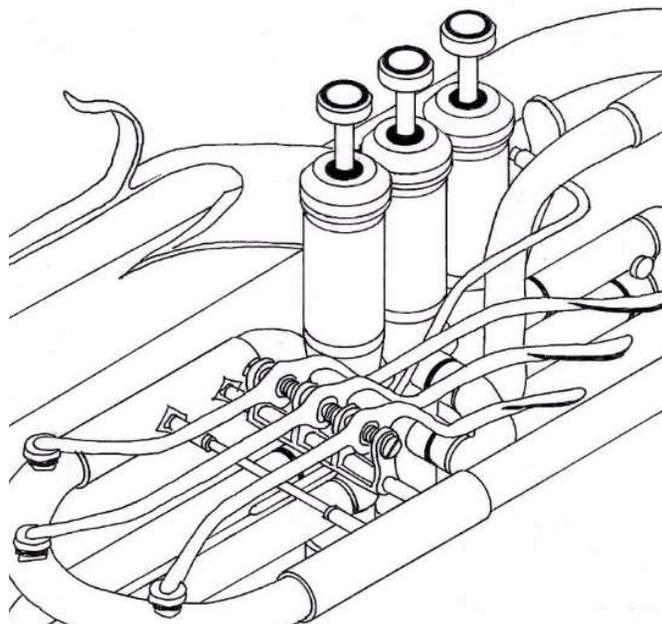


# PR.6



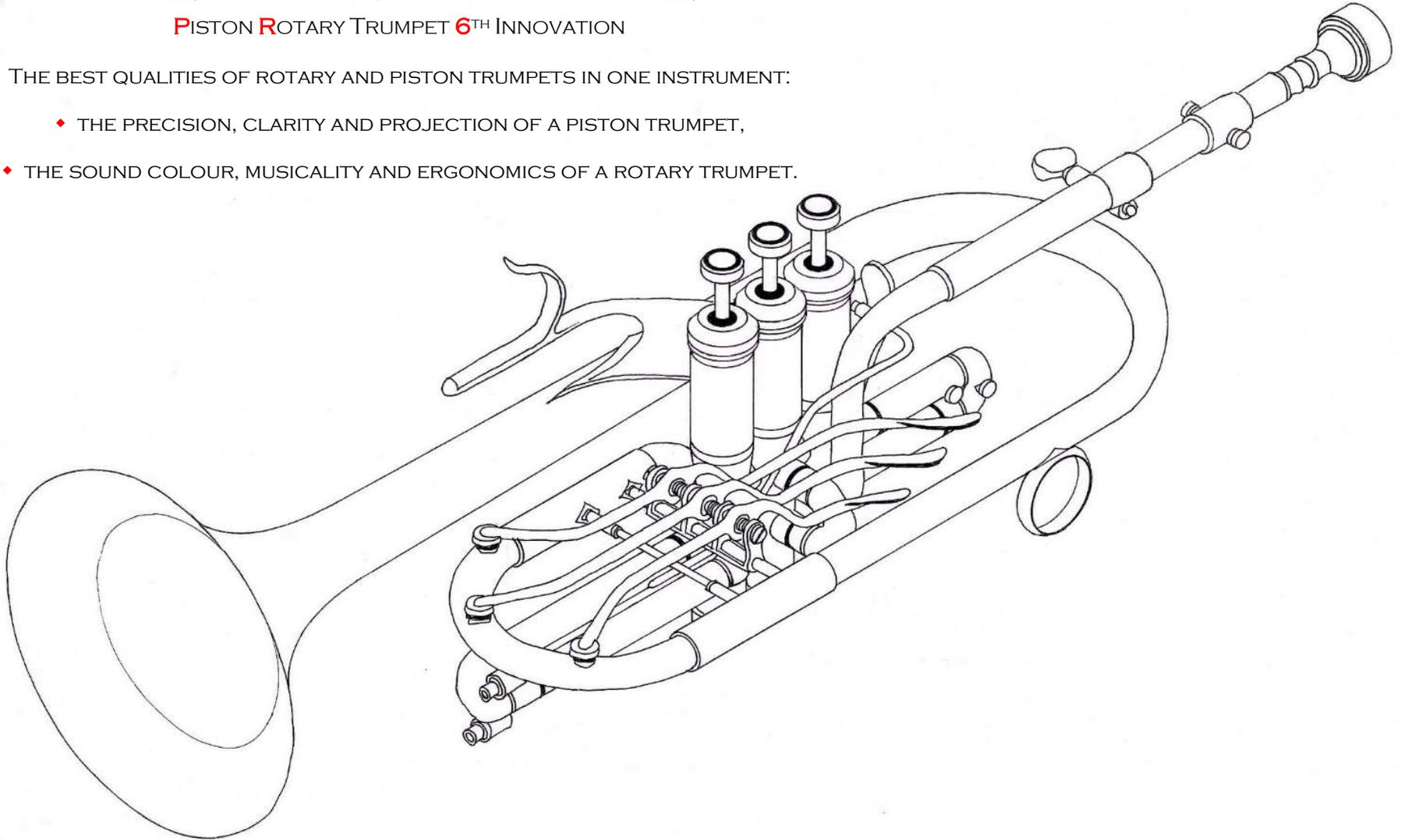
THE SIXTH INNOVATION IN  
TRUMPET ARCHITECTURE

