Oct. 11, 1949. C. F. HUBLEY 2,484,408

FRENCH HORN

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Fig. 1.

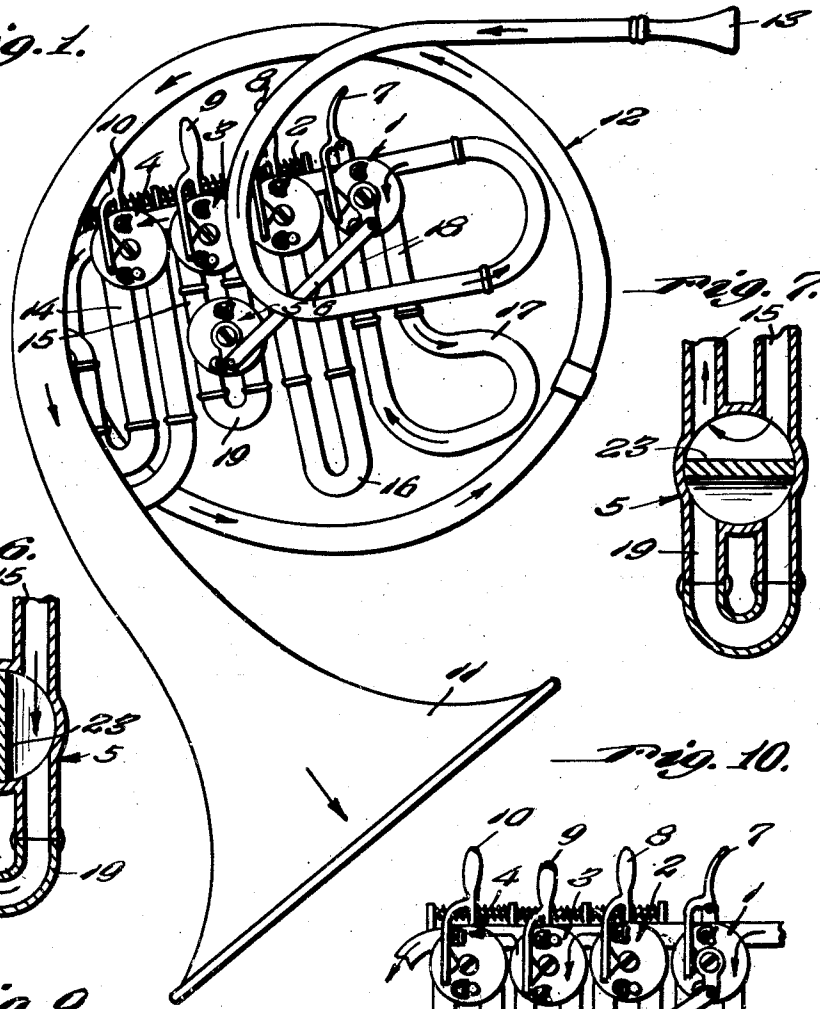



Fig. 7.



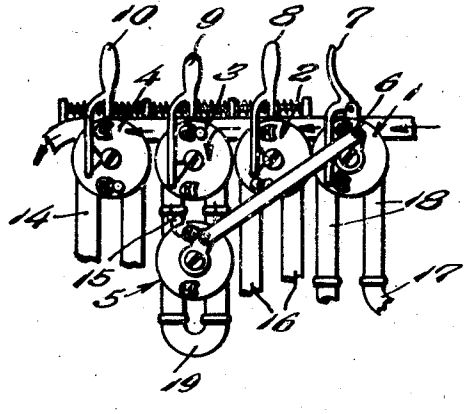

Fig. 6.




Fig. 10.




Fig. 9.




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Fig. 2.

