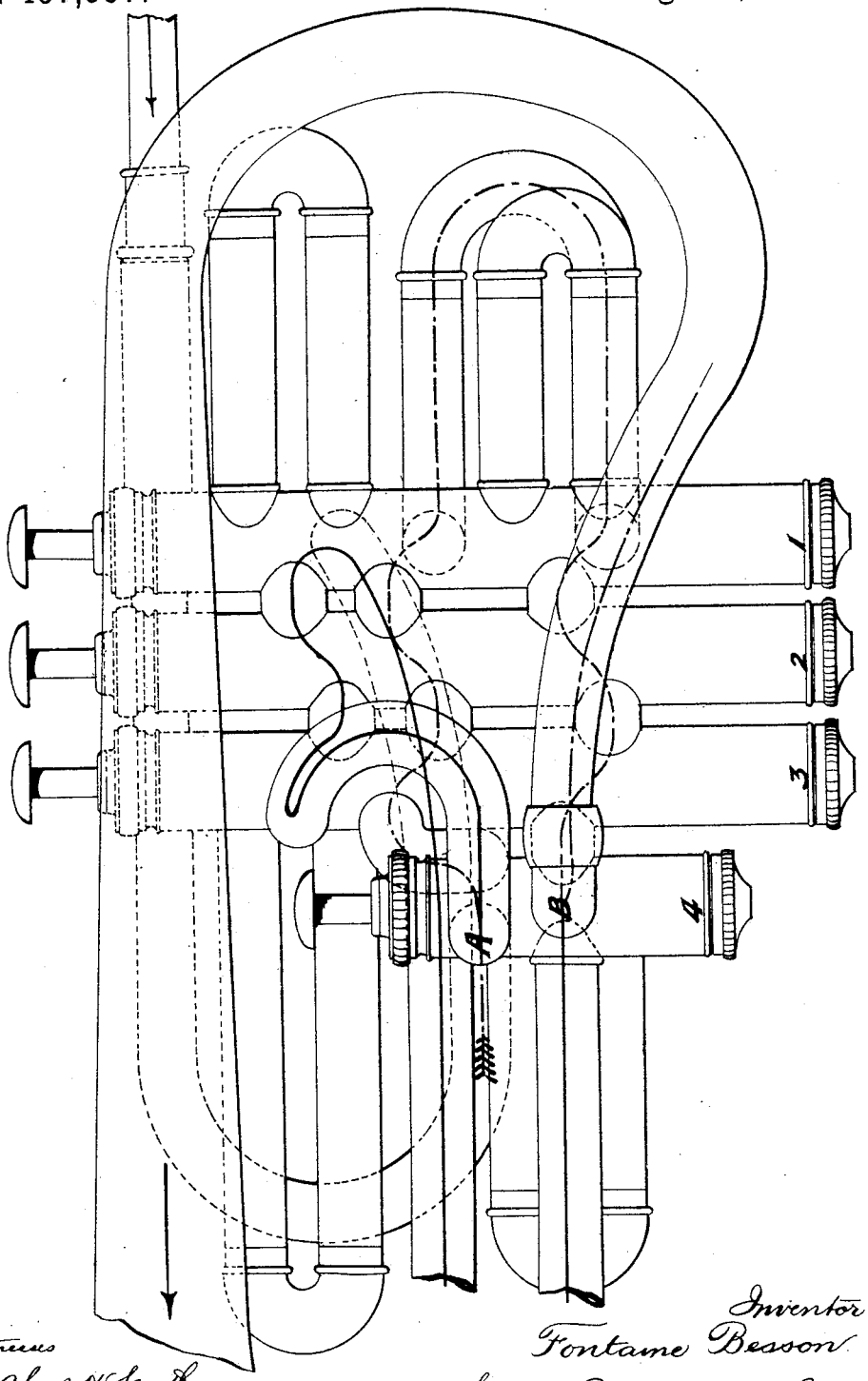


FIG: 4.

Witnesses
Chas. H. Smith
J. Stair

Inventor
Fontaine Besson
per Samuel W. Serrell
Atty

(No Model.) 8 Sheets—Sheet 5.

