No. 664,434. Patented Dec. 25, 1900.

F. J. RICHMAND.

CORNET.

(Application filed Mar. 30, 1899.)

(No Model.) 3 Sheets—Sheet 1

Fig. 1.

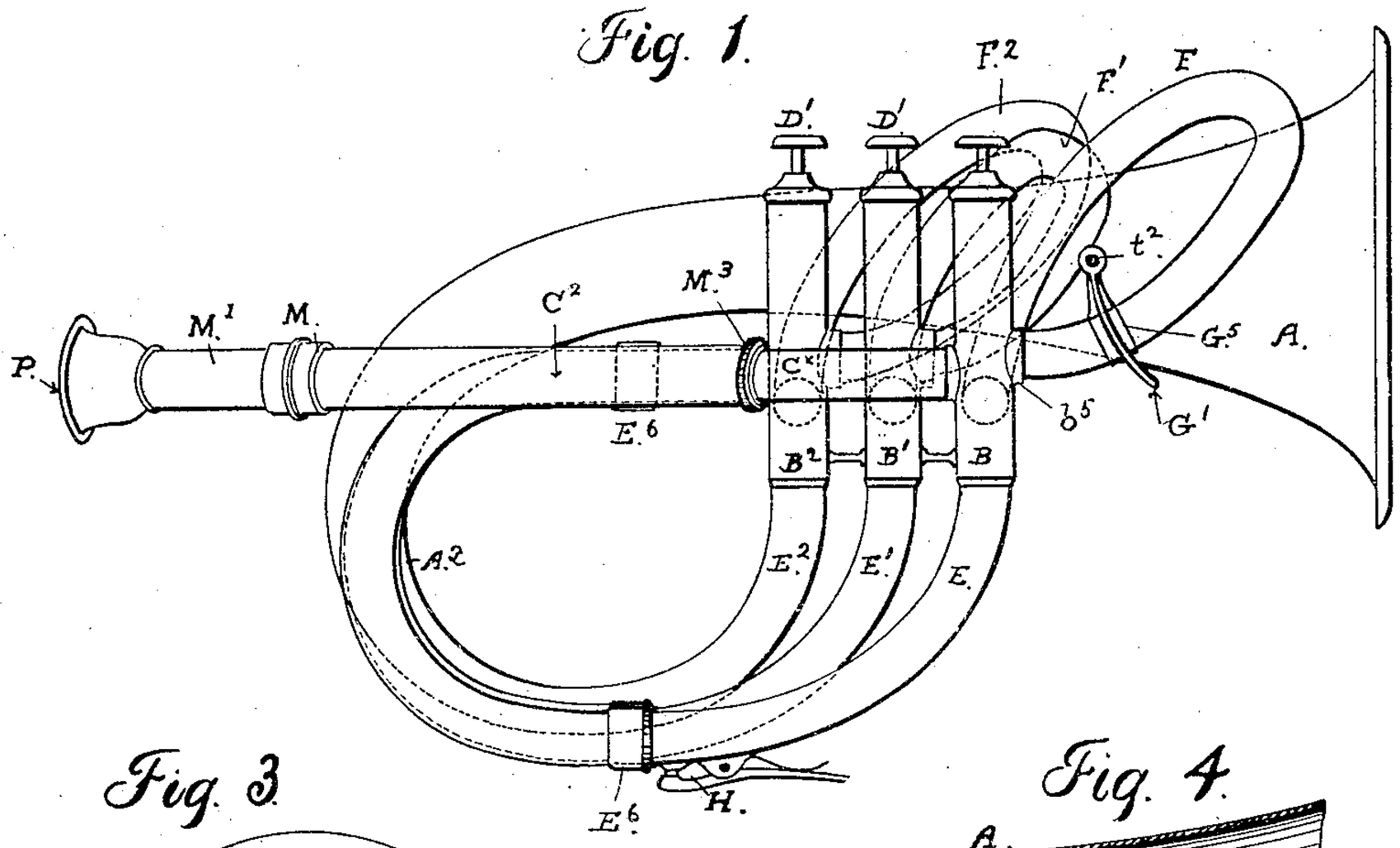
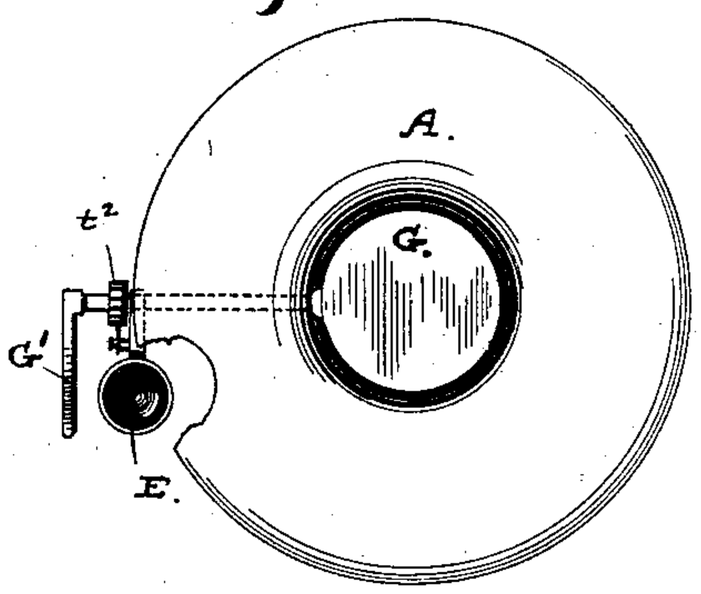


Fig. 3.



