May 22, 1962 R. MAZZEO 3,035,473

CLARINET

Filed June 15, 1959

2 Sheets-Sheet 1

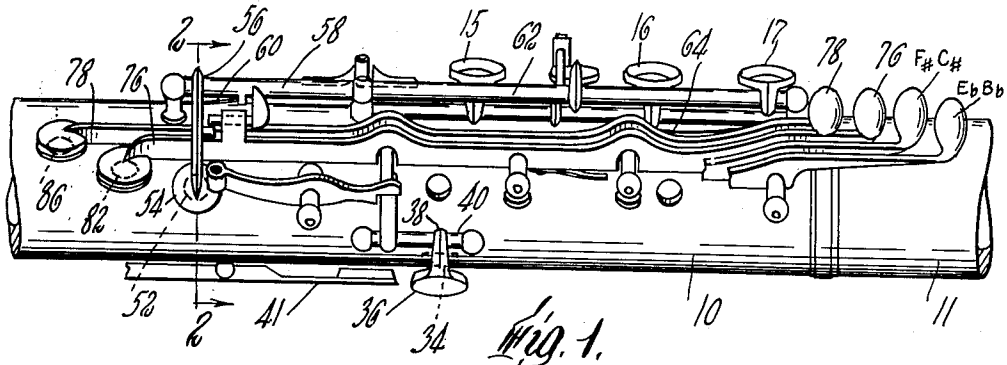

Fig. 1.

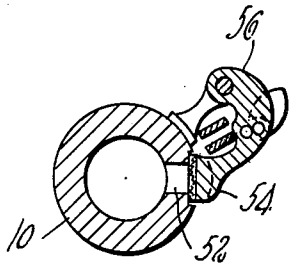

Fig. 2.

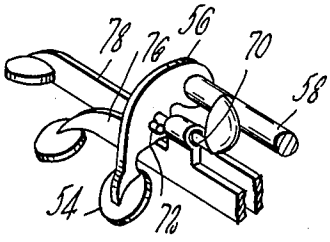

Fig. 3.

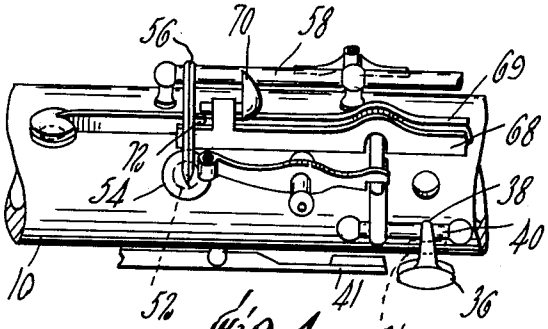

Fig. 4.

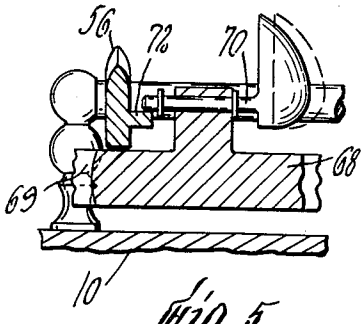

Fig. 5.