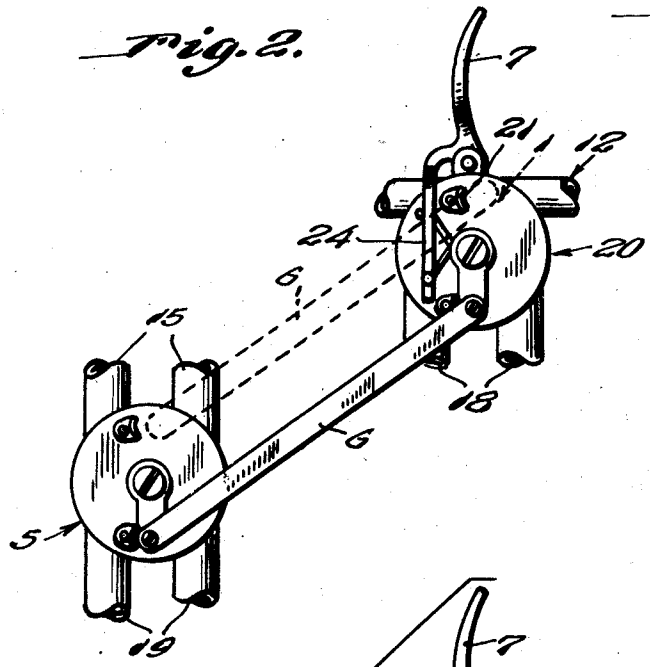



Fig. 3.

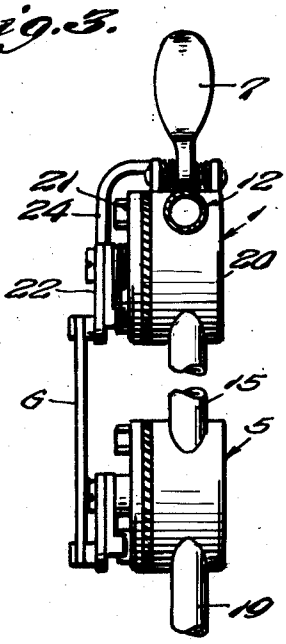
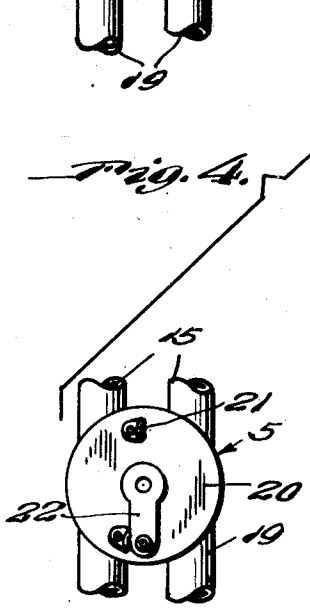



Fig. 4.



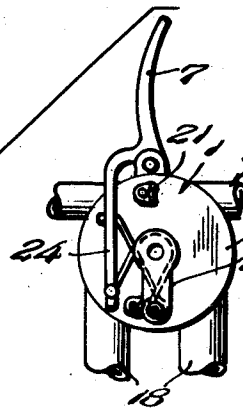




Fig. 8.

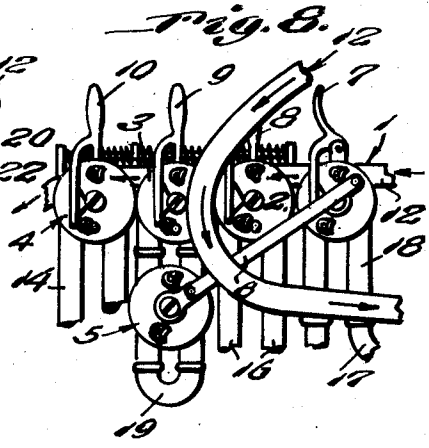
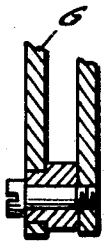



Fig. 5.




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# UNITED STATES PATENT OFFICE

2,484,408

## FRENCH HORN

Claude F. Hubley, Utica, N. Y.

Application September 13, 1945, Serial No. 616,127

9 Claims. (Cl. 84—390)

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This invention relates to certain new and useful improvements susceptible of satisfactory and practicable embodiment in French horns.

It is a matter of common knowledge that French horns utilize three or more conventional valves, these being incorporated in the air column or tubing and lying within the perimeter of the usual main coil or convolution. Some French horns use the piston or plunger type valves and others the so-called now customarily employed rotary valve. These rotary valves are provided with usual levers, one fashioned for depression or operation by the thumb of the left hand and the others by the fingers of the same hand.