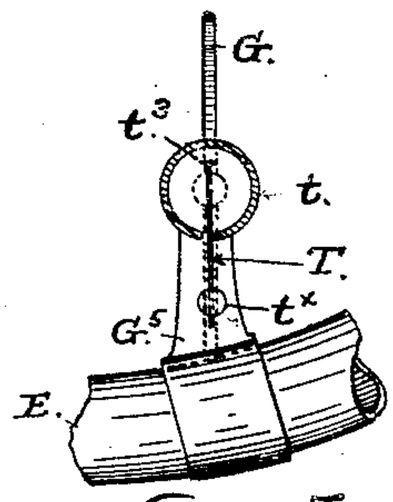
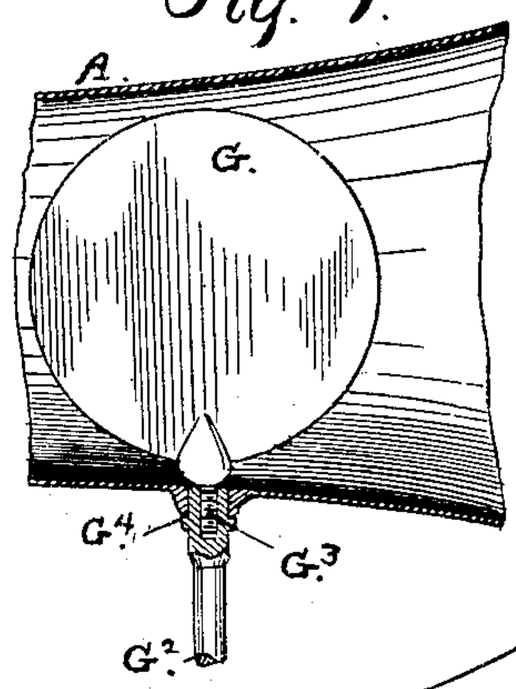


Fig. 5.

Fig. 4.



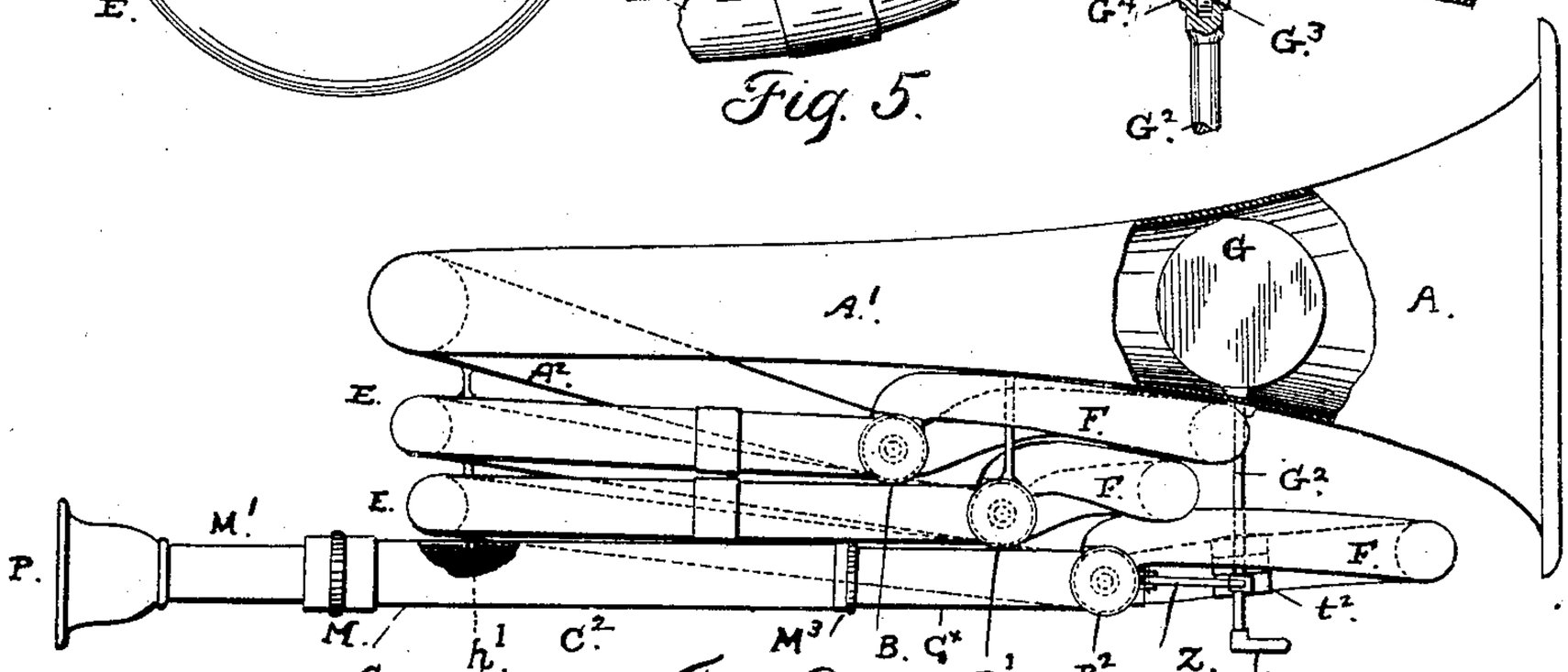


Fig. 2.

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3 Sheets—Sheet 2.

Fig. 6.