F. BESSON.

VALVED MUSICAL INSTRUMENT.

No. 457,337. Patented Aug. 11, 1891.

FIG: 7.

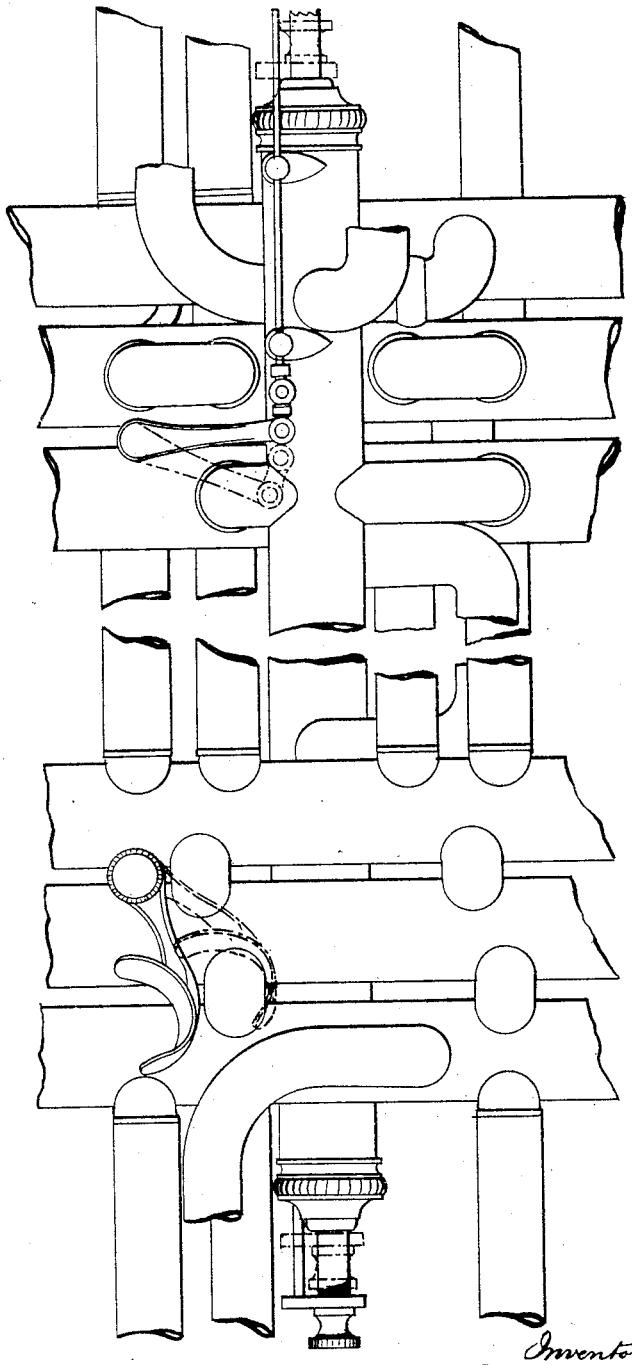


FIG: 5.

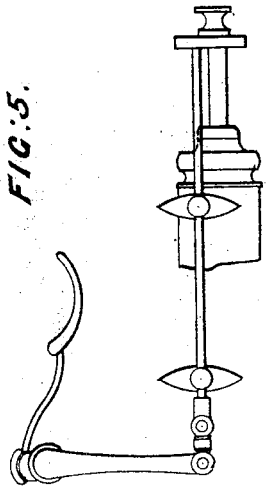


FIG: 6.