One of the main difficulties in playing the French horn is the production and controlling of the high tones. Due to the fact that tones in the upper register occur at closely spaced intervals, even the skilled performer has difficulty producing the exact high tone wanted, that is, with a desired degree of perfection and precision. Generally, when trying to produce a predetermined high tone, the nearest tone higher or lower than the wanted one is often likely to sound, this accidentally, of course. Also, the player may start the desired high tone and slide into the nearest higher tone, thereby producing a very disagreeable sound.

Instrument manufacturers have attempted to remedy the condition referred to by producing a so-called double French horn. It is pitched in "F," which is the regular pitch for most French horns, and by pressing a thumb valve, the sound waves go through a second set of valves and shorter tubing, which raises the pitch two and one-half tones to B-flat. Manifestly, the double horn is expensive and difficult to make, and only partly solves the problem. It actually raises the dependable range of tones up to G above the staff, but the tones from G up to high C are still very uncertain and not dependable and the horn costs about twice as much as the regular single horn.

My new invention raises the dependable playing range of tones up to high C and costs only slightly more to manufacture than a single horn. It accomplishes stability of high tones by having a shorter length of tubing than any French horn heretofore; that is, the length of tubing from mouthpiece to end of bell, bypassing all valve crooks or slides.

This shorter length of tubing raises the basic pitch of the horn two tones higher than that used heretofore, thereby raising the pitch of the dependable high tones two tones or up to high C. By doing this, the false tones at the high or upper

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register of the horn are raised above high C where they no longer can do any harm. We cannot eliminate these false tones, but this invention does raise them out of and above the usable high note range. Or, to state the situation otherwise, the adoption and use of an auxiliary valve plus the use of standard valve I as an open circuit valve instead of the customary usage of this valve as a closed circuit valve, which is my invention, added to the three regular valves makes it possible to practically isolate the undesirable harmonics above the normal high register and force them up and above the range of high notes used by the professional player.

In accordance with the principles of the invention here under advisement, the existing so called valve No. I is changed so that it remains open until the thumb lever is pressed. Ordinarily, the No. I valve remains normally closed in the conventional French horn. By adding a fifth valve in the regular air column or tubing and connecting same for simultaneous operation with the regular valve No. I, the latter remaining open normally, the pitch of the instrument is raised two tones, by depressing the thumb lever, this making it possible to achieve the aims and results above set forth. Usually high tones on a French horn are obtained only with difficulty, and even then with a lack of surety, but with this invention the addition of an extra valve in a predetermined part of the air column or main circuit, the basic pitch of the instrument is raised sufficiently that the high notes are more easily obtained and with assurance and expediency.

More specifically, novelty is predicated upon the adoption and use of a standard so-called rotary French horn valve, this being embodied in the relatively short U-shaped air circuit of the third valve. This extra or fifth valve thus provided is attached to valve No. I by a connecting link so that the two valves operate simultaneously. Thus, and briefly, the novelty has to do with leaving the No. I valve open instead of closed as in the normal horn setup, and incorporating in the crook or circuit of the third valve the extra or fifth valve.

Other features and advantages of the invention will become more readily apparent from the following description and the accompanying illustrative drawings.

In the drawings, wherein like numerals are employed to designate like parts throughout the views:

Figure 1 is a side elevational view of a conventional French horn with rotary valves showing

the additional fifth or auxiliary valve and the position it takes and the manner in which it is linked to the valve-operating arm of the first valve, said view also showing the air travel with the lever of the first valve in its normal position.

Figure 2 is a side elevational view with the parts enlarged and showing only the first valve with its thumb lever and the extra or auxiliary valve and the manner in which the two are linked together.

Figure 3 is a view in elevation, observing the assemblage of Figure 2 in a direction from right to left.

Figure 4 is also a view with the standard first valve and auxiliary improvement valve grouped together, the link being removed.

Figure 5 is a detail section taken approximately on the plane of the line 5—5 of Figure 2.

Figure 6 is a fragmentary sectional view of the improved or auxiliary valve showing the same in one position, which may be said to be its normal "open" position.