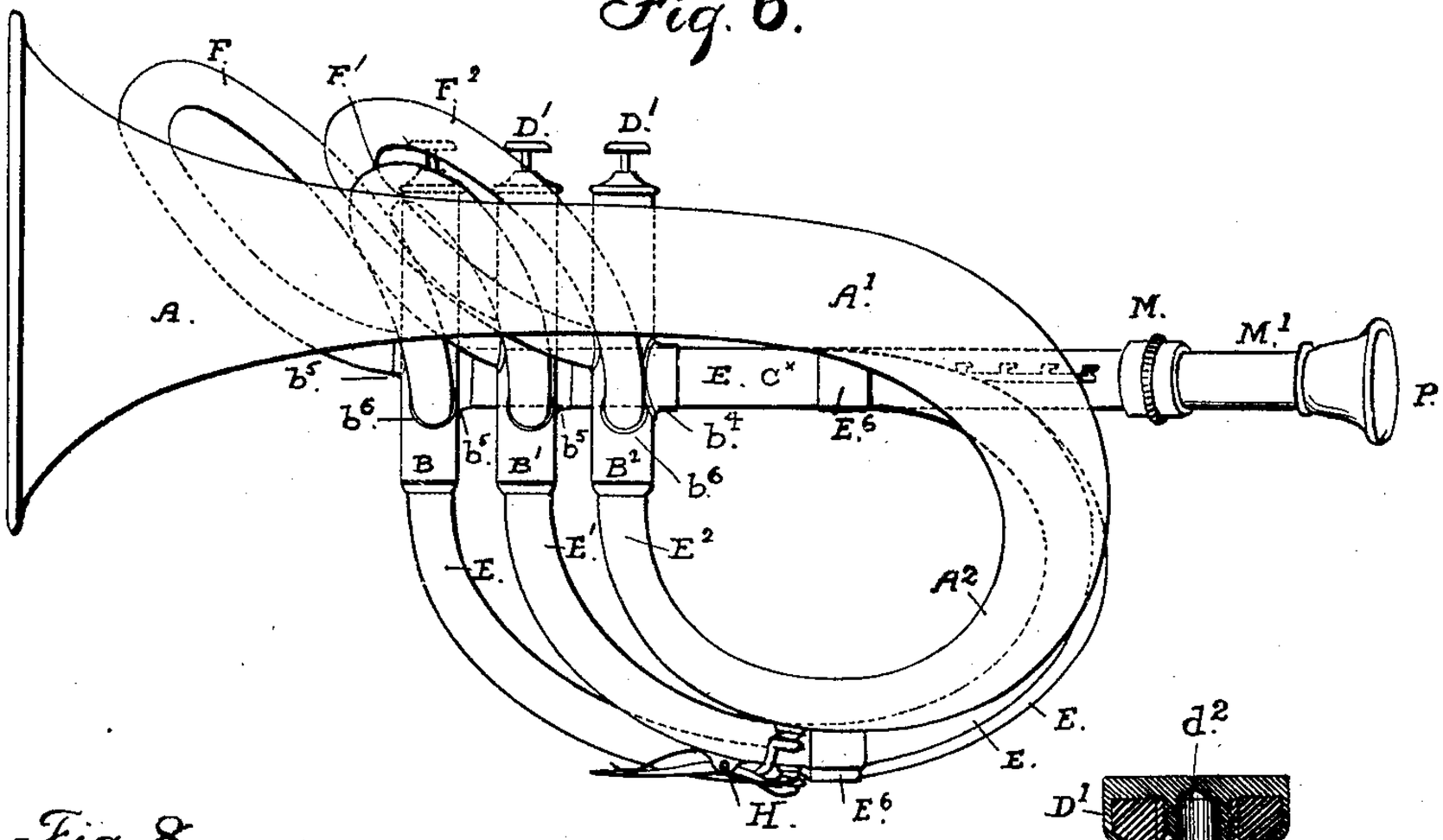


Fig. 8.

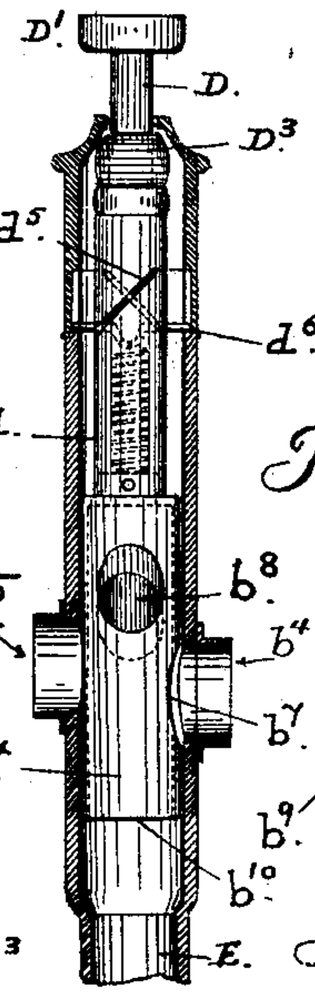


Fig. 9.

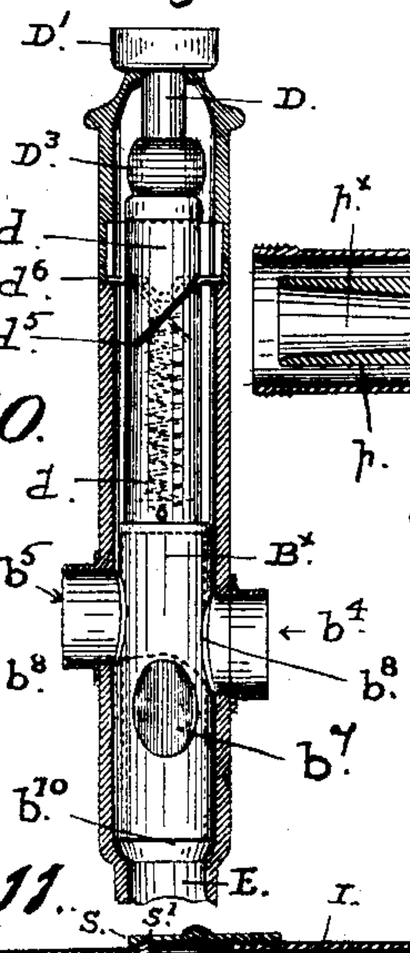


Fig. 10.

Fig. 7.