Witnesses
Chas. H. Smith
J. Stair

Inventor
Fontaine Besson
per Lemuel W. Serrell
Atty

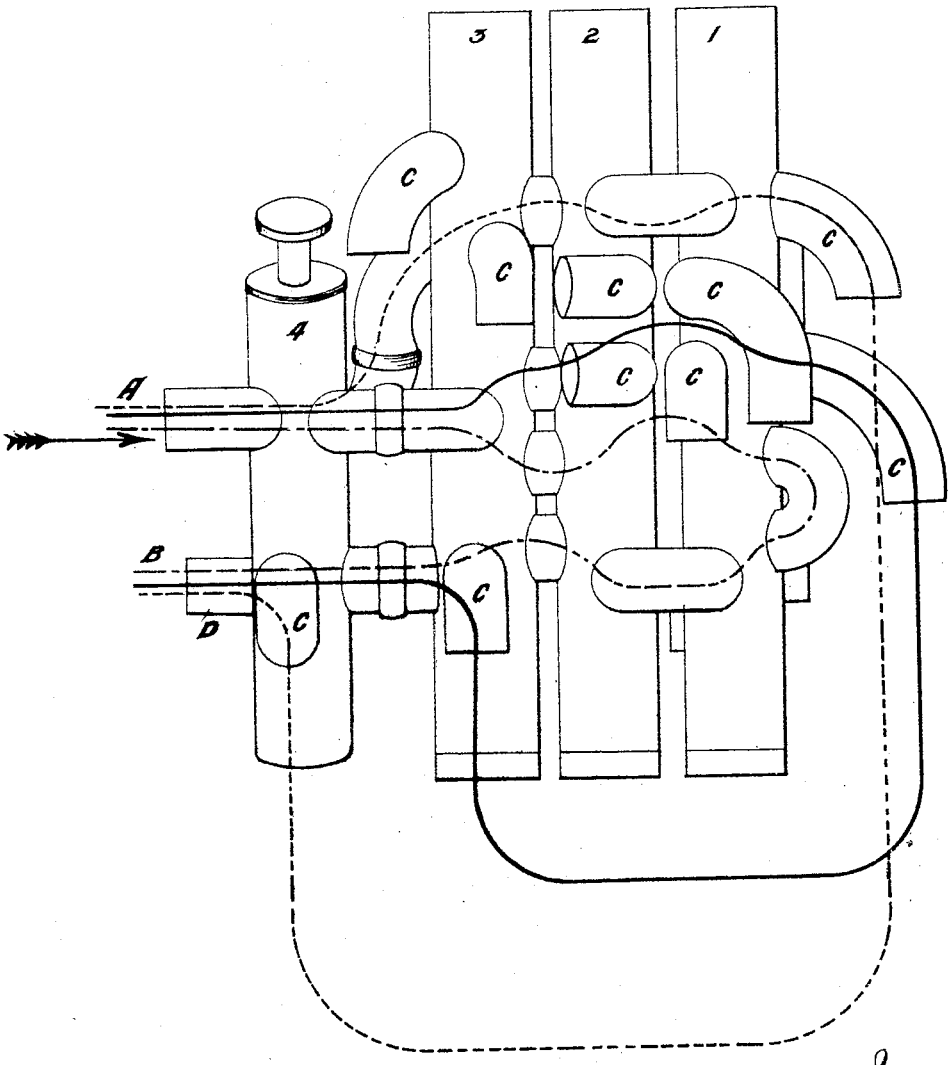
(No Model.) 8 Sheets—Sheet 6.

F. BESSON.

VALVED MUSICAL INSTRUMENT.

No. 457,337. Patented Aug. 11, 1891.

FIG: 8.