# THE PR.6 TRUMPET

PISTON ROTARY TRUMPET 6<sup>TH</sup> INNOVATION

THE BEST QUALITIES OF ROTARY AND PISTON TRUMPETS IN ONE INSTRUMENT:

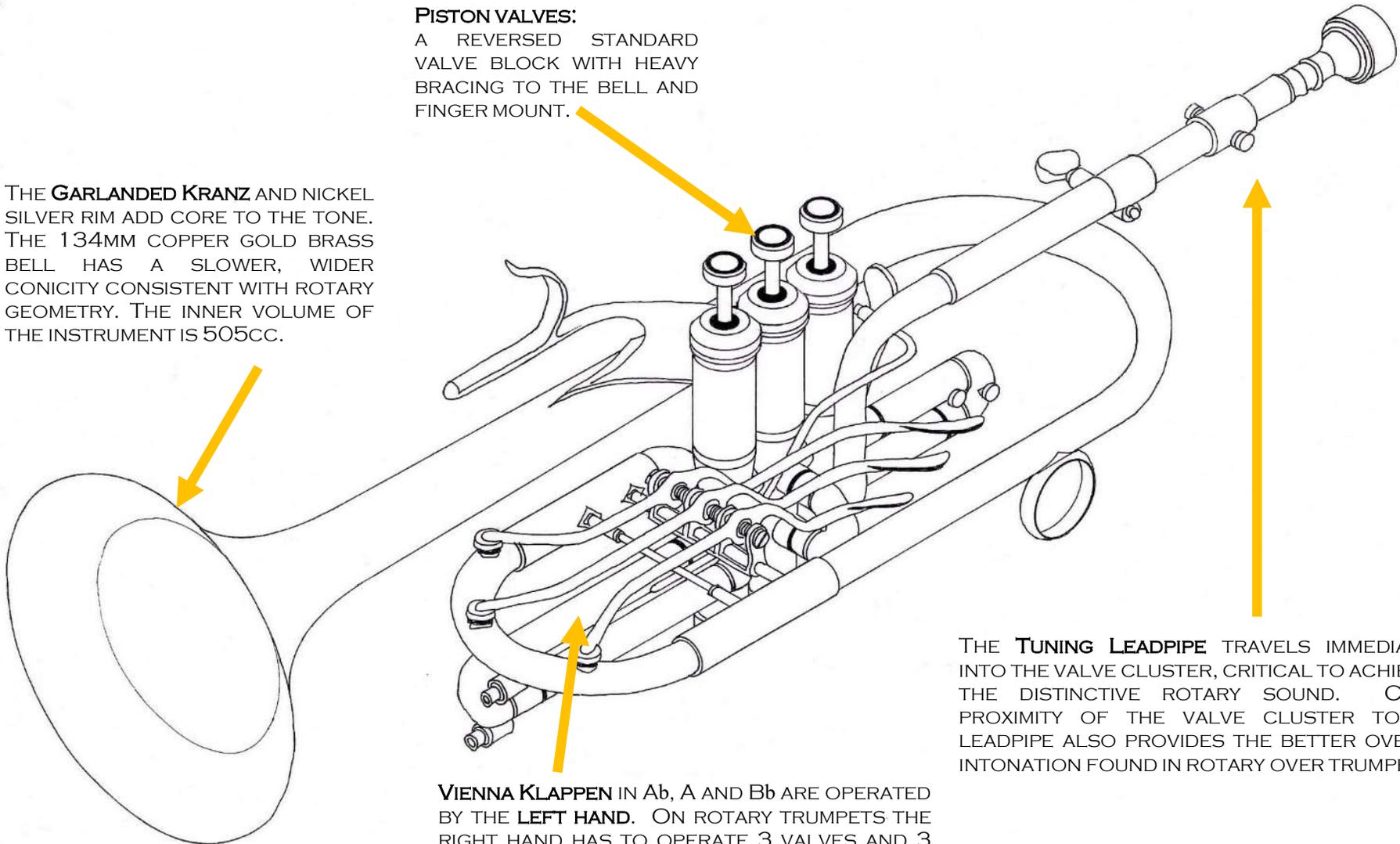
- ◆ THE PRECISION, CLARITY AND PROJECTION OF A PISTON TRUMPET,
- ◆ THE SOUND COLOUR, MUSICALITY AND ERGONOMICS OF A ROTARY TRUMPET.