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2 Sheets-Sheet 2

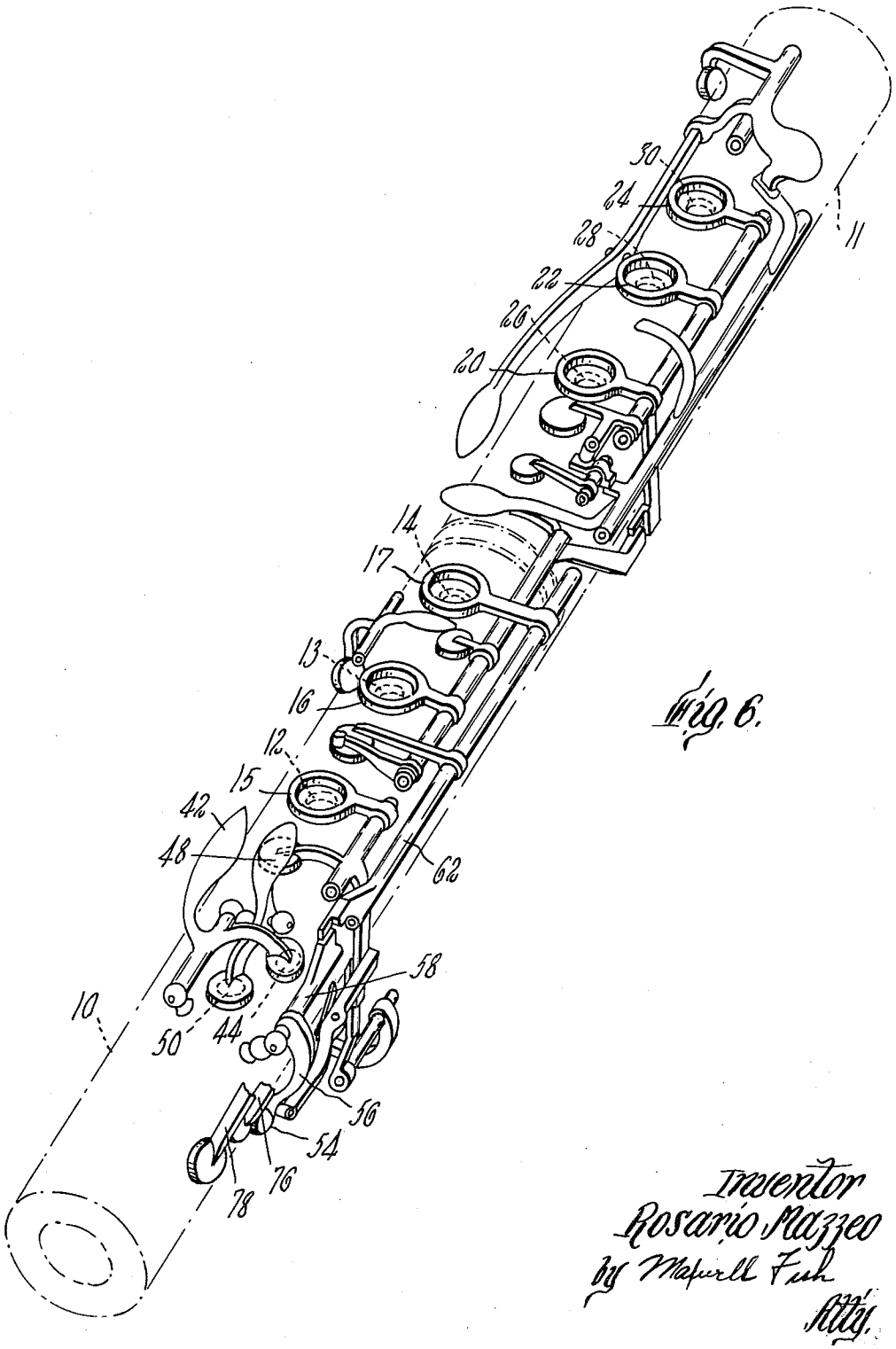

Fig. 6.

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United States Patent Office

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CLARINET

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9 Claims. (Cl. 84—382)

The present invention relates to an improvement in clarinets and is intended more particularly as an improvement upon the clarinet described and illustrated in my U.S. Pat. No. 2,867,146.

It is an object of the invention to provide an improved control means for a Boehm system clarinet having a finger control throat note B♭ producing mechanism providing alternative and more accessible ways of rendering the throat note B♭ which will permit said finger control mechanism to be rendered operative or inoperative at will, so that the clarinet may be fingered and operated either with said improved throat note B♭ producing mechanism or alternatively in the manner of a conventionally constructed Boehm system clarinet not equipped with said improved throat note B♭ producing mechanism.