Witnesses
Chas. A. Smith
J. Stair

Inventor
Fontaine Besson
per Lemuel W. Serrell
atty

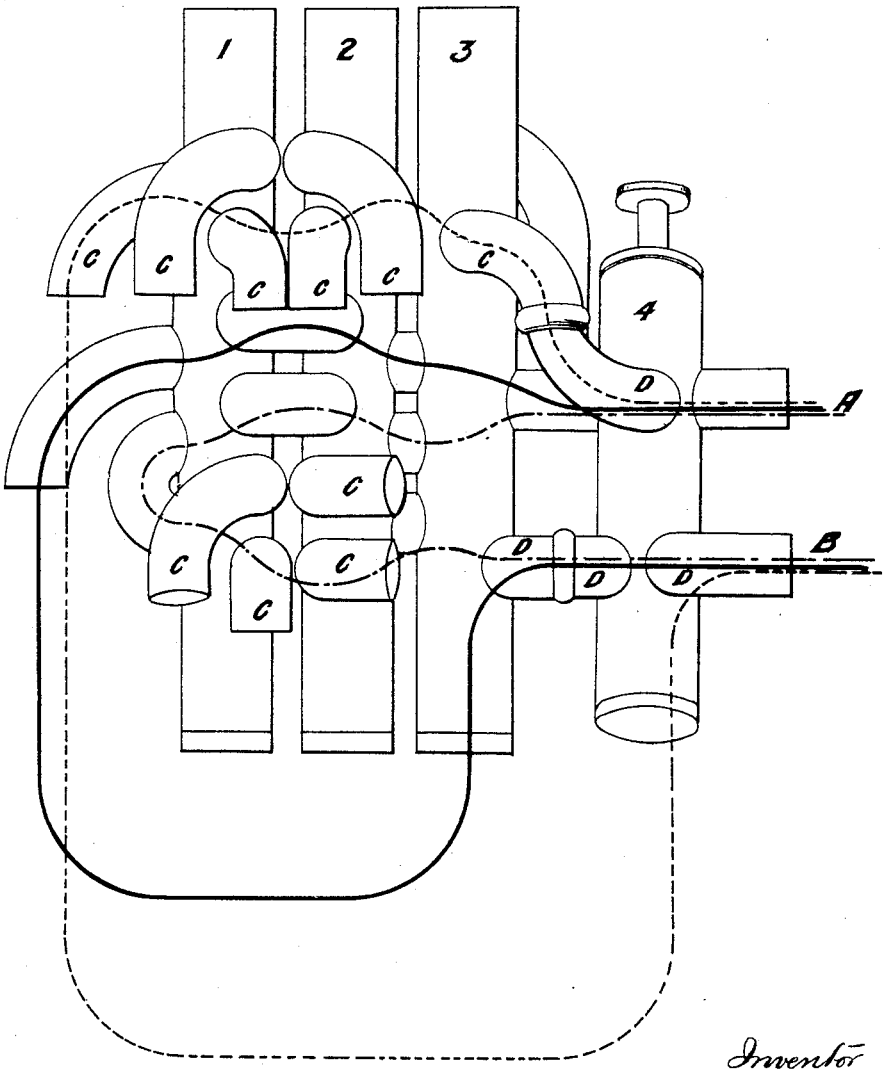
(No Model.) 8 Sheets—Sheet 7.

F. BESSON.

VALVED MUSICAL INSTRUMENT.

No. 457,337. Patented Aug. 11, 1891.

FIG: 9.



Witnesses
Chas. A. Smith
J. Stair

Inventor
Fontaine Besson
per Lemuel W. Serrell
Atty

(No Model.) 8 Sheets—Sheet 8.

F. BESSON.

VALVED MUSICAL INSTRUMENT.

No. 457,337. Patented Aug. 11, 1891.

FIG. II.