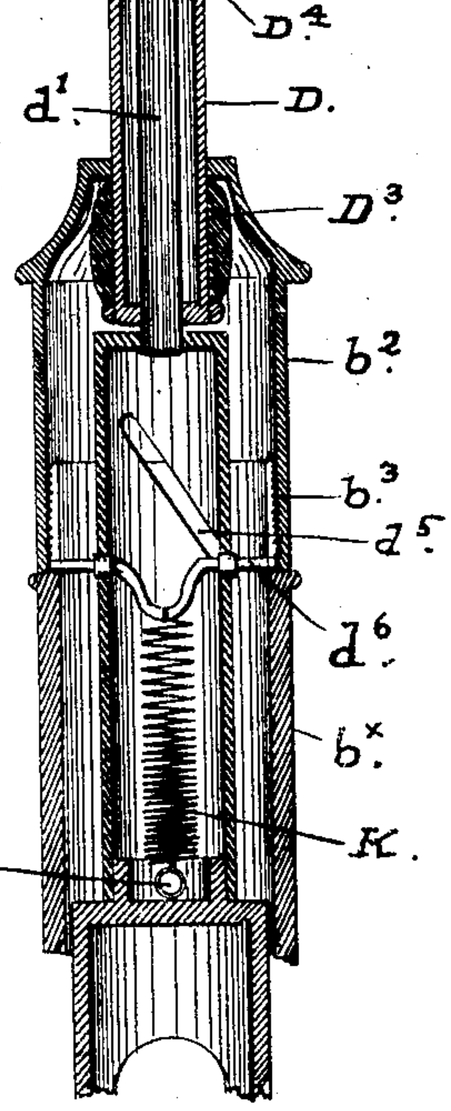


Fig. 13.

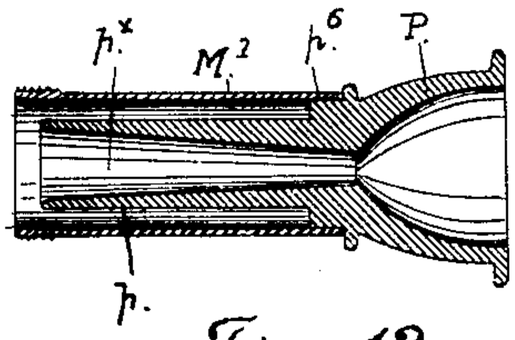


Fig. 11.

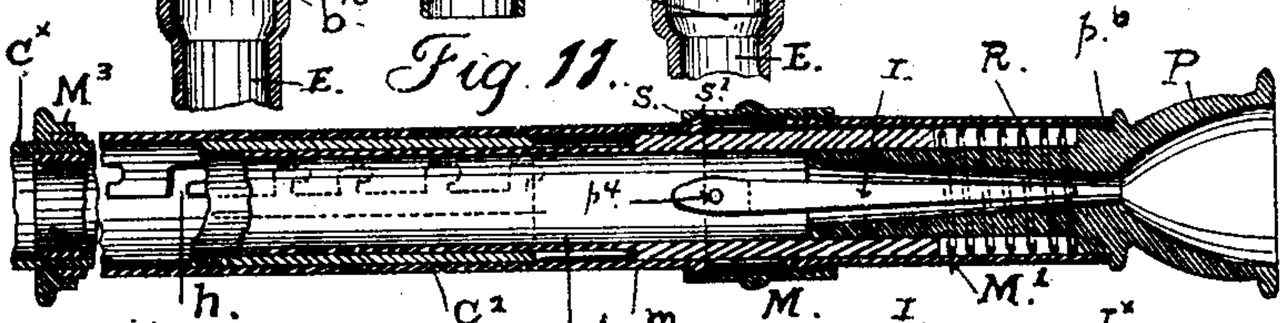
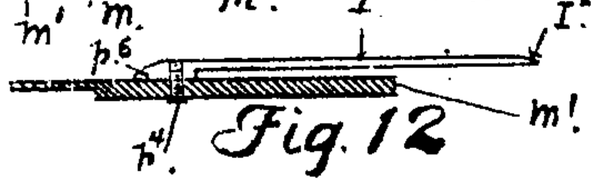


Fig. 12



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No. 664,434.

Patented Dec. 25, 1900.

F. J. RICHMAND.

CORNET.

(No Model.)

(Application filed Mar. 30, 1899.)