It is a further object of the invention to provide a novel way of producing a throat note B at the upper end of the lower register of the instrument, which consists in the provision of a B sound producing hole and an associated B key which acts when pressed to open the B tone hole and also an associated B♭ tone hole to produce a throat note B of improved fidelity and quality.

It is a further object of the invention to provide an improved construction and arrangement of the tone holes and associated keys of a clarinet for producing certain throat notes at the upper end of the lower register of the instrument which will take the fullest advantage of my improved throat note B♭ producing mechanism to further extend the upward range of the instrument in the lower register without further increasing the amount of work which the first finger of each hand is called upon to do.

In carrying out the invention, a lock-out mechanism is provided for rendering inoperative the finger control throat note B♭ producing mechanism referred to which comprises a latch associated with the key lever right hand utilized to open the B♭ tone hole. For the inoperative position of said latch the throat note B♭ hole closing lever is operatively connected to be raised either by the operation of the throat note B♭ producing mechanism referred to, or by the throat note key right hand utilized to open the B♭ tone hole. For the operative position of said latch, the throat note B♭ tone hole covering lever is operatively connected with the key lever right hand referred to in such a manner that the B♭ tone hole closing lever can be opened only by the actuation of said key lever right hand.

In one form of the invention shown in FIGS. 4 and 5 in which conventional B, B♭ trill keys right hand are employed, the lock-out latch is mounted on the B♭ trill key which in turn is engaged beneath the B♭ tone hole closing lever and is adapted in its operative position to overlie a lug on the B♭ tone hole closing lever.

In an alternative form of the invention shown in FIGS. 1 to 3 and 6, the lock-out latch referred to is mounted on a newly provided throat note B key right hand which also is utilized to raise the B♭ tone hole lever.

Further in accordance with the invention, as particularly shown in FIGS. 1 to 3 and 6, the key structure of which the B♭ mechanism of my prior patent is an integral part has been modified and applied to provide a new B sound hole and a B key associated therewith for producing the B note at the upper end of the lower register of the clarinet. The arrangement is such that the musician is able to produce successively higher notes

of high quality including A♭, A, B♭, B and C in the lower register by pressing the associated keys which will open in succession the sound holes producing these notes.

In the illustrated embodiment of the invention in a B♭ clarinet, the construction and function of the usual B♭ trill key has been altered so that this key functions normally to close a newly added B sound hole, and acts when raised to raise the B♭ cover lever to open the B♭ sound hole in order to obtain an accurate rendering of the B note.

With the above and other objects in view as may hereinafter appear, the invention consists also in the devices, combinations and arrangements of parts hereinafter described and claimed, which together with the advantages to be obtained thereby will be readily understood by one skilled in the art from the following description taken in connection wtih the accompanying drawings, in which:

FIG. 1 is a view in side elevation of the upper joint embodying in a preferred form the several features of the invention including the newly added B sound hole and B actuating key right hand;

FIG. 2 is a sectional view taken on a line 2—2 of FIG. 1 to illustrate particularly the relation of the B key right hand and the B♭ sound hole covering lever;

FIG. 3 is a fragmentary detail in perspective showing portions of the B♭, B and C right hand tone hole covering keys and the B♭ mechanism lock-out device;

FIGS. 4 and 5 illustrate an alternative embodiment of the invention;

FIG. 4 being a fragmentary view similar to FIG. 1 illustrating the lock of the B♭ mechanism lock-out device on a conventionally operating B♭ trill key;

FIG. 5 is a sectional view of the lock-out mechanism as shown in FIG. 4 including in dotted lines the inoperative position of this mechanism, and

FIG. 6 is a fragmentary perspective view of the B♭ finger control lock-out mechanism, the A♭ and A keys to be played by first finger left hand, and illustrating in dot-and-dash lines the outline and certain tone holes of the upper and lower joints of the clarinet.