**PISTON VALVES:**

A REVERSED STANDARD VALVE BLOCK WITH HEAVY BRACING TO THE BELL AND FINGER MOUNT.

THE **GARLANDED KRANZ** AND NICKEL SILVER RIM ADD CORE TO THE TONE. THE 134MM COPPER GOLD BRASS BELL HAS A SLOWER, WIDER CONICITY CONSISTENT WITH ROTARY GEOMETRY. THE INNER VOLUME OF THE INSTRUMENT IS 505CC.



**VIENNA KLAPPEN** IN Ab, A AND Bb ARE OPERATED BY THE **LEFT HAND**. ON ROTARY TRUMPETS THE RIGHT HAND HAS TO OPERATE 3 VALVES AND 3 KLEPPEN. THE KLAPPEN SLIDE CAN BE REPLACED WITH ONE WITH FEWER OR NO KLAPPEN.

THE **TUNING LEADPIPE** TRAVELS IMMEDIATELY INTO THE VALVE CLUSTER, CRITICAL TO ACHIEVING THE DISTINCTIVE ROTARY SOUND. CLOSE PROXIMITY OF THE VALVE CLUSTER TO THE LEADPIPE ALSO PROVIDES THE BETTER OVERALL INTONATION FOUND IN ROTARY OVER TRUMPETS.

# THE PR.6 TRUMPET

## PISTON ROTARY TRUMPET 6<sup>TH</sup> INNOVATION

IN 2021 A RESEARCH PAPER IN THE *INTERNATIONAL TRUMPET GUILD JOURNAL* COMPARED SCIENTIFICALLY FOR THE FIRST TIME THE TECHNICAL, MUSICAL, HISTORICAL AND CULTURAL DIFFERENCES BETWEEN ROTARY AND PISTON TRUMPETS.<sup>1</sup> READERS' RESPONSES CONFIRMED AN AMBIVALENCE AMONG PLAYERS BETWEEN THE TWO CONFIGURATIONS BUT RECOGNISED THE VIRTUES OF BOTH. THIS PROMPTED RESEARCH AND DESIGN DEVELOPMENT AS TO WHETHER THERE MIGHT BE A CONFIGURATION FOR A TRUMPET INCORPORATING THE BEST QUALITIES OF EACH TYPE IN A SINGLE INSTRUMENT.

## THE SIXTH INNOVATION

TRUMPETS AND CORNETS HAVE BENEFITED FROM CONSTANT AND SIGNIFICANT IMPROVEMENTS IN MANUFACTURING PROCESSES, ENGINEERING AND DETAILED DESIGN. THERE HAVE BEEN MINOR INNOVATIONS (AMADO WATER KEYS, TRIGGERED TUNING SLIDES, TUNING BELLS, AND PARTICULARLY THE PLACEMENT OF MASS AND BRACING) BUT GENUINE INNOVATIONS IN TRUMPET DESIGN HAVE BEEN FEW.

THE PR.6 JOINS A SHORT LINE OF INNOVATIONS:

1. THE SEPARATE AND TRANSFERRABLE MOUTHPIECE AND LEADPIPE,
2. THE SLIDE AND CLOCK-SPRING TRUMPET,
3. PADDED KEYS (WEIDINGER, VIENNA, 1792),
4. CHROMATIC PISTON VALVES (SATTLER, LEIPZIG, 1820) AND ROTARY VALVES (ADAMS, MASSACHUSETTS, 1825),
5. THE TARV MECHANISM (BELORGEY, PARIS, 1847), AND NOW
6. THE PR.6 TRUMPET.

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<sup>1</sup> Colin BLOCH, *International Trumpet Guild Journal*, vol 46 no.1, October 2021