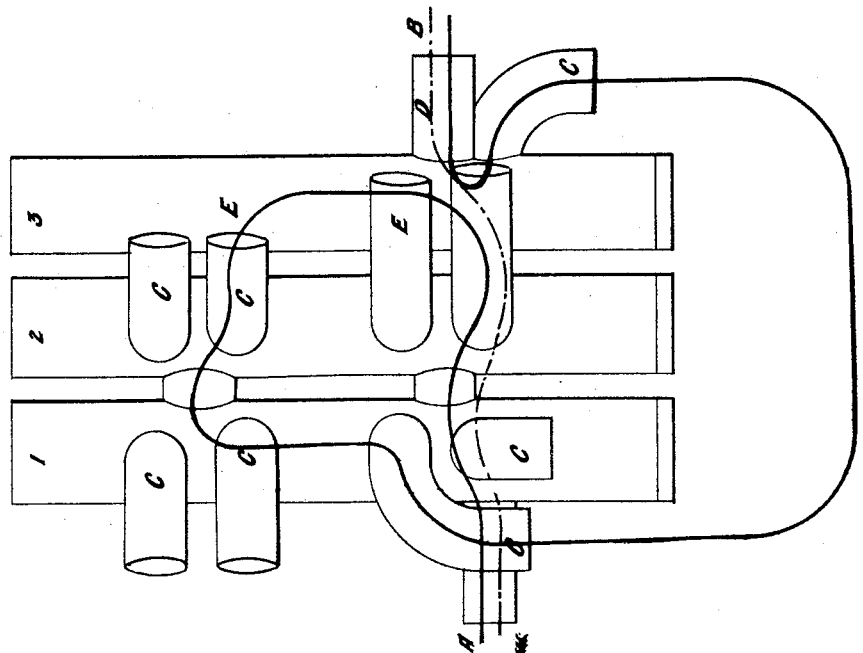
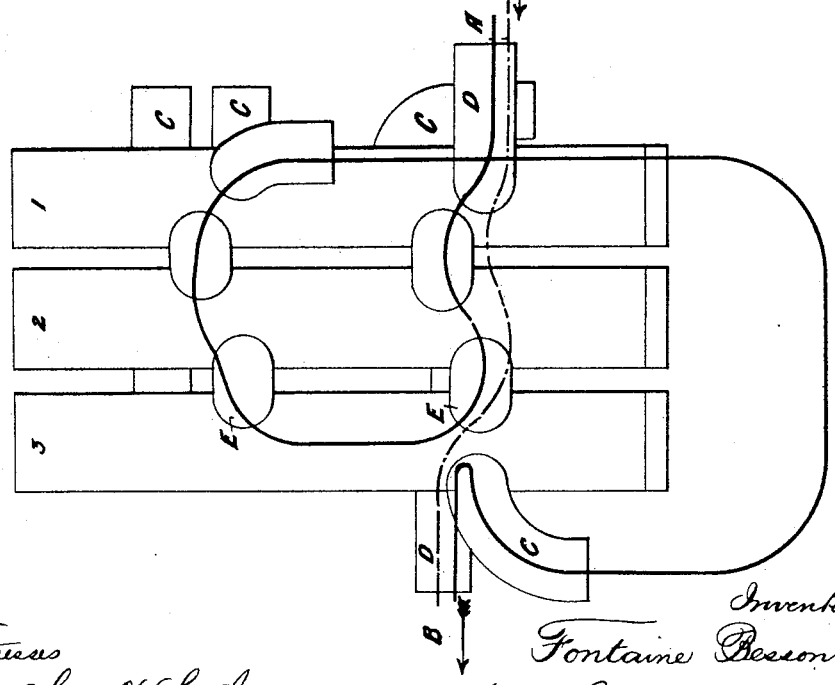


FIG. 10.



Witnesses
Chas. A. Smith
J. Stair

Inventor
Fontaine Besson
by Samuel W. Terrell
Atty

UNITED STATES PATENT OFFICE.

FONTAINE BESSON, OF LONDON, ENGLAND.

VALVED MUSICAL INSTRUMENT.

SPECIFICATION forming part of Letters Patent No. 457,337, dated August 11, 1891.

Application filed June 7, 1890. Serial No. 354,674. (No model.) Patented in England April 30, 1890, No. 6,649.

To all whom it may concern:

Be it known that I, FONTAINE BESSON, musical-instrument maker, of the firm of F. Besson & Co., a subject of the Queen of Great Britain, residing at Euston Road, London, in the county of London, England, have invented certain new and useful Valved Musical Instruments, (for which a patent has been granted to me in Great Britain, bearing date April 30, 1890, No. 6,649,) of which the following is a specification.