The invention is disclosed in the drawings as embodied in a clarinet constructed in accordance with the improved Boehm system, and further provided with the B♭ finger control mechanism disclosed in my issued U.S. Pat. No. 2,867,146 above referred to.

A preferred embodiment of the invention is particularly illustrated in FIGS. 1 to 3 inclusive and FIG. 6. These figures illustrate particularly the upper joint of the instrument, and in somewhat diagrammatic form the organization and articulation of the various operating parts which provide for the improved fingering as set forth in my said U.S. patent.

The clarinet shown in the drawings comprises generally the upper joint **10** designated in FIG. 1, a lower joint **11** and bell not here shown. The upper joint **10** contains the usual first, second and third finger holes left hand **12**, **13** and **14** together with their normally raised overlying ring levers indicated respectively at **15**, **16** and **17** (see particularly FIGS. 1 and 6). There are also shown in FIG. 6 the overlying normally raised ring levers **20**, **22** and **24** associated with the usual first, second and third finger holes right hand **26**, **28** and **30** in the lower joint of the instrument (see FIG. 6). The instrument is also provided in the upper joint with the usual thumb hole **34** which is covered by a normally raised thumb plate **36** carried on a rocker arm **38** and pivot shaft **40** and the usual register key **41**. As indicated in FIG. 6, the instrument is provided with an A♭ key **42** arranged to cover an A♭ tone hole **44** and an associated A key lever **48** which covers an A tone hole **50**. There is also provided in the upper joint of the

instrument the usual throat note B♭ tone hole indicated at **52** and its covering pad **54** which is mounted on a transversely extending B♭ cover lever **56** mounted on a longitudinally extending rock shaft **58** which is biased in a counterclockwise direction (see FIG. 6) to move the B♭ cover lever **56** to an open position by means of a light spring **60**. The B♭ cover lever **56** is, however, held normally in a closed position by means of a second shaft **62** which is articulated with relation to shaft **58** to rock both shafts clockwise as viewed in FIG. 6. Rock shaft **62** is acted upon in said clockwise direction by a relatively heavy spring **64** which acts to keep the B♭ cover lever closed.

A Boehm system clarinet is normally equipped with a cluster of four keys adapted to be fingered by the second joint of the first finger right hand including an E♭, B♭ key, an F♯, C♯ key, a B♭ trill key and a B trill key. In a preferred embodiment of the invention, particularly illustrated in FIGS. 4 and 5, the B♭ trill key has been replaced by a B♭ key **68** which at its upper end engages beneath the transversely extending B♭ tone hole covering lever **56** which forms also a part of the improved B♭ producing mechanism described in my U.S. Pat. 2,867,-146 above referred to. Pressing of the B♭ key **68** acts to raise the B♭ hole closing lever **56**. The B trill key is designated at **69** in FIGS. 4 and 5.

In accordance with the invention a B♭ mechanism lockout device is provided in the form of a plunger type latch **70** which is slidably mounted on the B♭ key **68** for movement into and out of engagement with a lug **72** formed on the B♭ tone hole covering lever **56** and projecting outwardly from the lever in a general direction toward the lower joint and bell end of the instrument. When the latch **70** is projected over the lug **72**, the B♭ tone hole covering lever **56** is held in its closed inoperative position except when it is permitted to move upwardly upon the pressing of the B♭ trill key **68**. The spring which normally maintains the B♭ trill key with its tab raised and the forward end thereof depressed is held in this position by means of a relatively heavy spring which overrides the light spring **60** which tends to move the B♭ tone hole closing lever to its open position.

The fingering and operation of the clarinet, assuming that the latch has been moved to its operative position, will be in all respects identical with that of any Boehm system clarinet precisely as if my improved B♭ producing mechanism were removed from the clarinet. It will readily be appreciated that an experienced clarinet player whose fingering and technique generally has become second nature to him as a result of many years of playing may be loathe to make such slight changes as may be necessary to make the fullest use of my B♭ producing mechanism. For such an individual the lock-out mechanism will be of advantage to facilitate in the playing of difficult passages in the manner to which such an individual is accustomed.