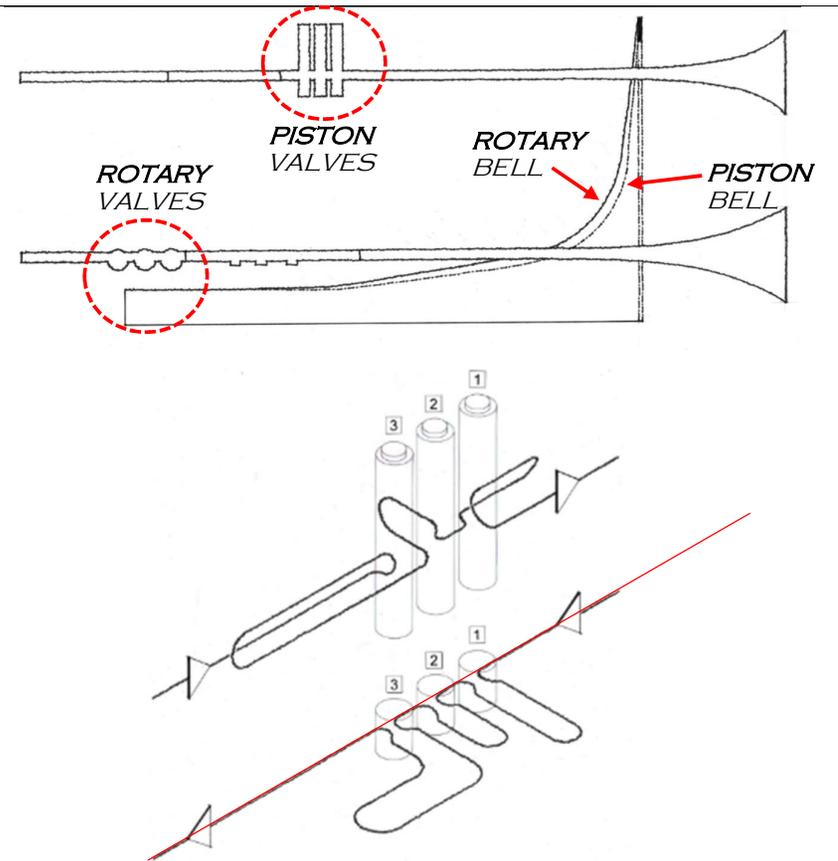
# ROTARY v PISTON: CRITICAL DIFFERENCES

THE **PRIMARY DIFFERENTIATOR** BETWEEN ROTARY AND PISTON TRUMPETS - HOW THEY SOUND AND FEEL TO PLAY - IS THE RELATIVE POSITION OF THE VALVE CLUSTER IN THE AIR COLUMN.

**PISTON** TRUMPET VALVES ARE MUCH **FARTHER ALONG** THE AIR COLUMN, LEAVING LESS OF THE AIR COLUMN IN WHICH TO DEVELOP CONICITY TOWARDS THE BELL.

**ROTARY** TRUMPET (AND FLUGEL HORN) VALVES ARE **CLOSER** TO THE MOUTHPIECE, ALLOWING CONICITY TO DEVELOP MUCH SOONER, YIELDING A LARGER INNER VOLUME AND A BELL WITH SLOWER AND WIDER CONICITY AND A WIDER RIM.

THE **SECONDARY DIFFERENTIATOR** IS THAT THE ROTARY TRUMPET'S AIR COLUMN PASSES MUCH MORE DIRECTLY THROUGH THE VALVE CLUSTER, IN A STRAIGHT LINE WHEN THE VALVES ARE NOT DEPRESSED, WHEREAS ON THE PISTON TRUMPET THERE ARE MANY MORE TWISTS AND TURNS. THIS GREATLY AFFECTS THE DIFFERENCE IN RESPONSE BETWEEN THE TWO TYPES.



# ROTARY v PISTON: DIFFERENT VIRTUES

THE MUSICAL QUALITIES OF THE PISTON AND ROTARY SYSTEMS ARE VERY DIFFERENT. NEITHER IS BETTER. THE GREATER AND LESSER VIRTUES OF EACH HAVE BEEN IDENTIFIED<sup>2</sup> AND IT IS THESE THAT ARE BROUGHT TOGETHER IN THE PR.6 TRUMPET.

THE **ROTARY TRUMPET**, WITH THE VALVE CLUSTER CLOSER TO THE MOUTHPIECE, A LARGER INNER VOLUME, AND A WIDER AND SLOWER CONICITY LEADING TO A LARGER BELL, PRODUCES **A WIDER AND MORE BLENDED SOUND**. ITS LATERAL CONFIGURATION NATURALLY INVITES **A MORE RELAXED AND HEALTHIER POSTURE**. IT IS SLIGHTLY **BETTER IN TUNE** THAN A PISTON TRUMPET AND HAS BETWEEN ONE AND FOUR (BUT OFTEN THREE) LEVER-ACTIVATED VIENNA 'KLAPPEN' OR VENT-KEYS. THESE PROVIDE INCREASED ACCURACY IN THE HIGHER REGISTER BY INTERRUPTING IMPEDANCE AND REDUCING RESISTANCE<sup>3</sup>. THE INSURMOUNTABLE DIFFICULTY ON THE ROTARY TRUMPET OF INSERTING OR REMOVING MUTES QUICKLY WHILE PLAYING IS PROBABLY WHAT HAS INSPIRED THE MODERN GENERATION OF TARV TRUMPETS.

THE **PISTON TRUMPET**, WITH THE VALVE CLUSTER MUCH FURTHER DOWN THE AIR COLUMN, HAS A SMALLER AND LESS CONICAL INNER VOLUME WITH A SMALLER AND MORE SHARPLY FLARED BELL. THIS PROVIDES GREATER **CLARITY AND PRECISION OF ATTACK AND PROJECTION** AND **A MORE FOCUSED SOUND**. MUTE CHANGING IS EASIER WHILE PLAYING.