My invention has for its object to give a perfect chromatic scale to all valve wind-instruments. I obtain this object with a new system of valves, as hereinafter described, with what I call a "registre" combination, giving my instruments two distinct internal sets of air-passages, as well as double internal effect. These improved valves and new "registre" are applicable to all wind-valved instruments and can be played without change of fingering. There is a lever which gives rapidity to the action and is applicable to all valves and slides of any system whatever. In the usual mode of constructing wind, piston, or valve instruments the combinational valve-notes (especially the lower ones) are more or less sharp. Attempts have been made to obviate and rectify this, but the remedies hitherto applied, destroying the proportionate ratio and not being strictly clear bore, either muffle the tone or affect the upper notes, or sacrifice air-tightness, or necessitate a change of fingering. My invention rectifies the chromatic scale throughout, gives equality and great brilliancy to the tone, facilitates the emission of sound, while reserving the usual fingering, and my instruments being true clear bore are therefore perfectly air-tight.

My invention will be best understood by reference to the accompanying drawings, as hereinafter described.

Figures 1, 2, 3, and 4 represent an instrument constructed according to one modification of my invention. Figs. 5, 6, and 7 show a lever for actuating or giving rapidity to the movement of any kind of valves, "registres," slides, keys, &c. Figs. 8, 9, 10, and 11 show examples of various arrangements of instruments constructed according to my invention.

Description of Figs. 1, 2, 3, *and* 4.

Fig. 1 represents in elevation, and Fig. 2 in vertical section through the valves, my valve "registre" attached to an instrument, which valve system has two distinct air-passages and two distinct effects, the "registre" being the third valve regulating the two others. I employ three cylinders, marked 1 2 3. The main air-passages connecting these cylinders are indicated by the letters *a b c*. The letters *d e f* indicate the main air-passage when the third valve, hereinafter called "registre," is in use. The letters *g h i* indicate the continuation of the main passage when the third valve is pressed down or in use. The letters *k l m* indicate the continuation of the main passage to connect it with the lengthening-slides of the "registre" valves. The second valve 2 is a half-tone, the valve 1 a full tone, and the valve 3 one tone and a half. Slides are provided on each of the cylinders for the purpose of tuning these notes. Thus *n o* represents a slide for the third valve, *p q* represents one of the slides for the valve 2, and *r s* represents the other slide for the valve 2, *p q* being put into action by the valve 3. *t u* and *v w* are the slides for the valve 1, *t u* being put into action by the valve 3 and *v w* simultaneously cut off. The first effect is produced without using the valves. The open air-passage or "corps sonore" *a b c* passes through the first piston or valve 1. The second effect is obtained by lowering the first piston or valve 1. The first effect is hereby done away with and the passage or corps sonore is through *d e f*, through the third valve or piston, and on through the bell. There are thus two effects produced, but not simultaneously, since there are two distinct air columns or passages, and the third valve acts for two purposes—as a slide to lengthen the tubing and as a "column d'air" or main air-passage.

My "registre," as before described, may be placed after any number of valves, more or less, in any position—horizontal, vertical, or otherwise—and applied to any size or kind of wind-valved musical instrument.

Fig. 3 represents a simplified arrangement of valve action, with double air-passages and two effects. The passages *d e f* are dispensed with. The slides *p q* and *r s* are not shown in the drawings.

Fig. 4 represents an arrangement on the same principle as the preceding, but in which there is a fourth valve to extend the

compass of the instrument to show that my "registres" may be applied to any other valve; also any number of "registres," according to the instrument, arranged either horizontally, vertically, or otherwise, may be used.

Fig. 5 represents a lever adapted to valves, "registres," slides, or keys to give rapidity to the movement of either, which I may place in any position, vertical, horizontal, or otherwise.

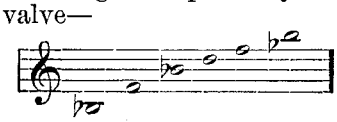
Description with reference to Figs. 1 and 2. An instrument with three valves and double air-passages.—As will be observed by reference to Figs. 1 and 2, this instrument has air-passages—that is to say, two distinct air-passages, as before described.

The first set of slides *v w* and *r s* of the open-air passage is marked in dotted lines. By lowering each valve separately there is obtained, as in the usual cornet, as follows: B♭ exactly by the first valve, B♮ exactly by the second valve, and A♮ exactly by the third valve.