In accordance with the invention I provide herewith an improved construction and arrangement of certain tone holes and the associated operated keys which will be available for increasing the range and accuracy of the upper portion of the lower register. As shown particularly in FIGS. 1, 2, 3 and 6, the B♭ and B trill keys right hand have been replaced respectively by a throat note B key **76** and by a throat note C key **78**. The arrangement is such that it is possible to produce the note G by using no keys or rings of any kind, to produce A♭ by pressing the A♭ key **42** which opens the A♭ tone hole **44** to produce A by pressing the A key lever **48** which holds the A♭ key **42** raised and at the same time opens the A tone hole **50**, to produce the throat note B♭ by operating my B♭ mechanism above referred to, as for example, by pressing the second or third finger left hand or first, second or third finger right hand while the A key lever **48** continues to be pressed, to produce the throat note B by pressing the newly added B key **76** which holds the B♭ cover lever **56** open and at the same time opens a newly added throat note B tone hole **82** to produce B while the A key lever **48** continues to be pressed. For the execution of note sequence, as for example, trills in which the throat note B follows B♭, it will be understood that the B♭ fingering above described may be maintained when the B key **76** is pressed to produce B. Finally, throat note C is produced by pressing the A key lever **48** and the B key **76**, and simultaneously pressing the C throat note key **78** thus opening a C throat note tone hole **86**. With this arrangement it will be noted that an additional note scaled upwardly in the lower register is made possible by the use of my improved B♭ mechanism to produce the throat note B♭ in the lower register. The two uppermost keys which are actuated by the second joint of the first finger right hand are thus made available for the production of throat notes B and C.

The construction above described including the improved arrangement of the tone holes and of the keys by which successively higher throat notes including B♭, B and C are produced has the advantage of simplicity both in the fingering of various note sequences and in the arrangement of keys and associated tone holes at the same time. The newly added throat notes are true notes, and thus distinguish from the somewhat inaccurate trill notes B and C produced by the standard trill keys, which are suitable for use only in trills. It is noted that the B♭ trill key is used with A to produce a true B♭. This note is, however, rarely used except as a trill note because of difficulties encountered in the fingering of many note sequences. With the usual Boehm system clarinet the somewhat inaccurate throat note trill B is produced by the use of the B♭ trill key in combination with the A key **48** and register key **41**. The similarly inaccurate trill note C is produced by pressing the A key **48**, the register key **41** and both of the B♭ and C trill keys referred to. In my improved construction herein illustrated which includes the mechanism for producing B♭ shown in the associated patent, it will be understood that the throat note B♭ is produced with the greatest of ease and for any note sequence including trills by the pressing of the A key **48** by the first finger left hand and by the pressing of any one or more of the finger rings which include the second and third finger rings left hand and the first, second and third finger rings right hand to open the B♭ tone hole, thus avoiding the use of the usual B♭ trill key.

In my improved construction a throat note B which is accurately in tune and of high quality is produced by means of the newly added B tone hole **82** when opened in combination with the A♭, A and B♭ tone holes **44**, **50** and **52** respectively by pressing the A key **48** and the newly added throat note B key **76**. A throat note C which is also accurately in tune and is of high quality is produced by opening additionally the throat note C tone hole **86** as above set forth. It will be noted that in the production of each of these notes the use of the register key **41** is avoided thus eliminating the inaccuracy which is introduced by the use of this key to produce the trill B and C notes in the conventional manner.

In this alternative form of the invention illustrated in FIGS. 1 to 3 and 6, it will be noted that the B♭ mechanism lock-out latch **70** is slidably mounted on the throat note B key **76** for engagement with the lug **72** on the B♭ tone hole covering lever **56**. My B♭ producing mechanism which utilizes any one or more of the several tone hole rings actuated by the second or third fingers left hand or first, second and third fingers right hand is thus rendered inoperative so that the instrument may be played if so desired in the manner of a conventional Boehm system clarinet with the exception that the B♭ and B trill keys normally provided are not available, but are replaced by the B and C throat note keys which will continue to operate in the manner above set forth.