Figure 7 is a similar view of the same arrangement showing said auxiliary valve turned and in "closed" position.

Figure 8 is a fragmentary view which shows the path of the tone wave from the mouthpiece (not shown) thru valves when valve No. 1 is closed and thus brought into play for producing its shortest route of travel.

Figure 9 is a view based on Figure 8, but showing the thumb lever of the first valve and the finger lever of the third valve both depressed and illustrating the path of the tone waves under these conditions.

Figure 10 is still another view also of a diagrammatic character carrying the procedure of Figure 9 a step further, this showing the thumb lever of valve No. 1 not depressed but normal, the third finger lever depressed, and the course of travel the tone waves take under these valve-closing operations.

Referring now to the drawings and different views by distinguishing reference numerals, and starting with the numeral 1, it will be seen that this denotes the first valve, that is, so-called valve No. 1 which controls the pitch of the horn. For the high tones above G at the top of the staff, this valve 1 is rotated by depressing thumb lever 7. To play the tones from the above G down to the lowest tone, valve 1 should be in the non-rotated or stationary position with the thumb piece or lever not depressed. Valve 2, when rotated, lowers the pitch of the horn exactly one whole tone and 2 is used only when valve 1 is not rotated. Valve 3, when rotated, lowers the pitch of the horn one-half tone. Valve 4, when rotated, lowers the pitch of the horn one and one-half tones and is used only when valve 1 is not rotated. The sole function of valve 5 is to shorten the length of tubing of of valve 3 automatically when using valve 1 for the high notes. If valve 5 were omitted, the tubing connected to valve 3 would be too long to lower the pitch exactly one-half tone when valve 1 is rotated. Valves 2, 3 and 4 function exactly the same as the first three valves on any modern French horn. The player uses them as he is accustomed to doing on the conventional horn. When valve 1 is rotated for the high tones from G to high C, the player depresses a different combination of finger levers than used on the regular French horn. This invention greatly simplifies the finger lever combinations to be depressed for the high notes. Every high note above G above the staff can be played either with lever 7 depressed alone, or, with levers 7 and 9 combined and depressed in unison.



The horn shown in Figure 1 comprises a bell 11 connected through tubing 12 to a mouthpiece 13. Three rotary valves 2, 3 and 4 are placed in the tubing for controlling connections to valve slides 14, 15 and 16 to vary the pitch of the instrument. These three valves are rotated by depressing the three finger levers 8, 9 and 10. The thumb valve 1 controls connections to valve slide 17. Valve 1 is so connected in the circuit that in the normal open position, without depressing thumb lever 7, the tone goes through branches or tubing 18 and valve slide 17.

If thumb lever 7 is depressed, valve 1 is closed, thereby removing tubing 18 and valve slide 17 from the circuit. This raises the pitch of the horn by shortening the total length of tubing. Depressing thumb lever 7 also rotates valve 5 because of the connecting link 6.

Valves 2, 3 and 4 operate in the usual manner. If finger levers 8 or 9 or 10 are depressed, the valve rotates, allowing the tone to go through the lateral tubing and the valve slide connected to that particular valve.

Explanation of the operation of valve 5: When finger lever 9 is depressed and finger lever 7 is the normal undepressed position, the tone goes through valve tubing 15, through valve 5 and through valve slide 19 (Figure 6). If thumb lever 7 and finger lever 9 are both depressed, valve 5 closes (Figure 7) and cuts valve slide 19 out of the circuit.

Using any French horn, either this type or the regular French horn, depressing fingervalve 9 only, will lower the pitch of the instrument one-half tone, but with my invention, when finger lever 7 is depressed, raising the pitch of the horn, the total length of the tubing connected to valve 3 (that is, tubing 15 and valve slide 19) will be too long to lower the pitch exactly one-half tone. Valve 5 compensates for this by removing valve slide 19 from the circuit.

Therefore, what is stressed is: a French horn pitched in high D and a lower pitch of B flat or F or both available to the player through the use of two open circuit valves connected together by a link. One open circuit valve shifts the pitch from F or B flat to high D. The other open circuit valve compensates the one-half tone valve so it is in tune on both pitches. Three other valves, used in the conventional manner; complete the instrument.

