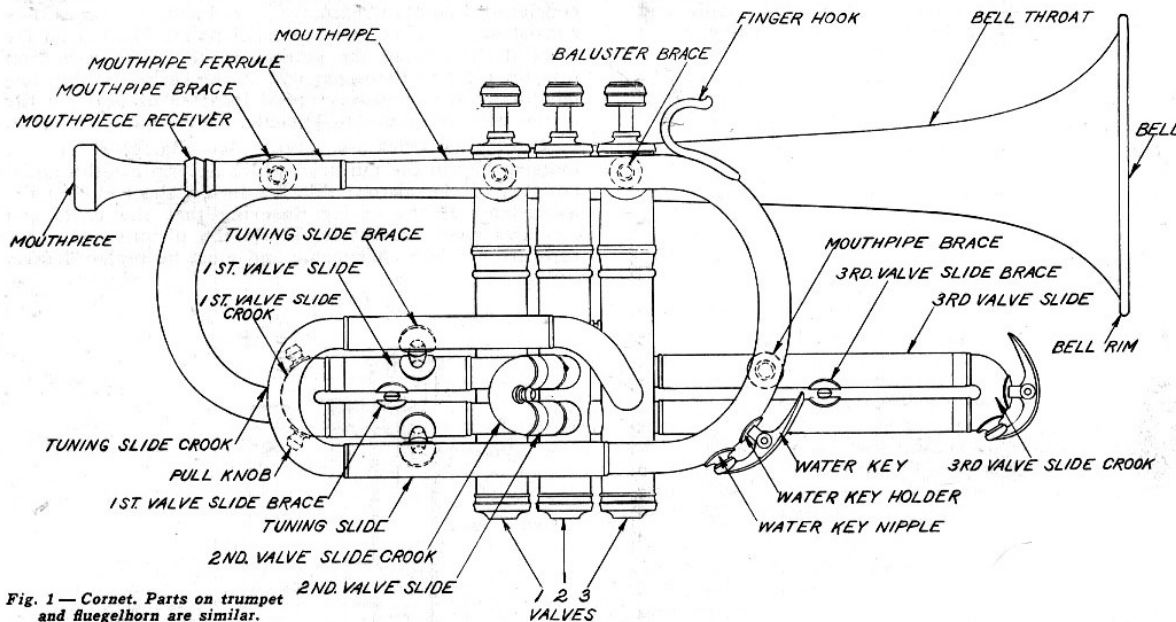
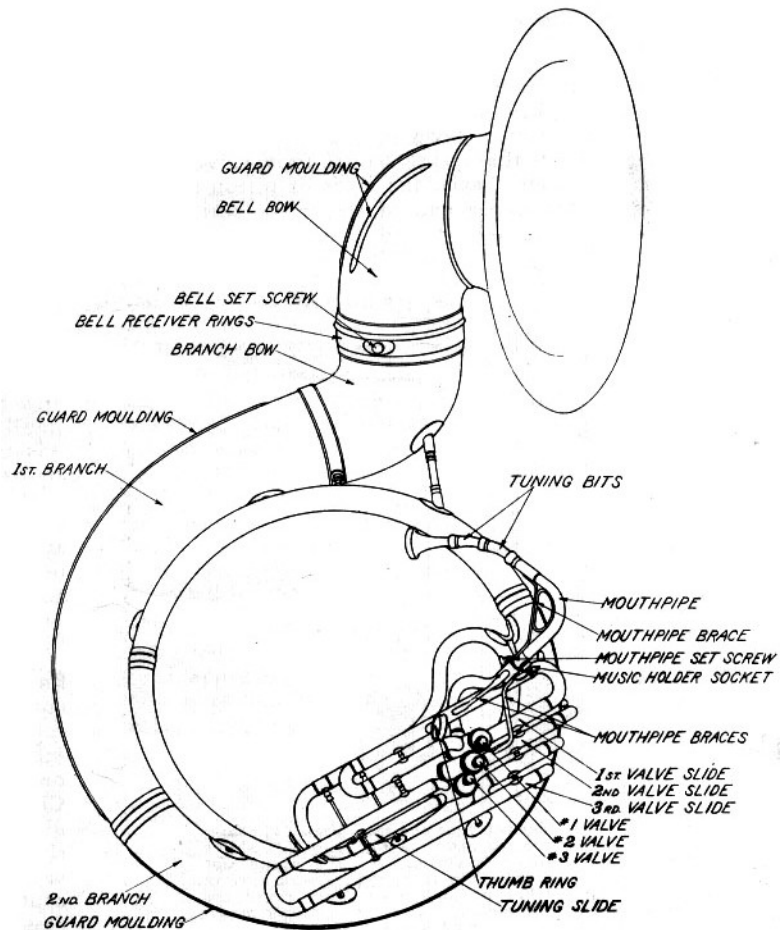