3 Sheets—Sheet 3.

Fig. 14

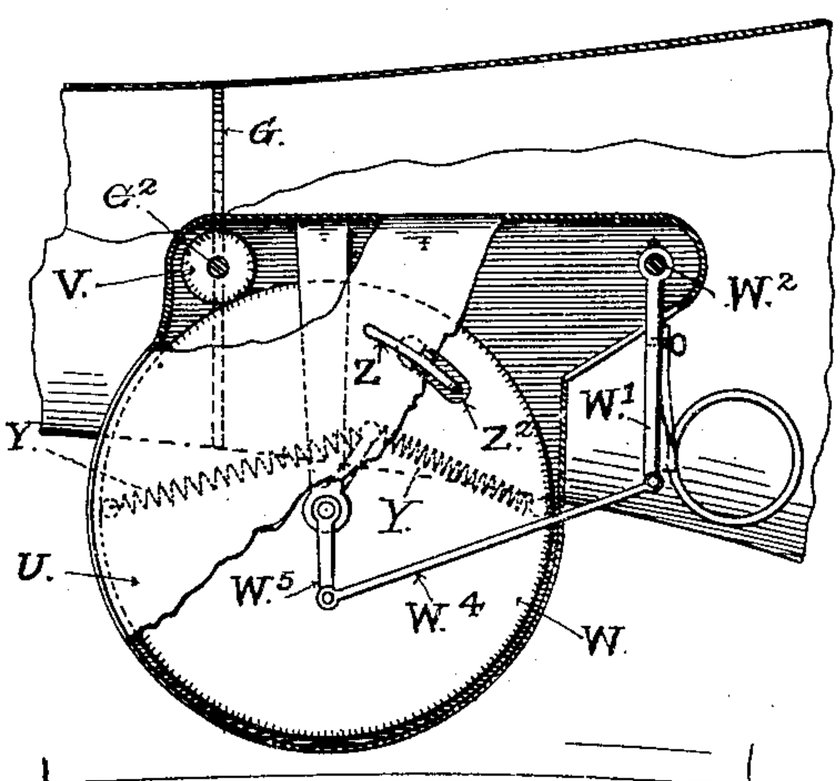
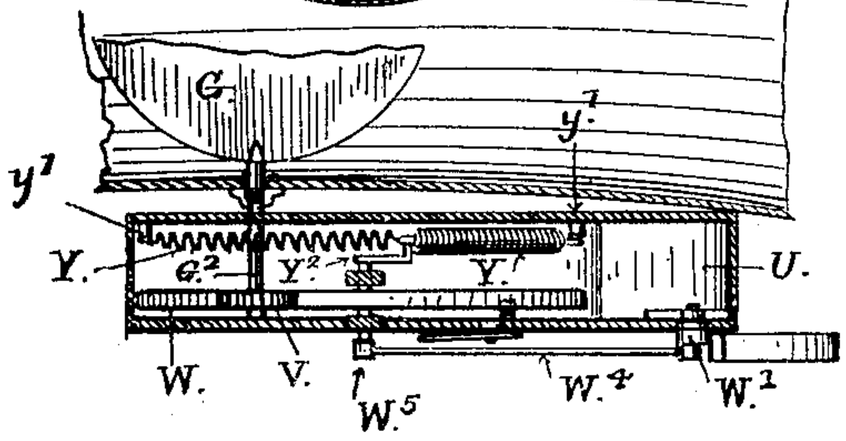


Fig. 15.



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UNITED STATES PATENT OFFICE.

FRANCIS J. RICHMAND, OF SAN FRANCISCO, CALIFORNIA.

CORNET.

SPECIFICATION forming part of Letters Patent No. 664,434, dated December 25, 1900.

Application filed March 30, 1899. Serial No. 711,055. (No model.)

To all whom it may concern:

Be it known that I, FRANCIS J. RICHMAND, a citizen of the United States of America, and a resident of the city and county of San Francisco, State of California, have invented certain new and useful Improvements in Cornets, of which the following is a specification.

This invention relates to improvements made in cornets and other similar musical instruments that are furnished with valves or pistons; and the said improvements comprise a novel construction of valve and valve-operating mechanism having for its object to obtain a quick action with a short stroke or movement; also, a certain novel construction of adjustable shank and mouthpiece by means of which the instrument is tuned in harmony with other instruments and higher notes and octaves are produced with less effort and without materially increasing the pressure of the lips upon the cup.

The invention includes also a novel means or device for producing a tremolo effect of any desired duration at will.

The following description explains at length the nature of my said improvements and the manner in which I proceed to construct, produce, and apply the same, reference being had to the drawings that accompany and form part of this specification.

Figure 1 of the drawings represents in side elevation a cornet embodying my said improvements. Fig. 2 is a plan or top view of Fig. 1. Fig. 3 is a front view looking into the bell of the instrument. Fig. 4 is a longitudinal section, on an enlarged scale, of a portion of the neck of the instrument just back of the bell or flaring end of the instrument, showing in detail the damper or pianoforte device. Fig. 5 is a detail of the support for the damper-shaft and the spring that holds the damper open. Fig. 6 is a side view of the instrument, showing the reverse side of Fig. 1. Fig. 7 is a vertical sectional view, on an enlarged scale, of one of the valves. Fig. 8 is a similar longitudinal section showing the position of the parts when the valve stands normally open. Fig. 9 is a similar view in which the key is depressed and the valve is set in its lowest position. Fig. 10 is a longitudinal section of the valve or piston removed from the casing. Fig. 11 is a longitudinal sectional view, on an enlarged scale, of the adjustable shank and mouthpiece. Fig. 12 is a detail side view of one of the adjustable tongues in the mouthpiece. Fig. 13 is a sectional view, enlarged, of the mouthpiece removed from the shank. Fig. 14 is a side view in detail of the tremolo attachment for operating the damper. Fig. 15 is a top view of Fig. 14 on an enlarged scale.

A indicates the bell, and A′ the neck and principal tubular portion of the instrument.

B B′ B^2 are the valve casings or chambers.

C is the shank, and P the mouthpiece.

E E′ E^2 are the tubes that form connection-passages between the valve-chambers and the neck or body of the instrument.

F F′ F^2 are loops or extension-tubes that are connected to the passages E E′ E^2 through the valves to increase the length of those passages, and thereby change the notes.

G is a damper-valve placed in the neck A′, and G′ a lever on the outside connected to the valve for throwing it into and out of action.

H H are water-valves in the bends of the curved tubes E E′ E^2 for draining the water of condensation from the valves and passages.

The construction and operation of the piston-valves will be understood more clearly by referring to Figs. 6, 7, and 8 of the drawings. The casing $b^\times$ is tubular and of cylindrical shape, in two parts, with the removable top portion b^2 united by a screw-joint b^3. The main outlet-aperture in each casing is located at the bottom, to which the tubular conductor E is joined, and the main inlet b^4 is located in one side. In addition to these apertures there are two openings b^5 b^6, to which is connected a loop or extension-tube F. One of the last-mentioned openings is located below, and the other above, the line of the inlet b^4. The piston $B^\times$ controlling these openings is in form a hollow cylinder open at the bottom, but closed at the top with an aperture b^7 in one side, and at right angles, or thereabout, to that aperture a cross-passage b^8, leading directly through the body, this passage being separated from the open lower part of the piston by a diaphragm b^9. The piston has a longitudinal sliding movement and also a short rotary movement in that portion of the casing where the apertures b^4 b^5 are located, so that