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<sup>2</sup> Colin BLOCH op.cit.

<sup>3</sup> Similar to vent holes on a natural or baroque trumpet, but with keys instead of using finger pads.

# PR.6: THE BEST OF BOTH IN ONE INSTRUMENT

THE PR.6 IS AN INNOVATION COMBINING THE BEST OF ROTARY AND PISTON TRUMPETS' PLAYING QUALITIES, TECHNOLOGIES AND ERGONOMICS. IT IS:

1. THE FIRST TRUMPET TO COMBINE **PISTON VALVES WITHIN A ROTARY CONFIGURATION**;
2. THE FIRST TRUMPET TO HAVE **VIENNA KLAPPEN OPERATED BY THE LEFT HAND**, LEAVING THE RIGHT HAND FREE TO USE THE VALVES. ON A ROTARY TRUMPET, THE RIGHT HAND OPERATES THE THREE VALVES AND UP TO FOUR VIENNA KLAPPEN;
3. THE FIRST TRUMPET IN A ROTARY CONFIGURATION TO ALLOW **QUICK AND EASY MUTE CHANGES** AND
4. THE FIRST TRUMPET ERGONOMICALLY DESIGNED *A PRIORI* TO SUPPORT **OPTIMUM POSTURE, BREATHING, STAMINA AND HEALTH**.

# PLAYING ERGONOMICS

WHICH BRINGS US TO **ERGONOMICS, POSTURE AND WELL-BEING**.

IT HAS BEEN SHOWN<sup>4</sup> THAT ROTARY AND PISTON INSTRUMENTS ENCOURAGE DIFFERENT POSTURE.

A FUNDAMENTAL PROBLEM WITH MANY BRASS INSTRUMENTS HAS BEEN THAT THE INSTRUMENT IS DESIGNED, AND THE ERGONOMICS HAVE TO FOLLOW. THIS OFTEN LEADING TO POSTURAL DIFFICULTIES WHICH MANIFEST IN PLAYING DIFFICULTIES AND STRESS.

## **ERGONOMICS**

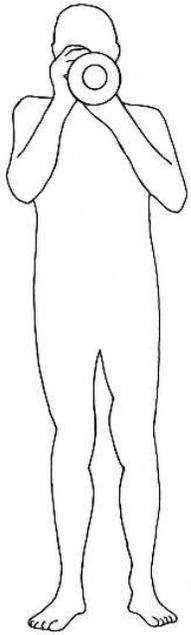
ERGONOMIC BENEFITS WITH IMPROVEMENTS IN WELL-BEING AND REDUCTION IN STRESS ARE AT THE HEART OF THIS DESIGN.

THE DIAGRAMS ON THE NEXT PAGE SHOW THE COMPARATIVE PLAYING POSTURES OF THE PISTON TRUMPET, THE PR.6, AND OF THE ROTARY TRUMPET.

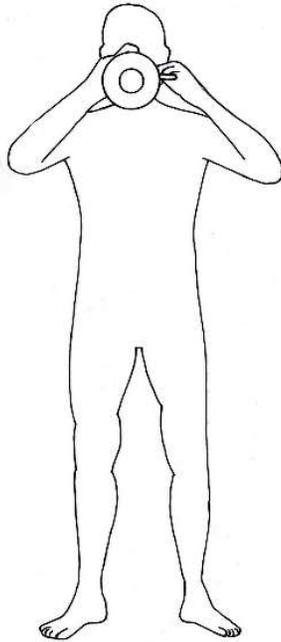
THE PISTON TRUMPET ENCOURAGES HUNCHING AND BENT WRISTS AND FOREARMS, WHEREAS THE ROTARY TRUMPET ENCOURAGES A MORE LATERAL POSTURE TO ARMS AND THORAX, UNBENT WRISTS, AND A MORE BALANCED OVERALL STANCE. MOST OF THESE BENEFITS ARE CAPTURED IN THE PR.6.

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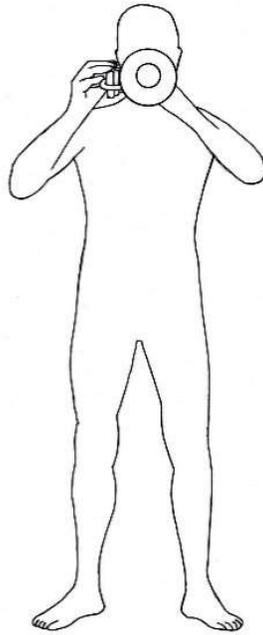
<sup>4</sup> BLOCH op cit