It will be understood that while the keys of a B♭

clarinet have been described, the invention in its broader aspects covers any clarinet having the claimed arrangement of tone holes and actuating mechanism, irrespective of the key to which the clarinet is tuned.

The invention having been described what is claimed is:

1. A clarinet having the Boehm system of fingering, said clarinet having a B tone hole and a B♭ tone hole in the lower register, a normally closed pad on said B♭ tone hole and a normally closed pad on said B tone hole, an extension for said B tone hole pad extended to be operated by the right fore finger and said extension coacting with said B♭ tone hole pad to open the same when said extension is operated to open the B tone hole pad.

2. A clarinet having the Boehm system of fingering, said clarinet having first, second and third finger tone holes right hand, first, second and third finger tone holes left hand, a thumb hole and an associated normally raised thumb actuated key left hand, in which said clarinet is provided with a B tone hole and a B♭ tone hole in the lower register, a normally closed pad on said B♭ tone hole and a normally closed pad on said B tone hole, operating connections for said B♭ lever including a spring means biasing said B♭ pad to open, a finger hole ring associated with the first finger tone hole left hand to be actuated by said first finger left hand, an extension of said first finger hole ring left hand operative when said first finger hole ring left hand is actuated to maintain said B♭ lever closed, an extension from said thumb actuated key actuated when said thumb hole is closed to maintain said B♭ lever closed, a finger hole ring associated with another of said finger tone holes having a one way operating broken connection with said B♭ lever, and spring means acting to move said finger hole ring to the open position and acting through said broken connection to override said B♭ lever spring means to hold said B♭ lever closed, whereby the actuation of said latter finger hole ring with the first finger tone hole left hand and thumb hole open and the associated finger hole ring and thumb actuated key not actuated permits said B♭ tone hole pad to move to its open position, and an extension for said B tone hole pad extended to be operated by the right fore finger and said extension coacting with said B♭ tone hole pad to open the same when said extension is operated to open the B tone hole pad.

3. A clarinet having the Boehm system of fingering, said clarinet having a B tone hole, a B♭ tone hole, and a C tone hole in the lower register, a normally closed pad on said B♭ tone hole, a normally closed pad on said B tone hole, and a normally closed pad on said C tone hole, an extension for said B tone hole pad extended to be operated by the right fore finger and said extension coacting with said B♭ tone hole pad when said extension is operated to open the B tone hole pad, and an extension for said C tone hole pad extended to be operated by said right fore finger simultaneously with said B tone hole pad extension to open additionally said C tone hole pad.

4. In a clarinet constructed in accordance with the Boehm system including first, second and third finger tone holes right hand, first, second and third finger tone holes left hand, a thumb hole and an associated normally open hole closing key left hand and a register tone hole and associated key, the combination of A♭, A, B♭ and B throat tone holes for use with the lower register, and associated keys including A♭ and A throat note keys left hand, a normally closed B♭ tone hole closing lever, and a B♭ operating mechanism including a plurality of finger hole rings associated with the second and third finger tone holes left hand and the first, second, and third finger tone holes right hand shiftable when pressed from a normally open to a closed position, a one-way actuating connection between said B♭ tone hole closing lever and at least one of said plurality of tone closing rings adapted for the open position of said one ring to hold the B♭ tone hole closing lever closed and for the closed position of said one ring to permit said B♭ tone hole closing lever to open, a normally closed B tone hole closing key right hand, and a connection between said B tone hole closing key right hand and said B♭ tone hole closing lever for raising said B♭ tone hole closing lever simultaneously with said B tone hole closing key right hand.