Although in Figures 2 to 5 I have shown certain of the details of the conventional so-called rotary valve, I do not deem it necessary to illustrate these details with any special particularity. Each valve embodies a circular casing 20 provided with the usual stops 21 and rocker arm 22 for the valve rotor 23 on the interior. I also show the usual trip cord 24, but, as stated, I do not feel that I have invented a valve, but rather the incorporation of an auxiliary or extra valve, that is, valve 5 of the valving system.

Novelty is thought to reside in the addition of a simple extra or so-called fifth valve, the same being installed in the half-tone crook embodying normally closed valve No. 3, said extra valve being linked or otherwise mechanically connected with the No. 1 valve, which latter valve is held normally open by complemental spring means, the same spring means acting upon the link to maintain the extra valve also open. Accordingly, therefore, it is ingenious in this line of endeavor, it is be-

lieved, to unite the No. 1 valve and the extra or fifth valve so that they are open at one and the same time, which is the normal condition under the action of the spring-closing means of the No. 1 valve; and are closed at one and the same time, which is the condition which exists when the thumb lever of the No. 1 valve is depressed to rotate said valve to closed position.

Additional novelty has to do with a valve arrangement of the kind herein shown and described wherein, after valves 1 and 3 are closed and the extra valve is also closed, the No. 3 valve in the corresponding or third crook may be opened to assist in playing the high notes from G to high C in tune, especially through the aid of the extra valve in said third crook which then comes into play to effectively achieve the wanted ends.

It is thought that persons skilled in the art to which the invention relates will be able to obtain a clear understanding of the invention after considering the description in connection with the drawings. Therefore, a more lengthy description is regarded as unnecessary.

Minor changes in the shape, size and arrangement of details coming within the field of invention claimed may be resorted to in actual practice, if desired.

I claim:

1. In a French horn of the class described, a length of tubing of conventional shape and proportions having a mouth-piece pipe at the air intake end, a bell at the tone wave outlet end, the usual coil intermediate said ends, and a group of four individual but complemental slide-equipped crooks for selectively shunting and controlling the passage of air through said tubing, said crooks being mechanically and communicatively attached to the tubing by way of four rotary valves, valve number 1 normally open and provided with an actuating thumb lever, valves number 2, 3 and 4 all normally closed and provided with customary controlling finger levers, and an effective length regulating and pitch compensating auxiliary valve incorporated in the crook of the valve number 3, said auxiliary valve being normally open, and means connecting the number 1 and auxiliary valves for operating same in unison.

2. In a French horn of the class described, a length of tubing of conventional shape and proportions having a mouth-piece pipe at the air intake end, a bell at the tone wave outlet end, the usual coil intermediate said ends, and a group of four individual but complemental slide-equipped crooks for selectively shunting and controlling the passage of air through said tubing, said crooks being mechanically and communicatively attached to the tubing by way of four rotary valves, valve number 1 normally open and provided with an actuating thumb lever, valves number 2, 3 and 4 all normally closed and provided with customary controlling finger levers, and an effective length regulating and pitch compensating auxiliary valve incorporated in the crook of the valve number 3, said auxiliary valve being normally open, and a single push-pull link directly and pivotally connecting the auxiliary valve with the number 1 valve for operation in conjunction with one another, whereby when said number 1 valve and auxiliary valve are in use, they both open at one and the same time and are both closed at one and the same time.

3. In a French horn of the class described, tubing standard in length, cross-section and customarily fashioned and provided at its regular air intake end with a conventional mouthpiece, said tubing having at its opposite discharge end a regulation tone-wave discharge bell, the intermediate portion of the tubing being fashioned into customary coiled form and said tubing being provided within the bounds of said coiled portion with a regulation assemblage of individually valved slide-equipped crooks, there being in said valve assemblage the usual group of four selectively usable valves for controlling the passage of air through the tubing and selected crooks, three of said valves being normally closed by spring means and provided with usual finger levers for opening purposes, the remaining valve, the usual number 1 valve, being held normally open by spring means and provided with a thumb lever; and an extra valve included in one of said crooks and employed as a compensating valve, said extra valve, in conjunction with said number 1 valve, making it possible to effectively shorten the tubing from the mouth-piece to the bell, whereby to course the air directly through the tubing along the shortest route possible and to thus raise the pitch of the horn two tones and to, as a result thereof, stabilize high tones from G above the staff to high C.