PISTON VALVE INSTRUMENTS



Cleaning Valves. Remove the pistons, wash them and the inside of the casings with castile or Ivory soap and warm water, and rinse in clear water. Be careful in handling the pistons that you do not drop or strike them against objects, as they are hollow and dent more or less easily. Wipe the pistons dry with clean cheesecloth and lay them on a clean cloth so they won't pick up grit or dust. Then swab the inside of the casing with clean cheesecloth, using swab supplied with the instrument, or a weighted string. If you use the metal swab, be sure you do not gouge the casing wall with the end of the swab. Keep end covered with the cheesecloth. See Fig. 3 on how to do it. After cleaning, dip the pistons in clean, cold water and replace in the casings.

Be sure you get No.1 piston in No.1 casing, No.2 piston in No.2 casing, and No.3 piston in No.3 casing. This obvious point is stressed because it is so often a cause of trouble. The interchange of pistons one and 3 will still permit the instrument to be played but it will blow stuffy and will be out of tune. No.1 casing is nearest the mouthpiece and No.3



casing is nearest the bell; the pistons are numbered, usually on top; so there is no excuse for getting them mixed up.

Sometimes the valve caps are also numbered 1, 2, 3, and if so be sure to avoid getting them mixed up, as they are liable not to be interchangeable. On Conn Clickless valves, the valve caps are numbered inside and should be properly replaced, No.1 on No.1 valve, etc.

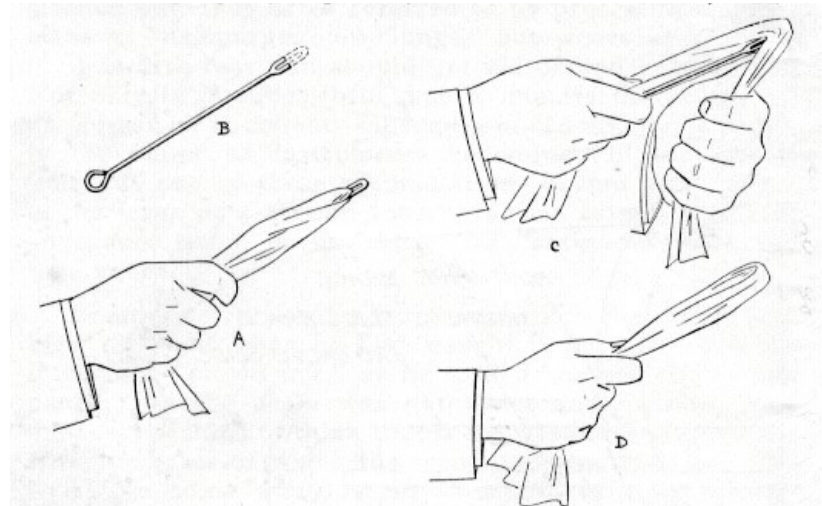


Fig. 3—How to cover swab for valve casing. View (A) shows how NOT to do it. Even though corners of "eye" are rounded, they are liable to scratch and gouge the sidewall of the casing. Some repairmen break off the eye, as shown in view (B), the better to hold the cloth. Views (C) and (D) show two steps in covering swab so all metal is shielded by cloth.