in one position it closes communication between the inlet b^4 and the outlet b^5 to the extension-tube F and establishes a direct passage between the inlet b^4 and the outlet b^{10} in the bottom of the valve-casing, while in another position it connects the inlet-passage b^4 with the outlet b^5, and thus throws the loop or extension into operation to increase the length of the conducting-passage. The movement of the piston to throw it into these positions is effected by the following means: A cylindrical barrel d, of smaller diameter than the piston $B^\times$, is rigidly fastened to the head of the piston, and a rod or spindle d', having its lower end fixed in the closed top end of the barrel, extends outward through the end of the valve-casing. Over this rod a hollow cylindrical plunger D is fitted to work smoothly up and down through a circular opening in the cap or top of the casing $b^\times$, and on its upper end, outside the casing, is set a head or key D'. The spindle working through an aperture in the lower end of the plunger extends through the center of that piece and is seated in a conical bearing d^2 on the under side of the head D', the end of the spindle being pointed to fit and turn smoothly in that bearing. D^3 is an elastic cushion surrounding the plunger inside the casing, and D^4 is a cushion on the lower side of the head to prevent contact of the metallic surfaces with each other in the stroke of the plunger, and thus overcome the noise and shock incident to the movements of the keys. In the sides of the barrel are cut diagonal slots d^5 d^5, diametrically opposite to each other and having a pitch or inclination with respect to the axis of the barrel, and d^6 is a fixed pin or bar having its ends fixed in the sides of the valve-casing and extending through the slots d^5 and diametrically across the barrel and the casing.

K is a helical spring having one end secured to a fixed point X on the top of the piston B' and at the opposite end attached to the cross-bar d^6. The slots d^5 are located diametrically opposite to each other, and they are inclined at such an angle with respect to the axis of the barrel that a quarter turn or rotation of the piston is produced by a short stroke or longitudinal movement of the plunger D. The ends of the cross-bar d^6 are set into slots in the body of the casing at the joint b^3 before the top section B is screwed on. This construction is illustrated in Fig. 7. In the normal position of the piston the key is held up in its highest position by the spring K, and the aperture b^7 stands in line with the inlet b^4, so that the extension-loop is cut out and there is direct connection through the piston between the inlet b^4 and the outlet b^{10} in the bottom of the valve. This position is shown in Fig. 8. From this position when the key is depressed the piston is forced down and at the same time is rotated about a quarter-turn, so that the cross-passage b^8 is brought in line with the aperture b^4 and the passage across the piston is brought in line with the aperture b^5 in the valve-casing. In this position, which is shown in Fig. 8, the extension-loop F is made a part of the conductor between the mouthpiece and the bell, and the passage is increased in length by that amount as long as the key is held down. This construction of valve-operating mechanism gives a quick and full throw and return of the valve with a short stroke and light pressure of the key.

In the present arrangement of keys, as I have illustrated in Figs. 1, 2, and 5, where the improvements are applied to an instrument with three keys, the mouthpiece P is connected directly with the first valve B, and the tube E from the bottom of that valve is connected with the inlet b^4 of the second valve B', while the tube E from the outlet at the bottom of the second valve B' is connected to the inlet b^4 in the side of the third valve B^2, to the bottom of which the neck or main portion of the body A' is connected by the tubular portion A^2. The wind-passage through each valve is increased in length by a separate loop or extension to each valve-casing. In the normal position of the pistons, with the keys elevated, the wind-passage from the mouthpiece P is open and continuous through all the valves in the order of their connection with the bell, and only when a key is depressed is the length of this passage increased and the musical sound varied or modified. The shank carrying the mouthpiece P on the outer end is formed of the stationary tube $C^\times$, joined at b^4 to the casing B of the first valve, and the sliding section C^2, that telescopes on the tube $C^\times$ and is locked on it by a bayonet-slot h and a pin or stud h'. (See Fig. 2.) The section C^2 is composed of an outer tube m and an inner tube m' of smaller diameter, the two tubes being united near the outer end of the shank at the screw-coupling M, that joins the mouthpiece to the shank. The stationary tube is fitted to slide closely into the space between the two tubes m m', so that while the shank is readily lengthened or shortened by sliding one part on the other a smooth passage without crevices or openings that will let out the wind is secured. The bayonet-slots h are formed in the outermost tube m, and the pin h' to engage the slot and lock the sliding tube is fixed on the outermost conductor E, as seen in Fig. 2. By partially rotating the sliding section C the pin is thrown out of the locking-recess in the slot and brought into the straight portion of the slot, so that the shank can be increased or reduced in length, as desired, after which the section C^2 is locked by turning it back with the same rotative movement. A close joint between the outer tube m of the sliding section and the stationary section $C^\times$ is produced by the collar M^3 on the end of the tube m. This construction of extensible shank is similar to that described and shown in my former Letters Patent, No. 593,690, issued to me on the 16th day of November, 1897. The present