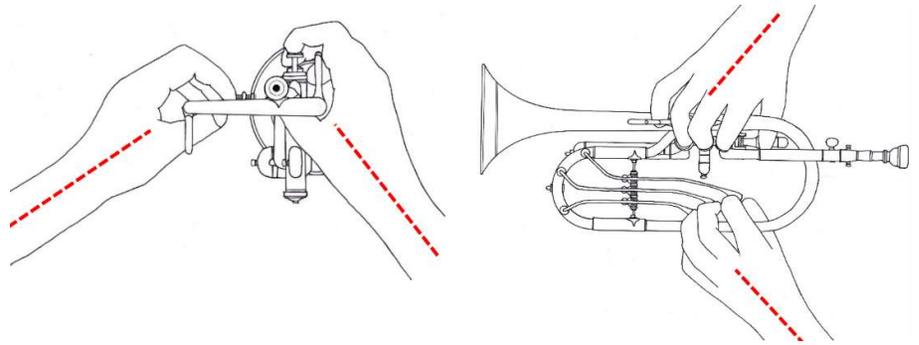
THE TYPICAL HUNCHED POSTURE OF THE **PISTON** TRUMPET



THE **PR.6** POSTURE SITS BETWEEN THE TWO, BUT MUCH MORE TOWARDS THE ROTARY POSTURE.



THE **ROTARY** POSTURE ENCOURAGES A MORE RELAXED STANCE, WITH OPENED ARMS SUPPORTING A LESS COMPRESSED THORAX AND THUS BETTER BREATHING.



THE **PR.6** ENCOURAGES A COMFORTABLE, BALANCED AND POISED POSITIONING OF THE HANDS AND FOREARMS, WITH THE HANDS EVENLY PLACED, AND GENERAL STRAIGHTNESS THROUGH THE WRIST AND FOREARM

# MAKING IT: TARGET SPECIFICATIONS

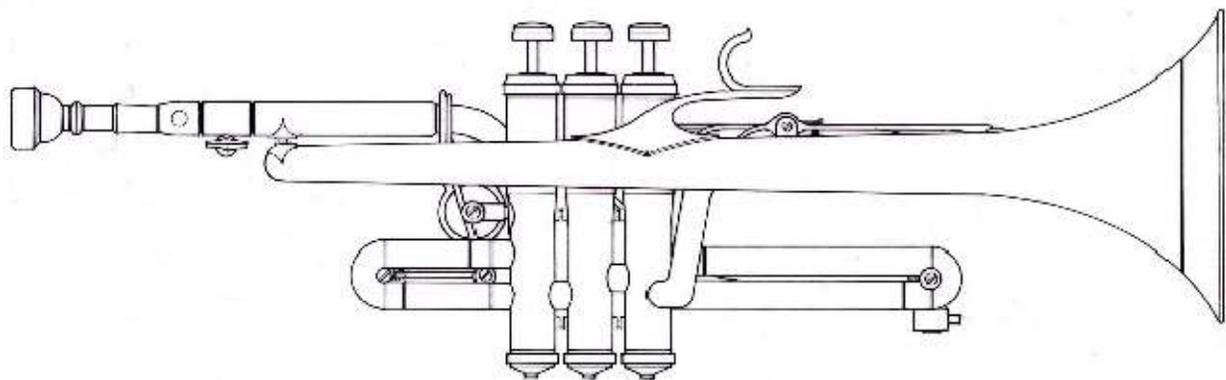
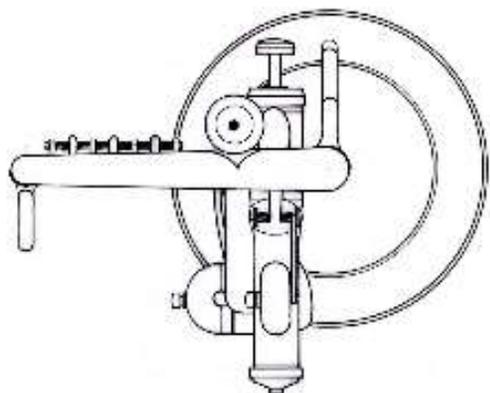
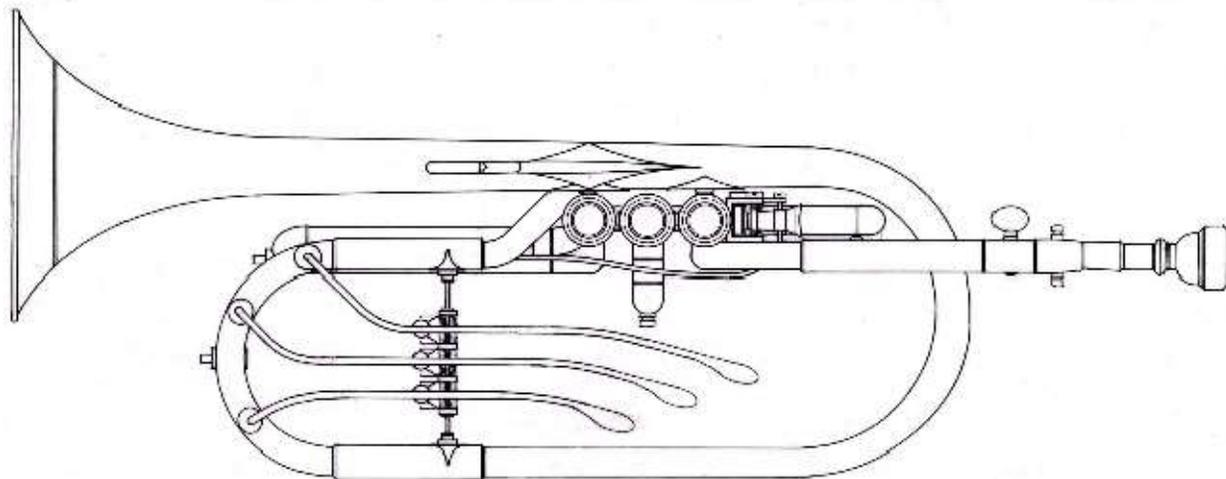
THE PR.6 HAS BEEN DESIGNED FOR EASE OF FABRICATION.