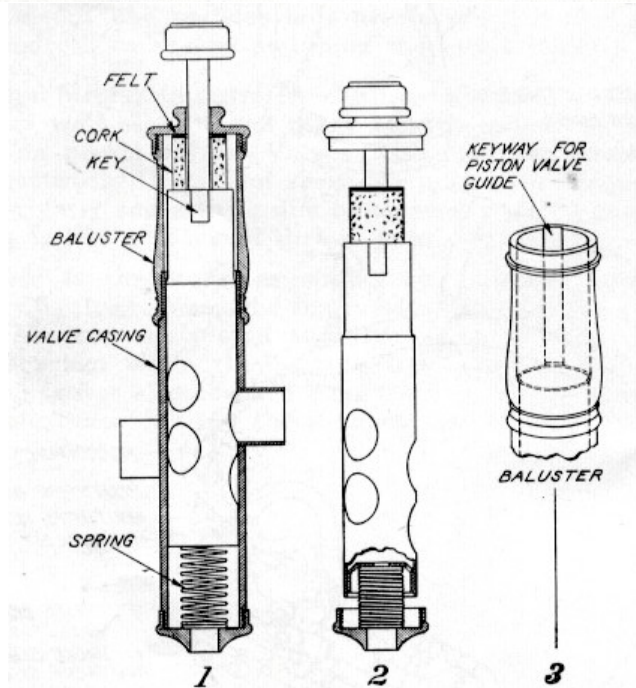
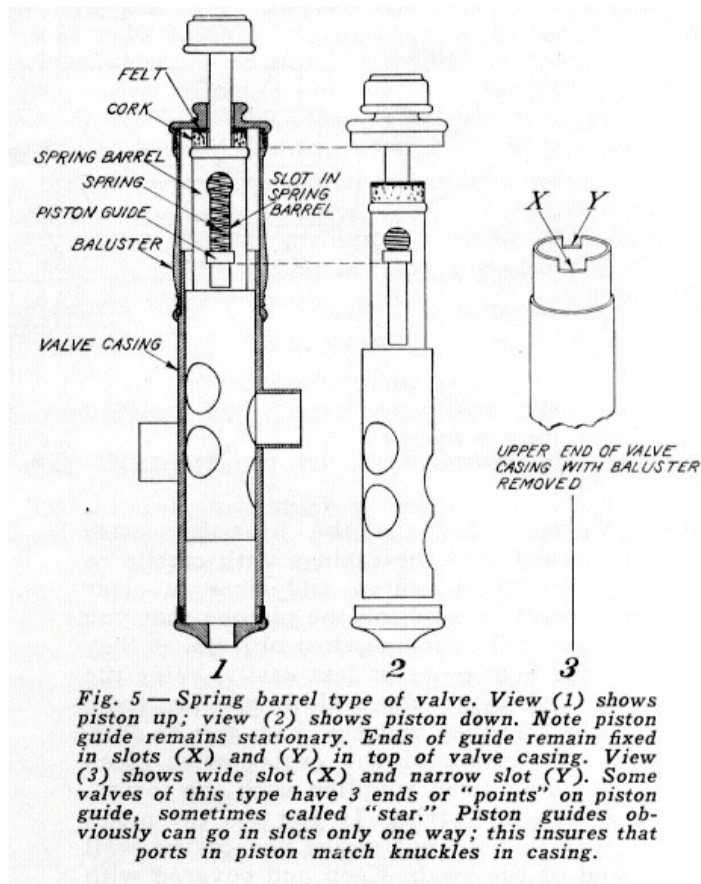


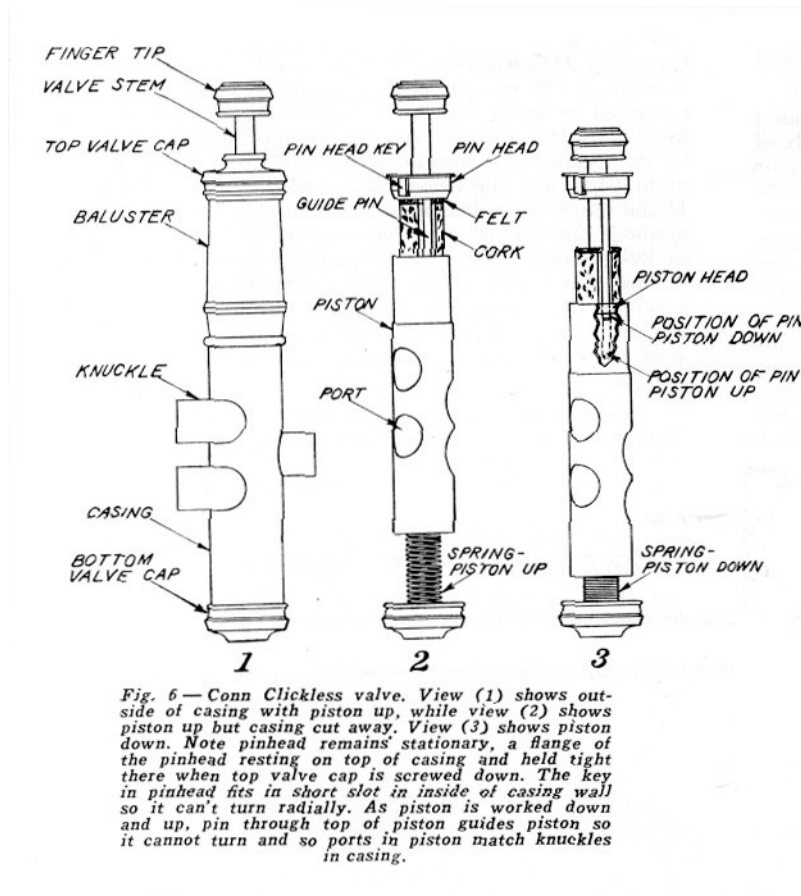
Fig. 4—Key-in-keyway type of valve. View (1) shows position of parts when piston is up; view (2) shows position when piston is down. View (3) shows slot or keyway in baluster. Key in piston rides in keyway as piston is worked up and down. This key keeps piston from turning radially, maintaining proper match of ports in piston with knuckles in casing.