mouthpiece differs from the construction embraced in that patent, however, in the peculiar position and arrangement of the tongues for regulating the area of the orifice in the cup and in the means of adjusting the same. The present improvements relate to the means of fixing the mouthpiece on the shank and the means provided for regulating the pitch of a note by varying the pressure of the lips against the cup, and the same have for their object mainly to secure a delicate adjustment of the mouthpiece without changing or affecting the depth or area of the cup as the outer shell is moved on the cup, and thereby affect in some degree the quality of the tone produced. In the present improvement one, two, or more tongues I are placed inside this shank-section m' with their tapering ends $I^{\times}$ extending into the passage $p^{\times}$ in the cup and with their opposite ends attached to the tube m' by screws. Two of these tongues set diametrically opposite to each other are found to answer well and give good results. Each tongue is made with a gradual taper from the broad end to the point which is set into the narrow part of the passage $p^{\times}$, and at the broad end it is fastened to the inner tube by a screw p^4, the tongues having greater thickness at this end to produce the offset portion p^5, so that the tongue stands clear of the inner tube and a space is afforded for the tubular shank P of the mouthpiece to pass between the tongue and the tube. A spiral spring R, placed around the shank between the end of the inner tube m' and a shoulder p^6 on the base of the cup, acts to keep the mouthpiece in a normally open or free position with the points of the tongue clear of the orifice. This spring is covered by a cylindrical sleeve M', which is secured to the base of the cup at one end, and at the other end is screw-threaded exteriorly to take a coupling ring or band M. This last-named piece unites the mouthpiece to the external tube m of the telescopic section C^2, the joint being formed by an inwardly-turned flange S on the coupling M and an outwardly-turned flange S' on the end of the tube. This construction is shown in the detail sectional views, Figs. 11 and 12. The function of this coupling is to set and regulate the position of the tongues I in the tapering passage with respect to the orifice in the bottom of the cup, and thus increase or reduce the area of the orifice accordingly. Of the two adjustments thus provided the screw-coupling enables the tongues to be set into or out of the contracted portion of the tapering passage to a greater or less amount and their working position adjusted by hand, while the movement of the cup itself under the pressure exerted against it by the lips of the performer sets the tips of the tongues into the orifice to a greater or less amount, according to the pressure exerted. In the adjustment of the tongues by hand they are set into or out of the lowermost portion of the passage a greater or less amount at the time of tuning the instrument to the required pitch, and by the pressure exerted against the cup by the lips of the performer the tips of the tongues reduce the area of the orifice, so that high notes in one or two octaves can be easily played.

G is a damper-valve placed within the neck of the instrument and connected with a key G' on the outside. This piece is placed within the contracted portion of the bell and is fixed to the inner end of a short shaft G^2 by a screw-threaded stem G^3 on the valve G and a threaded socket in the end of the shaft, the outer end of the shaft carrying the key-lever G' for turning it. A socket and bearing G^4 for the shaft is formed on the side of the neck A', and a support G^5 is fixed on the tube E to carry the outer end of the shaft. The valve is a thin disk, in diameter somewhat less than the internal diameter of the surrounding tube, so as to leave an annular space between the rim of the valve and the tube. It is mounted to make about a quarter-turn on the axis formed by the stem at one side, so as to stand either at right angles across the tube or else in line with the tube to stand edgewise in the passage. In the first-mentioned position the disk closes the passage, except for the annular space left between the edge of the disk and the surrounding tube, and in the other position at right angles the disk is presented edgewise to the body of wind. According to the position in which it is set, therefore, the disk operates either to reduce or to modify the intensity of the sound, which it does without affecting the pitch or quality, or to leave the passage unobstructed and practically of full area, so as not to affect the volume of sound. It is held normally open by a spring T on the shaft, and it remains closed as long as the lever G' is held back. The spring is a flat strip T, confined at one end in a split stud $t^{\times}$ on the bracket G^5, with its free end inserted through a slit in the rim of a circular head t^2, fixed on the shaft G^2. The tendency of this spring to return to a straight line when bent sidewise by the rotation of the shaft causes it to throw the valve open when the finger is removed from the lever G'. The end of the spring within the part t^2 is furnished with a T-head t^3, that prevents it from drawing out of the slit and forms a stop to limit the rotation of the shaft G'.

If it be desired to hold the damper in closed position for any considerable time, the lever G' can be locked against the side of the valve-casing by a hook Z or other suitable catch provided on the first casing, as indicated in Fig. 2.

The damper is readily detached and removed from the bell by unscrewing it from the shaft S'.

A tremolo effect in the tones of the instrument is produced at the pleasure of the player by giving a rapid rotary motion to the damper G, and in connection with this part G a means of imparting a rapid motion to it and for placing this motion under the control of the player

is provided on the instrument, so that it can be brought into action and stopped at will by the simple movement of a finger.

The construction of the mechanism for rotating the damper and controlling its motion is illustrated in Figs. 14 and 15 of the drawings. A pinion or small gear V, fast on the shaft G^3, connects that part with a wheel W of much greater diameter, the proportions in the present construction being about one to five, and the rims of the two wheels are caused to engage each other either by spur-teeth or elastic rims. One wheel is in constant engagement with and is caused to drive the other when rotated. Power is applied to the large wheel by means of the lever W', pivoted at W^2, and a connecting-rod W^4, attached to the free end of the lever and to a crank W^5, fast on the axis of the large wheel. Oscillating movement of the finger-lever thus imparts rotary motion of the damper-shaft at a velocity considerably higher than the crank-shaft.

The "dead-centers" in the rotation of the driving-crank are overcome or prevented by an arrangenent of two springs Y Y, which are attached to stationary points *y' y'* diametrically opposite, or nearly so, to each other and to a common crank Y^2 on the end of the axis of the wheel opposite to the driving-crank, the two cranks being set at such angles with respect to each other that when the driving-crank stands on the horizontal center line the crank Y^2 on the opposite side of the wheel occupies an angular position either above or below the horizontal center line, according as the driving-crank is on one side or the other of the axis.

A stop-lever Z on the casing U, that covers the wheel, is provided for arresting the motion of the tremolo mechanism and throwing it out of action at will. The stop-lever Z works through the casing and engages a slot Z^2 in the wheel W when it is pressed in by the finger, or by a contrary movement it is disengaged from the wheel, and the latter is allowed to act as the finger-lever V is vibrated. The slot Z^2 is of such length that the movement given to the wheel W in one direction when the stop engages the slot will open the damper G or in the opposite direction it will close the damper, so that the same finger-lever V is made to operate both as a tremolo and to produce "piano" or "forte" effects at pleasure.

Water-valves H are provided on the tubes E at the lowest part of the bends, from which outlets all the valves and tubes, including the loops F, are thoroughly drained.