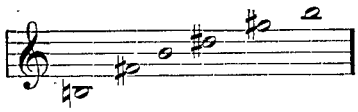
The second set of slides is brought into action by the third valve, which forms my "registre." When this is lowered, it creates thus for the sound-waves a new direction. (Represented by the black line.) This new direction has for its object to remedy the faulty notes which exist on the usual valved instruments each time that the player lowers more than one valve. These defects and want of "justesse" (and by the term "want of justesse" I mean notes not in perfect pitch or tune, and these are regulated or tuned by my new system of "registre" or regulator aided by the new lever) are specially noticeable in the low D and G, first and third valves; C♯ and E♯, first, second, and third valves; E♭ and A♭, second and third valves, and their harmonics, which are out of tune in the usual three-valved instruments, but are rendered perfect by my invention herein described. It will be understood that if previously I arrange the slides of the second set proportionately longer than those of the first set I obtain an E♭, a D♮, and a C♯ absolutely correct, as well as the corresponding harmonics.

First set. I obtain, therefore, with the first set the following notes perfectly:

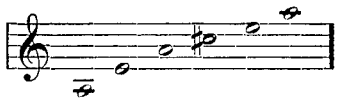
First valve—



Second valve—

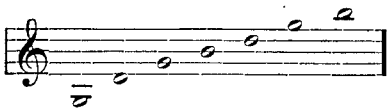


Third valve—

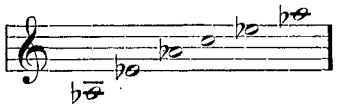


Second set. By the use of my "registre" in conjunction with one of my two other valves I also obtain the following notes perfectly in tune:

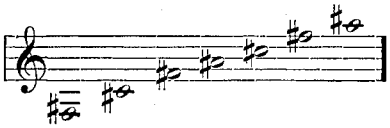
Third "registre" valve and first valve—



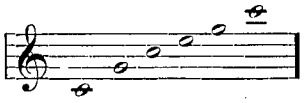
Third "registre" valve and second valve—



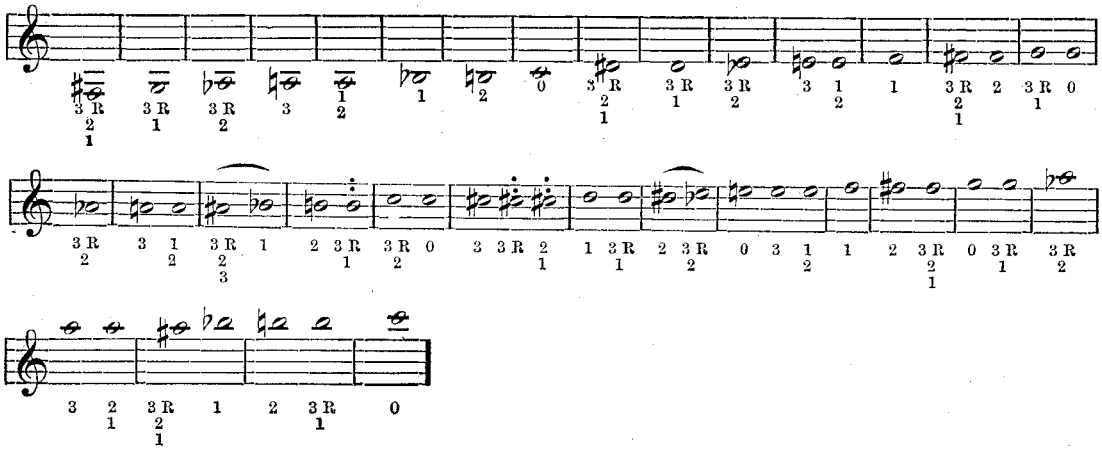
Third "registre" valve and first and second valves—



The harmonics of the open notes give—



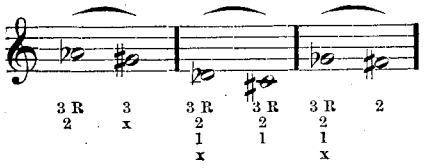
My invention therefore gives a perfect chromatic scale throughout, as per following examples, and in order that players may well understand the superiority of my system I also give the fingering of the enharmonics and "sensibles:"



The starting and ending points of the two air-passages (marked in chain and black lines) are respectively indicated by the letters A and B.