On valves of the key-in-keyway type (See Fig. 4) be sure you have the key properly started in keyway before you push the piston down or the key and keyway may be damaged. In the spring barrel type valve (See Fig. 5), where various shapes and sizes of piston guides fit into slots in the upper end of the valve casing, be sure these guides are in their proper slots before you screw the top valve cap down. Sometimes these guides consist of 3 points irregularly spaced and sometimes they consist of one large and one small point. The reason for these designs is so the points of the guides will drop into the slots in the upper end of the casing in *only one position*, insuring proper radial location of ports in the piston with reference to knuckles in the valve casing.



On Conn's Clickless valves (See Fig. 6) there is a locating key in the pin head which determines the radial position of the piston; this fits into a short slot in the upper end of the casing, insuring that the ports and knuckles meet accurately. While the pistons and valve caps are not interchangeable and must be replaced carefully according to the number each bears, the pin heads are interchangeable. Be very careful in handling these pin heads that the pins do not become sprung or bent, for this will impair smooth valve action. If a pin does become bent or damaged, don't try to repair it; get a new pin.

Replacing Cork and Felt Bumpers. Putting on new cork and felt bumpers is really a job for an experienced repairman, but in an emergency you may have to do the job yourself. If regular cork bumpers are not available, one can be made from an ordinary bottle cork. On Conn Clickless valves, be sure to glue on cork and felt with a glue not readily soluble in water, or saliva will soak them loose. Avoid getting any glue on the piston or casing walls, and be sure the slot in the cork and felt is centered so the pin will move up and down freely in this slot without touching.



Most valve stems are marked to indicate just how high the bumper and felt should be to allow the piston to come up so that the ports in the piston accurately meet the knuckles in the casing. If there is such a mark on the valve stem, it is easy to cut the cork so the piston will stop at the proper place when the finger releases it. Keep shaving or sanding off the cork until when you sight across the top of the valve cap, the mark on the valve stem is level with the top of the valve cap; then you know the cork and felt are the proper height.

If there is no such mark, you'd better let an experienced repairman do the job. It is extremely important that the height of cork and felt is correct; otherwise the ports in the piston and the knuckles in the casing will not meet accurately, and the instrument will blow stuffy and will lack resonance.

Lubricant. Before putting pistons back in casing, be sure there is no lint left in the ports or later this will come out and foul the action. Also, before putting the pistons back in casings, place a few drops of oil on the pistons. Use a light, high grade valve oil. Conn valve oil was developed especially for this purpose. Many players get good results by putting a few drops of oil on the piston, then running cold water over it and working it into the casing. Some players prefer to use water or saliva on new, tight-fitting valves, but generally speaking a fine oil is best. On valves which are worn, a heavier oil can be used, as this heavier oil helps seal up the excess clearance which has worn between the walls of the piston and casing.