Among the peculiar features of the present construction should be mentioned especially the position of the valves, the arrangement of the bends or members connecting the valves with the body of the instrument, and the combination of the whole with the adjustable shank. The valves are set in stepped position instead of on a straight line, so that the keys stand in position to accommodate the fingers of the player, and the hand is not thrown out of natural position or required to be held in a cramped state. As tuning slides and elbows are dispensed with and the tubes are bent and carried in free curves from the curved neck or elbow of the main portion of the instrument around to the end of the valve-casings, the entire center is left open, so that the arm of the player can be readily passed through the open center, and thus the instrument can be hung on the arm or from the shoulder when not in use. This is of special advantage in instruments of the larger sizes from alto-horns upward, in which class of instrument the player can carry it on the left shoulder, with the arm passed through the open center and with the bell hanging down, while by raising and throwing the bell forward into a horizontal position the instrument is brought to position for use without removing it from the left arm. The rear bends or elbows of the curved tubes E are connected by slip-joints E^6 to the portions that are directly attached to the valve-casings, so that longer or shorter elbows or curved portions can be substituted, as conditions may require in tuning the instrument to different keys.

The manner of arranging and connecting the valves, the bell, and the mouthpiece, as above described and shown in Figs. 1, 2, and 6 of the drawings, is productive of many advantages, especially in the construction of the larger kinds of instruments, for it will be noticed that the bell and the mouthpiece are located on a straight line, with the bell extending horizontally in front of the player, and especially the bends or coils of tubes that connect the valves and the mouthpiece to one another and to the bell are so arranged that a clear opening is afforded through which the left arm of the player can be introduced. Thus the weight of the instrument can be thrown upon and borne by the left shoulder with the bell presented to the front, and when the instrument is not in use it can be suspended from the shoulder with the bell hanging down. These features are secured, first, by the construction of the valves and the position in which they are set, whereby the connecting-tubes are carried from the bottom of the valve-cases with smooth and gradual bending, and, secondly, by dispensing with slides and crooks or extensible sections between the valve-cases and the bell or the mouthpiece.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a cornet, or similar wind instrument, the combination of the bell, the straight shank carrying a mouthpiece on the outer end, valve-cases having wind-apertures in the bottom ends and sides, and the windings or curved tubes connecting the bottom end of

one valve with the aperture in the side of the next valve-case, the said connecting-tubes being arranged around an open center.

2. In a cornet, or other similar wind instrument, a cylindrical valve-case having an outlet in the bottom, and apertures in the sides in combination with a slidable and rotatable valve having apertures and passages through which the wind is directed across the valve-case in one portion of the valve and downward through the bottom aperture in the other portion of the valve and a finger-key, and mechanism whereby the longitudinal stroke or movement of the key produces a sliding and a rotating movement of the valve.

3. The combination of the cylindrical valve-case having a wind-outlet in the one end, and the apertures b^4 b^5 b^6 in the sides, with a cylindrical valve adapted both to slide and to rotate in the valve-case, said valve having a transverse passage b^8 and ports in the side, an outlet-aperture in the bottom and aperture b^7 in the side leading into said outlet.

4. In a cornet, or similar wind instrument the combination, with a cylindrical valve-case having the principal aperture b^4 in the side, the outlet b^{10} in one end, and the auxiliary aperture b^6 in the side located at ninety degrees or thereabout on the circumference of the valve-case with relation to the principal aperture; of the slidable and rotatable valve having a transverse passage b^8, the port b^7 in one side and the longitudinal passage and outlet at the bottom, the principal connecting-tubes uniting the mouthpiece and the bell with the valve-case, and the auxiliary tube or loop connected to the side aperture in the valve-case.

5. The combination, with the cylindrical valve-case having an outlet-aperture in one end, and apertures in the side of the case; of the slidable and rotatable valve having a longitudinal passage and outlet in the bottom connecting with an aperture in the side, and a transverse passage and apertures in the side separated from the said longitudinal passage and its aperture, the tubular stem fixed to said valve having inclined slots in its circumference, the cross-bar passing through said slots and fixed to the valve-case, the tubular key-rod fitted to slide in the head of the valve-case and provided with a finger-key on the outer end, the spindle rigidly fixed in the head of the tubular stem and having a pointed end adapted to turn on a bearing in the top of the tubular key-rod, and a spring having one end attached to the valve and the other end secured to a fixed point above.

6. In a cornet, or similar instrument, the shank composed of a stationary tubular section, a telescopic section formed of an inner and an outer tube-section set concentrically and adapted to slide on the stationary tube, in combination with a yielding mouthpiece having a stem with a tapering passage, a spring acting in a direction opposed to the pressure of the lips against the mouthpiece and a tapering tongue located within the stem of the mouthpiece and attached to the inner tube of the sliding section of the shank.

7. The combination with the telescopic section composed of the concentrically-set tubes, of the yielding mouthpiece having a stem with a longitudinal passage, tapering tongues fixed to the inner tube and extending into the stem of the mouthpiece, the spiral spring and the sleeve and screw-coupling connecting the mouthpiece with the shank and adapted to adjust the mouthpiece longitudinally on the shank.

8. In a cornet, or similar wind instrument the combination of a damper-valve, and means for imparting to it a rapid rotating motion to produce a tremolo effect, as described.

9. A tremolo attachment for cornets and other band instruments, comprising a damper-valve located in the throat of the instrument and mechanism for rotating the same, consisting of a vibrating finger-lever, and mechanism connecting the same with the damper-valve, whereof a rotating movement is imparted to the valve from the vibrations of the finger-lever.

In testimony that I claim the foregoing I have hereunto set my hand and seal.

FRANCIS J, RICHMAND. [L. S.]

Witnesses:

EDWARD E. OSBORN,

L. OSBORN.