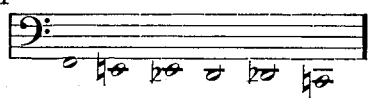
Second arrangement: This arrangement, Fig. 3, embraces the arrangement Figs. 1 and 2, of which it is the specification.

Remark. The slide of the third valve is arranged in such manner that there may be added a small additional valve—such as is shown at Figs. 4, 8, and 9, marked "4"—which increases the length to obtain G♯ by the simultaneous lowering of the third valve and also of the small additional valve. By lowering the third valve of the instrument and this small additional valve there is obtained low B♭. The player therefore can obtain at will by my invention the following enharmonics: X small additional valve.



Third arrangement: This arrangement of instrument with four valves has also for object Fig. 4 to show that my "registre" can be employed at will to compensate or transpose in conjunction with any number of valves that may be used, either by increasing or diminishing their number. Thus: in an instrument having two valves, one of which being a "registre" valve is employed to regulate the other.

Bass Instruments.—According to my invention I may add to any desired number of ordinary valves one of my "registre," that is, making one of the ordinary valves a "registre" with the object of giving extension to the descending scale. Thus to a bass instrument constructed according to my invention, having three valves, I may also add a fourth valve, in this case the third valve being the "registre," whereby can be obtained a chromatic descent absolutely in tune down to the pedal.



Description of Figs. 5, 6, and 7, which show a lever working one of my "registres" placed across the instrument, and this lever for working all valves, slides, keys, or rotary cylinders is a special feature of my invention.

Fig. 6 shows one side of an instrument with this valve-lever applied, and Fig. 7 shows the the other side of the same instrument with the same valve-lever applied.

Description of Figs. 8, 9, 10, *and* 11.

When examining Figs. 8 and 9, it should be remarked that besides the two air-passages mentioned with reference to Figs. 1, 2, 3, and 4 I also construct a third (represented by dotted lines) for giving access to the air-passage of the fourth valve, the third valve constituting in this case a "registre." C bends for the slides of the valve-tubes. D bends for the slides or tubes for the air-passages.

By the employment of four valves I obtain twelve positions absolutely correct produced by the following combinations:

First chain line	C	open note.
First air-passages	B♮	second valve.
Figures 1, 2, 3, and 4	B♭	first valve.
Second black line	A♮	third valve.
Second air-passage	A♭	second and third valves.
Figures 1, 2, 3, and 4	G	first and third valves.
	F♯	first, second, and third valves.
Third dotted line	F♮	fourth valve alone.
	E♮	fourth and third valves.
Air-passage of fourth valve	E♭	second, third, and fourth valves.
	D♮	first, third, and fourth valves.
	C♯	first, second, third, and fourth valves.

It will be remarked that in order to obviate making the valves of too great a length I may arrange the valves as shown in Fig. 3, as previously described. Thereby I am able to dispense with two holes in each valve 1 and 2. According to my invention the two first valves each have eight holes, including the two distinct air-passages of Figs. 1, 2, 3, and 4. The third valve in its two uses of "registre" and ordinary valve has only seven holes. The fourth valve in its two uses of registre and ordinary valve has only four holes.

It is to be understood that the description concerning Figs. 8, 9, 10, and 11 applies to bass instruments; but the principle, however, could also be applied to small instruments.

I claim as my invention—

1. In valved musical instruments, the registres having two distinct internal sets of air-passages, whereby a perfect chromatic scale is obtained in such instruments.

2. In valved musical instruments, the registres having two distinct internal sets of air-passages, in combination with the actuating-lever, as set forth.

3. In valved musical instruments, the combination, with the two distinct internal sets of air-passages, of the cylinders, bored as specified, whereby a true clear bore is obtained, as set forth.

FONTAINE BESSON.

Witnesses:
THOMAS W. ROGERS,
GRIFFITH BREWER,
Both of 33 *Chancery Lane, London.*