Conn piston valves are very accurately fitted with clearance from .0012" to .0018" (one and two-tenths of a thousand to one and eight-tenths of a thousandth of an inch.) The clearance on a side is just half this, or about .0008" (8 ten-thousandths of an inch) or the diameter of an average human hair. This does not leave much space for the film of oil, but a fine grade of oil will work all right. Valves that wear until the clearance reaches .0025" to .003" are liable to leak. Only a heavy oil which helps close up the excess clearance will make them playable.

Corroded Valve Caps and Pistons. An instrument not properly cleaned and oiled will corrode after months of disuse. Valve caps will stick and cannot be unscrewed. Don't use strong-arm methods to loosen them. Don't use pliers or pipe wrench, for you'll mar and break the instrument. Sometimes tapping with a wood mallet or wood hammer handle will be enough to break the corrosion loose sufficiently that the cap can be unscrewed.

Sometimes a liberal bath of kerosene left overnight will loosen the cap. If these more gentle methods fail, take the instrument to a good repairman.

To remove a corroded piston is even more difficult. Don't try to poke the piston out of the casing with a stick. The piston is *hollow*, and the walls are thin. See Fig. 7. This force is liable to stave in the will top or bottom of the piston or buckle the sidewall. Put kerosene or a good penetrating oil in the valve and let it sit over you night. Then try pulling and pushing the piston with a slight rotating motion. If this does not bring success, see your repairman.

Before putting an instrument away for any length of time, apply a little vaseline or tallow to the threads of the valve caps; also a little valve oil on the piston. This will help avoid corroded

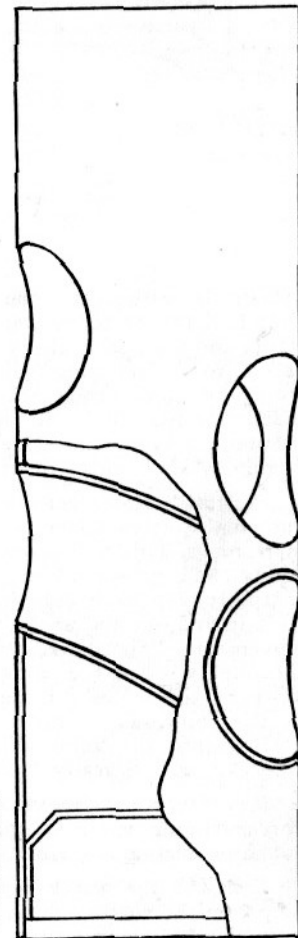


Fig. 7— The piston is a hollow shell. The holes through the piston are short lengths of smaller tubing which furnish the air passage from one side to the other. These pieces of tubing are inserted through holes in the sidewall of the piston and are brazed flush with the sidewall.

caps and pistons and will help preserve the instrument.

Cleaning Valve Slides. If valve slides are stuck don't use strong-arm methods to get them loose. The result of force is usually a broken brace or a kink in the valve casing. The best method of starting a valve slide not too badly corroded is to put a piece of cloth (a handkerchief will do) through the slide and give it a quick jerk. If this won't do it, try some kerosene on the slide and let it stand overnight. A slide which resists all such efforts should be taken to an experienced repairman.

Once the slides are removed clean off all corrosion with gasoline or the metal polish you use for cleaning the outside of your instrument. Do not buff the slides or you will soon wear the slides down until the fit will be too loose and the slides will drop or blowout. Wash the inside with castile soap and warm water. Fill the slide half full of soapy water and shake well. A weighted string and a piece of cheesecloth about 3 to 4 inches wide and 3 to 4 feet long will enable you to remove dirt from the slide crook which you might not otherwise reach. See Fig. 18 for illustration of this cleaning device adapted to trombone slides. When the slides are thoroughly washed, rinse them in cold water.

Mutton tallow, vaseline, or cork grease should be put on the valve slides before putting them back in the instrument. This will prevent corrosion, make them work freely, and retard wear. After applying the lubricant sparingly, lap each side in individually by pushing the slide in and out and at the same time giving it a rotating movement. This distributes the lubricant evenly and thoroughly over the slide surface. Finally, push both sides of the slides all the way in and wipe off excess at the joint. This prevents the excess lubricant from getting into the valve slides and then into the valves, where it will literally "gum up the works."

Never try to remove or replace a slide unless the corresponding valve is open; that is, unless the corresponding piston is pushed down.

Examine the water keys. A thin coating of oil will help prevent rusting of the spring. If the cork is defective, supply a new one.