4. The structure specified in claim 3, together with a single rigid link positively and pivotally connecting said extra valve with said number 1 valve.

5. In a French horn of the class described, a length of tubing of conventional proportions having a regulation mouth-piece at the air intake end, a bell at the tone-emitting end, the intermediate portion of said tubing embodying the usual coil and further including four lateral slide-equipped crooks, the branches of the crooks being connected for communication with the adjacent portion of said tubing, an individual hand-operated spring-return valve for each crook, said valves being identified and distinguished as valves 1, 2, 3 and 4, and an extra valve embodied in the crook in which valve 3 is incorporated, a link connection between said extra valve and the number 1 valve, said number 1 valve and extra valve being operable in unison and being normally open, said extra valve and number 1 valve, when pressed by hand, both closing, valves 2, 3, and 4 being held normally closed, and the number 1 valve being spring held normally open.

6. A French horn of the class shown and described comprising tubing of standard length, cross section and shape and provided at its regular air-intake end with a conventional mouthpiece and at its opposite end with a regulation tone wave discharge bell, the intermediate portion of said tubing being fashioned into customary coiled form and the said tubing being provided with the confines of said coiled portion with a rectilinearly straight portion, a slide-equipped crook attached to said straight portion, a number 1 valve built into said crook at its junctural communicative point with the tubing, three additional slide-equipped crooks also connected with said rectilinearly straight portion and angularly thereto, a rotary valve mounted in each of said three crooks and providing valved communication between the branches of said crooks and said main tubing, said three valves being identified as numbers 2, 3 and 4, the latter three valves being provided with finger pieces and having spring means whereby they are all normally held in closed positions, said number 1 valve having a thumb piece, spring means connected with said thumb piece and serving to hold

said number 1 valve in normally open position permitting unhampered passage of air through the intake end and said first-named crook and into the rectilinearly straight portion of the tubing, an extra valve mounted in the intermediate portions of the branches of the crook in which the number 3 valve is incorporated, said extra valve being normally in open position, and a link connecting the extra valve with said number 1 valve, the spring means on the latter serving to actuate the number 1 valve and extra valve simultaneously to open positions.

7. In a French horn of the class described, tubing standard in length, cross-section and customarily fashioned and provided at its regular air intake end with a conventional mouth-piece, said tubing having at its opposite discharge end a regulation tone-wave discharge bell, the intermediate portion of the tubing being fashioned into customary coiled form and said tubing being provided within the bounds of said coiled portion with a regulation arrangement of individually valved crooks, there being in said valve arrangement the usual group of four selectively usable valves for controlling the passage of air through the tubing and crooks; and a fifth valve included in said valve arrangement and employed as an auxiliary valve, said fifth valve, in conjunction with one of the first-named valves, making it possible to temporarily shorten the tubing from the mouth-piece to the bell, whereby to course the air directly through the shortest route possible and to thus raise the pitch two tones and to, as a result thereof, stabilize high tones, said fifth valve being situated within the confines of one of the crooks, and a link positively and operatively connecting said fifth valve with the first valve of said group arrangement.



8. The structure specified in claim 3, said fifth valve being connected for operation in unison with the first valve of the group of four valves, this by way of a pivotally connected, rigid push-pull link.

9. In a French horn of the class described, a length of tubing of conventional proportions having a regulation mouth-piece at the air intake end, and having a bell at the tone discharge end, the intermediate portion of said tubing embodying the usual coil and further including a plurality of lateral slide equipped crooks, the branches of the crooks being connected for communication with the adjacent portion of said tubing, there being four such crooks, and an individual hand-operated valve for each crook, said valves being identified and distinguished as valves 1, 2, 3 and 4, and a fifth valve embodied in the crook in which valve 3 is incorporated, a link connection between said fifth valve and the valve 1, said 1 valve and fifth valve being operable in unison and being normally open, and said valves 2, 3 and 4 being normally closed.

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