THE VALVE BLOCK IS A STANDARD ONE (BACH OR SIMILAR), BUT REVERSED. THE BELL IS A STANDARD ROTARY 134MM BELL.

THE REMAINDER REQUIRES PIPEWORK WITHIN THE COMPETENCE OF ANY SMALL MAKER.

THE PR.6 WOULD HAVE INTERCHANGEABLE LEAD PIPES AND TUNING SLIDES (WITH OR WITHOUT KLAPPEN KEYS).

<i>KEY</i>	C 440 (SHOWN), Bb	<i>LENGTH WITHOUT MOUTHPIECE</i>	465MM
<i>INNER VOLUME</i>	505CC	<i>WEIGHT WITHOUT MOUTHPIECE</i>	1,085G
<i>MEAN BORE</i>	22.121MM	<i>BALANCE POINT</i>	2.1 - 2.5 VALVE
<i>BELL</i>	GOLD BRASS ONE-PIECE LINEAR SEAM RIM DIAMETER 134MM COPPER RICH GOLD BRASS / NICKEL SILVER GARLAND 3 NICKEL SILVER BRACES ROTARY CONICITY	<i>ADJUSTMENTS</i>	COMBINED 1 <sup>ST</sup> / 3 <sup>RD</sup> TRIGGER 1 <sup>ST</sup> SLIDE MINIBALL JOINT PRESSURE RELEASE APERTURE IN THIRD VALVE CASING
<i>LEADPIPES</i>	REMOVEABLE INTERCHANGEABLE BASED ON KUHN C355 AND C2	<i>VALVES</i>	11.00MM, BASED ON A BACH STRAD VALVE BLOCK REVERSED VALVE TRAVEL 10.34MM FRICTIVE AREA 4,084MM <sup>2</sup> INTER-VALVE 7.41MM
<i>TUNING SLIDE</i>	STANDARD WITH THREE VIENNA KEYS OPTIONS WITH FOURTH G KEY, WITH Bb KEY ONLY, OR WITH NO KEYS	<i>CUSTOMISATIONS</i>	COPPER CONTENT OF BELL LAYOUT OF VIENNA KEYS POSITION AND SIZE OF LEFT THUMB RING POSITION OF RIGHT FINGER RING PUSH-ROD OR LEVER TRIGGERS VARIANT LEADPIPES RUBY CHIP INSETS TO VALVE CAPS



# PR.6-L

IN WESTERN POPULATIONS 10 - 12% ARE LEFT-HANDED. IN CHINA, CULTURAL DISCRIMINATION RESULTS IN LEFT-HANDEDNESS BEING 'CURED' TO THE EXTENT THAT ONLY 1 - 2% OF THE POPULATION IS LEFT-HANDED. IN THE WEST:

6 - 8% ARE OF TRUMPETERS ARE LEFT-HANDED

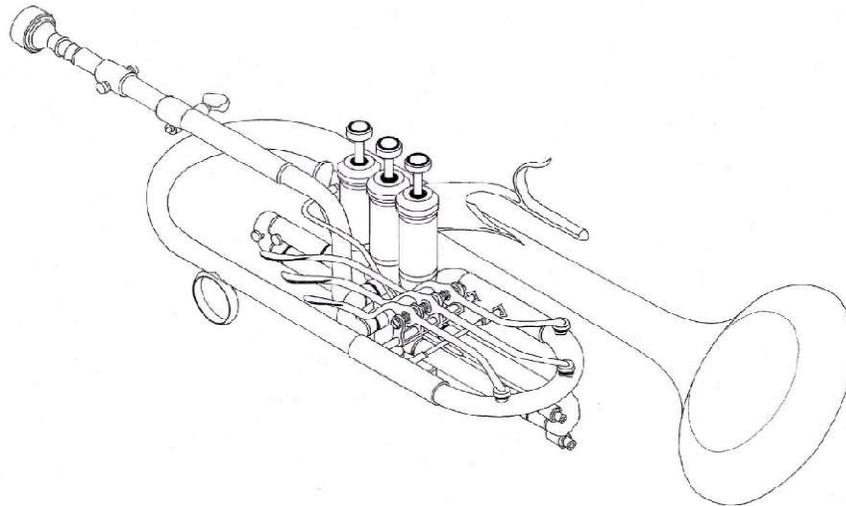
14 - 15% OF FRENCH HORN PLAYERS ARE LEFT-HANDED