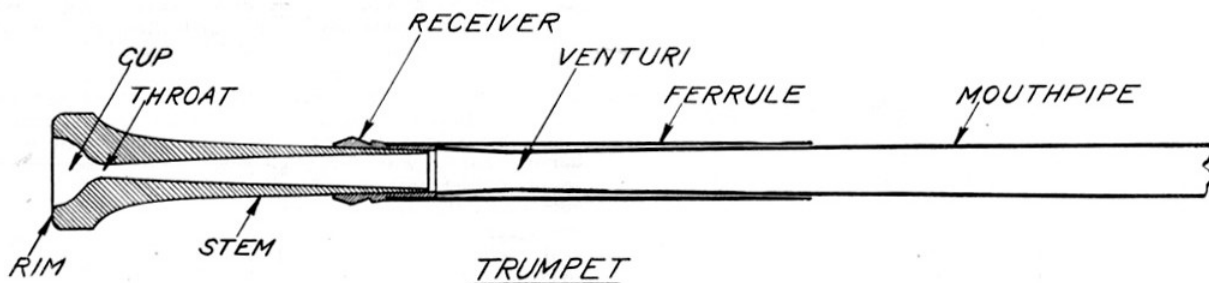


Fig. 8 — Trumpet mouthpiece and mouthpipe. The throat of mouthpiece and venturi of mouthpipe are the critical spots and must be kept clean. Avoid forcing cleaning rod through these passages which will enlarge them, for this will damage the response of instrument. Note frail construction of receiver. If mouthpiece becomes corroded and stuck, don't use strong-arm methods to loosen it or you will break receiver loose.

Cleaning Mouthpiece. The greatest single cause of damage to cup mouthpiece instruments is the mouthpiece corroded or stuck fast in the mouthpipe. In the attempt to loosen and remove the

mouthpiece, braces are torn loose, mouthpiece receivers are pulled away from the mouthpipe, and the mouthpipe itself is bent and broken. If the mouthpiece becomes stuck, don't go beyond gentle methods, such as tapping the receiver with a wood mallet or wood handle, applying kerosene or penetrating oil and letting stand over night. When tapping the mouthpiece receiver, lay it against something solid, such as table top or block of wood. If these gentle efforts fail, you'll save yourself costly repairs by letting a repairman do the job.

The mouthpiece should be kept clean all the time. The throat is the critical spot in the mouthpiece as it does not take much dirt in this narrow throat to spoil the performance. See Fig. 8 to get an idea of this narrow throat and the construction of mouthpiece receiver, ferrule, and mouthpipe.

Good mouthpieces should be kept in a pouch or bag. This protects the rim from dents and the thin edge of the stem from becoming mashed. It also cultivates the habit of removing the mouthpiece after every performance.

Never put your instrument away at the end of the season with the mouthpiece left in. If you do, much trouble awaits you when you pick it up again.

Cleaning Inside Tubing. Dissolve some castile soap in warm water. Pour this into the bell, working the valves so the solution will pass through the valve slides. This will loosen corrosion and dirt which may have been blown into the instrument. After this has been done, the inside of the instrument should be rinsed in cold water, either by pouring it into the bell or with a hose and a reducing nozzle to fit the mouthpipe. If you use latter method, avoid excess pressure; a medium flow is sufficient. This process of cleaning the inside of tubing should be followed by thorough cleaning of valves and valve slides, to remove from these parts any dirt dislodged from the interior of the instrument.

Avoid poking swabs down mouthpipe and be careful if you use a weighted string, for inside the mouthpiece receiver and ferrule is a more or less delicate mouthpipe which must not be damaged. See Fig. 8.

Cleaning Outside. For lacquer finish, use Conn Lacquer-Life or similar lacquer cleaner and preservative. Liquid wax is also used to protect lacquer finish but be sure to rub with soft cloth until all stickiness is removed. Mild soap and water or simply a damp chamois can also be used. Avoid using special cleaners with alcohol in them, for this will take the lacquer off. Avoid use of abrasives.

For plain polished brass (not lacquered), chromium, nickel-silver, or nickel plated finish, use Hyshine. A simple but satisfactory cleaner can be made by mixing a tablespoonful of fine grade whiting in a half glass of denatured alcohol. Stir the whiting well, apply lightly, and rub off carefully when dry. Be sure to use a *soft* piece of flannel for this purpose, as other cloth is liable to scratch.