5. In a clarinet constructed in accordance with the Boehm system including first, second and third finger tone holes right hand, first, second and third finger tone holes left hand, a thumb hole and an associated normally open hole closing key left hand, and a register tone hole and associated key, the combination of A♭, A and B♭ throat tone holes for use with the lower register, a B tone hole for trill notes, A♭ and A throat note keys left hand, a normally closed B♭ tone hole closing lever shiftable between closed and open positions, means biasing said B♭ tone hole closing lever to the open position, a B tone hole closing trill key right hand, a B♭ throat note producing mechanism including a normally open first finger left hand tone hole ring shiftable from said open to a pressed position, a plurality of finger hole rings associated with the second and third finger tone holes left hand, and first, second and third finger tone holes right hand shiftable when pressed from a normally open to a closed position, a one-way actuating connection between at least one of said plurality of rings and said B♭ tone hole closing lever adapted for the open position of said one ring to hold the B♭ tone hole closing lever closed and for the closed position of said one ring to permit said B♭ tone hole closing lever to open, means overriding said first mentioned biasing means for yieldably maintaining said finger hole rings open and said B♭ lever closed, a B♭ lever actuating key right hand engaging said B♭ tone hole closing lever and arranged when pressed to move said B♭ tone hole closing lever to open position, and a latch mechanism connecting said B♭ lever actuating key with said B♭ tone hole closing lever shiftable between a disconnected position and a latching position in which the B♭ tone hole closing lever is latched to said B♭ lever actuating key for movement only therewith, and means overriding said first mentioned biasing means for holding said B♭ lever actuating key open and said B♭ lever tone hole closing lever while latched to said key closed thereby rendering said B♭ throat note producing mechanism inoperative.

6. In a clarinet constructed in accordance with the Boehm system including first, second and third finger tone holes right hand, first, second and third finger tone holes left hand, a thumb hole and an associated normally open hole closing key left hand, and a register tone hole and associated key, the combination of A♭, A, B♭, B and C throat tone holes for use with the lower register, and associated keys including A♭ and A throat note keys left hand, a normally closed B♭ tone hole closing lever, and a B♭ operating mechanism including a normally open first finger left hand tone hole ring shiftable from said open to a pressed position, a plurality of other normally open finger tone hole rings shiftable from said open to pressed positions, means rendered operative when either of said thumb tone hole key and first finger tone hole ring left hand are pressed to maintain said B♭ tone hole lever closed, a one way actuating connection between said B♭ tone hole closing lever and at least one of said other tone hole closing rings operable when said last mentioned ring is pressed to permit said B♭ tone hole closing lever to move to the open position, a normally closed B tone hole closing key right hand, and a connection between said B tone hole closing key right hand and said B♭ tone hole closing lever for raising said B♭ tone hole closing lever simultaneously with said B tone hole closing key right hand, and a C tone hole closing key right hand.

7. In a clarinet constructed in accordance with the Boehm system including first, second and third finger tone holes right hand, first, second and third finger tone holes left hand, a thumb hole and an associated normally open hole closing key left hand, and a register tone hole

and associated key, a B♭ tone hole and a normally closed B♭ tone hole closing lever shiftable between closed and open positions, means biasing said B♭ tone hole closing lever to the open position, a B♭ throat note producing mechanism including a normally open first finger left hand tone hole ring shiftable from said open to a pressed position, means rendered operative when either of said thumb tone hole key and said first finger tone hole ring left hand are pressed to maintain said B♭ tone hole lever closed, a plurality of finger hole rings associated with the second and third finger tone holes left hand and first, second and third finger tone holes right hand shiftable when pressed from a normally open to a closed position, a one-way actuating connection between at least one of said plurality of rings and said B♭ tone hole closing lever adapted for the open position of said one ring to hold the B♭ tone hole closing lever closed and for the closed position of said one ring to permit said B♭ tone hole closing lever to open, means overriding said first mentioned biasing means for yieldably maintaining said finger hole rings open and said B♭ lever closed, a key having a one-way connection with said B♭ tone hole closing lever operable when said key is pressed to open said B♭ tone hole closing lever, a latch connected between said key and said B♭ tone hole closing lever shiftable between an inoperative position and an operative position in which movement of the B♭ tone hole closing lever from said closed position is obstructed, and biasing means for said key overriding said first mentioned biasing means, thereby rendering said B♭ throat note producing mechanism inoperative for the operative position of said latch.