12 - 14% OF TROMBONISTS ARE LEFT-HANDED

THIS SUGGESTS THAT LEFT-HANDED BEGINNERS HAVE BEEN DIVERTED TO THE LEFT-HANDED FRENCH HORN, OR THE TROMBONE. THE FULL EXTENT OF TALENT EMBEDDED IN LEFT-HANDED PEOPLE, OFTEN MORE MUSICALLY CAPABLE, IS BEING LOST TO TRUMPETING.

ONLY CAROLBRASS MAKES A LEFT-HANDED TRUMPET, SHOWN HERE. THE CONFIGURATION WITH THE BELL TO THE RIGHT OF THE VALVES IS ALSO WHAT IS FOUND ON A FLUGEL HORN.

THE **PR.6** COULD EASILY BE MADE FOR LEFT-HANDED PLAYERS: THE **PR.6-L**



# APPENDIX: THE TARV TRUMPET

THE TARV (TOP ACTION ROTARY VALVE) MECHANISM HAS BEEN AROUND FOR A LONG TIME WITHOUT GAINING POPULAR TRACTION. NICOLAS-PAUL BELORGEY GAINED A PATENT IN 1847 FOR A PISTON MECHANISM CONTROLLING A ROTARY VALVE<sup>5</sup> WHICH OFFERED VERTICAL PLUNGER LEVERS ACTIVATING ROTARY VALVES<sup>6</sup>. THERE HAS BEEN A MODERN TARV REVIVAL OF INNOVATIVE BUT PERHAPS ECCENTRIC HIGH-QUALITY INSTRUMENTS. TWO EMINENT MAKERS - SCHAGERL AND POSSEGGER - EACH NOW MAKES A TARV TRUMPET IN TWO DIFFERENT CONFIGURATIONS WITH THE PISTON-ACTIVATED ROTARY VALVES EITHER ....

1. **CLOSE** TO THE MOUTHPIECE IN THE CONVENTIONAL **ROTARY** POSITION (SCHAGERL'S *GANSCHHORN* / POSSEGGER'S *VERTIKAL*) OR
2. **FURTHER DOWN** THE AIR COLUMN, IN THE CONVENTIONAL **PISTON** POSITION (SCHAGERL'S *RAWENI* / POSSEGGER'S *TRICKY*).



A 19<sup>TH</sup> CENTURY **TARV** CORNET WITH THE ROTARY VALVES MUCH FURTHER DOWN THE AIR COLUMN, IN THE TRADITIONAL PISTON POSITION.



**SCHAGERL'S GANSCHHORN** WITH THE ROTARY VALVES CLOSE TO THE MOUTHPIECE, IN THE TRADITIONAL ROTARY (AND FLUGEL HORN) POSITION.



**SCHAGERL'S RAWENI** WITH THE ROTARY VALVES MUCH FURTHER DOWN THE AIR COLUMN, IN THE TRADITIONAL PISTON POSITION.



**BACH'S EARLY ERROR:** VINCENT BACH MADE EARLY ROTARY VALVE TRUMPETS WITH ROTARY VALVES IN THE PISTON VALVE POSITION FURTHER DOWN THE AIR COLUMN. SHOWN HERE IS A 1934 MODEL<sup>7</sup>. THESE WERE NOT SUCCESSFUL AND ONLY 15 WERE MADE. BACH'S LATER AND CURRENT ROTARY VALVE INSTRUMENTS HAVE THEM IN THE CORRECT POSITION.

<sup>5</sup> Belorgey was Parisian valve-maker who had worked with most Parisian makers. On Thursday 25<sup>th</sup> November 1847 he acquired a French patent, number 6428, for 'Genre de piston à cylindre, à moteur vertical, pour les instruments de musique en cuivre' or 'Type of piston-cylinder, vertically-driven, for brass musical instruments' for a rotary valve cylinder controlled by a small valve with a coiled spring.

<sup>6</sup> The history of TARV instruments is well documented at [https://brasspedia.com/index.php?title=Top\\_action\\_rotary\\_valve\\_trumpets](https://brasspedia.com/index.php?title=Top_action_rotary_valve_trumpets)

<sup>7</sup> <https://www.horn-u-copia.net>