For silver, use Nu-shine in paste or liquid form, or the whiting mixture, described above.

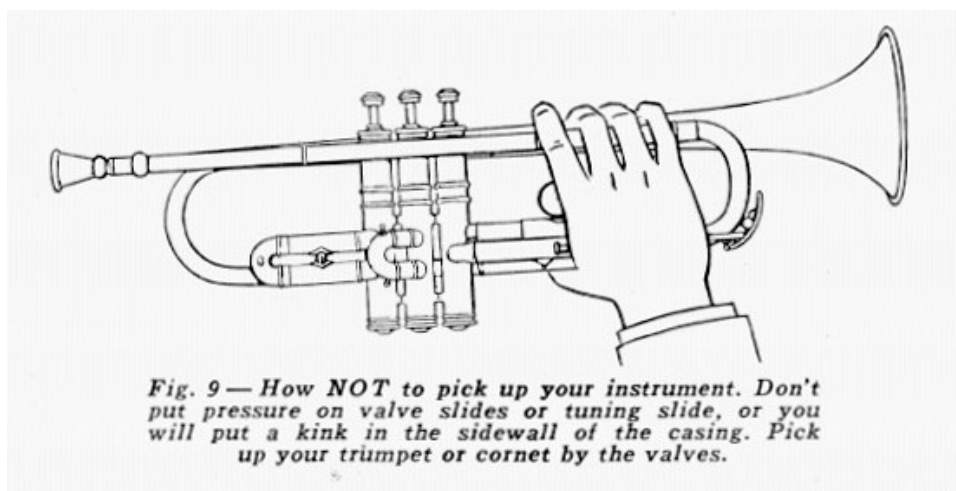
For gold, use Nu-shine or rouge and a piece of *soft* flannel. Gold is easily scratched, so be especially careful in cleaning an instrument in gold finish.

Be careful not to get any of the cleaning materials inside the valves or slides. Use cleaning materials sparingly and wipe them off carefully.

Lacquer is a good preservative for all metal finishes. Clear lacquer applied over silver, gold, nickel, nickel-silver, or chromium protects the plating or metal from the attacks of acids in perspiration without changing the color or appearance of the finish. "Gold" lacquer is usually applied over brass so it looks like gold. Lacquer has been improved until it ordinarily has quite a long life. This does not apply to certain individuals who "go through" lacquer in a few days. There is so much acid in their system that it eats the lacquer away quickly and even eats into the metal.

Tips on Avoiding Trouble. In the foregoing we have made several suggestions on how to avoid trouble. Here are a few more, taken from the experience of both professionals and amateurs. Some of these tips may seem trivial, but it is some of these "trivial" things which cause big troubles.

1. Don't chew gum or drink Coca Cola and other "soft drinks" while playing. Sugar from the gum and soft drinks will be blown into the instrument, causing the valves to stick. Don't smoke while playing, or tobacco particles will be blown into the instrument. After eating candy or food, rinse the mouth thoroughly with water before playing your instrument. The reason is obvious.
2. Don't pick up instrument by grasping it near the end of the valve slides or tuning slide. See Fig. 9. At this point the leverage on the valve slides is greatest and the slides are liable to become sprung. Not only that but this leverage on the slides often puts a buckle or dent in the valve casing to which they are joined. It takes only a slight dent here to rub on the piston and cause the valves to drag. If you don't believe what we're telling you and you want to run the risk of damaging your valves, try this test: Push the third valve down, then grasp your third valve slide and apply a little pressure. This slight pressure will buckle the valve casing enough to bind the piston so it will not come up. Every time you pick the instrument up in this manner and squeeze the valve slides, you buckle the valve casing—and then you wonder why the valves give trouble. Pick up cornets and trumpets by their valves. Pick up larger instruments by thumb ring, one of the larger branches, or other well-braced part.