8. In a clarinet constructed in accordance with the Boehm system including first, second and third finger tone holes right hand, first, second and third finger tone holes left hand, a thumb hole and an associated normally open hole closing key left hand, and a register tone hole and associated key, the combination of A♭, A and B♭ throat tone holes for use with the lower register, A♭, A throat note keys left hand, a normally closed B♭ tone hole closing lever shiftable between closed and open positions, means biasing said B♭ tone hole closing lever to the open position, a B♭ throat note producing mechanism including a normally open first finger left hand tone hole ring shiftable from said open to a pressed position, means rendered operative when either of said thumb tone hole key and said first finger tone hole ring left hand are pressed to maintain said B♭ tone hole lever closed, a plurality of finger hole rings associated with the second and third finger tone holes left hand and first, second and third finger tone holes right hand shiftable when pressed from a normally open to a closed position, a one-way actuating connection between at least one of said plurality of rings and said B♭ tone hole closing lever adapted for the open position of said one ring to hold the B♭ tone hole closing lever closed and for the closed position of said one ring to permit said B♭ tone hole closing lever to open, means overriding said first mentioned biasing means for yieldably maintaining said finger hole rings open and said B♭ lever closed, a B♭ lever actuating key right hand engaging said B♭ tone hole closing lever and arranged when pressed to move said B♭ tone hole closing lever to open position, and a latch mechanism mounted on said B♭ lever actuating key comprising an abutment on said B♭ lever actuating key and a stop member adjustable on said B♭ lever key into and out of locking engagement with said abutment on the B♭ tone hole closing lever, adapted for the locking position of said B♭ lever actuating key to prevent upward movement of the B♭ tone hole closing lever except in combination with said B♭ key, and thereby to render said B♭ throat note producing mechanism inoperative.

9. In a clarinet constructed in accordance with the Boehm system including first, second and third finger tone holes right hand, first, second and third finger tone holes left, hand, a thumb hole and an associated normally open thumb hole closing key left hand, and a register tone hole and associated key, the combination of A♭, A and B♭ throat tone holes for use with the lower register A♭ and A throat note keys left hand, a normally closed B♭ tone hole closing lever shiftable between closed and open positions, means biasing said B♭ tone hole closing lever to the open position, a B♭ tone hole closing lever operating key right hand operatively connected with said B♭ tone hole closing lever shiftable between a normally maintained hole closing position and a pressed open position engaging and shifting said B♭ tone hole closing lever to the open position, a B♭ throat note producing mechanism including a normally open first finger left hand tone hole ring shiftable from said open to a pressed position, means rendered operative when either of said thumb tone hole key and said first finger tone hole ring left hand are pressed to maintain said B♭ tone hole lever closed, a plurality of finger hole rings associated with the second and third finger tone holes left hand and first, second and third finger tone holes right hand shiftable when pressed from a normally open to a closed position, a one-way actuating connection between at least one of said finger hole rings and said B♭ tone hole closing lever adapted for the open position of said one ring to hold the B♭ tone hole closing lever closed and for the closed position of said ring to permit the B♭ tone hole closing lever to open, means overriding said first mentioned biasing means for maintaining said ring open and said B♭ tone hole closing lever closed, a latching device shiftable to latch said B♭ tone hole closing lever in said closed position under the control of said B♭ tone hole lever operating key right hand, and additional biasing means acting upon said B♭ tone hole closing lever operating key right hand, overriding said first mentioned biasing means thereby yieldably maintaining said B♭ tone hole closing lever operating key right hand and said B♭ hole closing lever controlled thereby closed.

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