3. When holding the cornet or trumpet in playing position, don't put pressure on second valve slide with the right hand. This puts a strain on the valve slide, which in turn puts stress on the valve casing, causing the same trouble pointed out above.
4. Don't lay your instrument down so stress and strain are put on any of the valve slides. This is especially important in the larger instruments, such as basses and sousaphones.
5. Check up on the latch of your case to be sure it is holding properly. Such care may avoid a bad spill and damage to your instrument if the lid should fly open.
6. Tie down or box mouthpiece and other accessories in the case so they can't bang around loose. Many a bad dent, especially in the valve casing, has been caused in this manner.
7. Be sure your case is properly blocked to give protection to your instrument in the event the case and instrument are dropped or something is dropped on them. Usually a case made by the manufacturer of the instrument has been designed for this specific instrument. But beware of "special" cases made by firms that make cases only - cases made to fit all instruments. Also, beware of second hand cases originally made for other instruments. They often support the instrument where it should not be supported and do not support it where they should.
8. Don't force lid shut on a case crammed with music and other stuff. You run a big chance of springing slides and jamming the valves. And don't use your case as a seat; it isn't built to withstand such usage.
9. Don't use rubber bands to hold water key shut, except in an emergency and temporarily. Sulphur in the rubber will tarnish silver and brass and eventually will eat into the metal. Any rubber article, such as rubber mouthpiece, will tarnish silver if left in the case unwrapped.
10. A piece of camphor gum absorbs moisture and is often carried in the case with the instrument to absorb moisture and retard tarnish or corrosion, especially in summer when humidity of the air is high.
11. When you put your mouthpiece in your instrument, don't hit it with your hand to drive it in. This constant hitting your mouthpiece may damage the mouthpipe or other part of your instrument. Simply put the mouthpiece in the mouthpipe and give it a slight twist to seat it properly.

12. Check springs, especially springs in the bottom of the valves, to see that their thrust is vertical and not sidewise. You can usually tell from the way the spring leans. Such a leaning spring exerts more pressure on the piston against one side of the casing than against the other, and tends to wear the casing out of round. If the spring leans to right, open up the coils on that side to push it back; and vice versa.

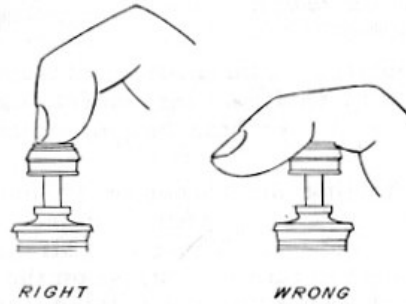


Fig. 10—Right and wrong way to finger piston valve. If you use first joint you can make a stroke directly up and down. If you use the second joint you tend to push the piston over so it rubs against the opposite side of the casing. This in time will wear the casing out of round so it will leak.

13. Press the valves down by placing the ends of the fingers on the valve finger tips and making a vertical stroke. Some players use the second or third joint. See Fig. 10. This position pushes the piston against the opposite side of the casing, causing the piston to cock slightly and producing a bad valve action. In time this constant pushing against the opposite side will wear the casing out of round. It is no defense of this faulty style of fingering that some great artists use it. We know of one great cornet soloist who plays this way but we happen to know he has constant trouble with valve action.
14. It is the practice of some to stop valve spring sing by applying some vaseline. This is bad, for the vaseline is liable to get into the valves and when it does it will gum and cause trouble with the action. To remove sing, try new springs or interchanging springs from one casing to another. Also try increasing tension by stretching.
15. Don't shove heavy mutes into the bell of your cornet or trumpet with too much force. This tends to stretch the throat of the bell and may in time affect the playing qualities of the instrument. Any mute *properly corked* will stay in the bell satisfactorily if pressed in firmly and rotated or twisted slightly. If your mutes will not stay in without jamming them in with force, re cork them.
16. On the larger instruments with detachable bells, such as euphoniums, basses, and sousaphones, put a little tallow or vaseline on the bell receiver rings and bell set screws so they will work freely and so corrosion will be retarded.
17. Keep the larger instruments out of the reach of practical jokers who delight in throwing erasers, cigarette butts, clothing and refuse into the bell. This material lodges in the bend of the bow where it cannot be seen and where it is difficult to remove. Presence of this foreign

material, of course, causes stiffness and faulty intonation.

18. In playing an outdoor concert or parade, where there may be considerable dust and grit in the air, use more oil on the valves than usual and be sure to clean your instrument thoroughly when the engagement is finished.
19. Some players have the nervous habit of sitting during tacit passages and entertaining themselves by twisting the finger tips, tightening and loosening them. Don't do it. This puts unnecessary strain on the devices which regulate the radial position of the piston in the casing, especially the star in the spring barrel type of piston and the pin in the Conn Clickless valves.

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