TREMULANTS

by Dan Barton, Organbuilder
Illustrated by the author

No doubt there are a great many organ enthusiasts who have full knowledge of tremulants, but there are also many who have had no opportunity to gain this information. So, to the first group this article will be a review; to the others a source of interesting information.

All theatre organ buffs know that well-regulated "trems" are a "must." During the "Golden Age" the sobbing Tibia became famous with theatre organ buffs, but not so with the "purists" of the classical organ world. A well-known and highly respected authority on classic organs states in his book, "The overdone tremolo heard in a theatre organ, especially in connection with the big solo Flutes causing them to go off pitch, thereby creating a sobbing effect, has no connection with serious music. Such a tremolo is essentially vulgar and distressing to the educated ear."

His opinion notwithstanding, the tremulant as used on high pressure (ten inches and upward) unit theatre organs is one of the important factors that help create the characteristic sound which distinguishes the theatre organ from the classic or church-type organ.

To explain this I quote Mr. William H. Barnes' "The Contemporary American Organ," which states with reference to the tremulant, "The tone may increase and decrease in intensity, the pitch remaining constant."* Mr. George Audsley, author of "The Organ of the 20th Century" states, "the action of a tremulant should be sufficient to impart a gentle, wave-like ripple or undulation to the natural speech of the pipes." These gentlemen are highly regarded authorities on the history of church and concert organs, architects of organ specifications and experts in tonal design. Note the reference to the "pitch remaining constant" and "the natural speech of the pipes." Robert Hope-Jones changed this concept of a tremulant. With the use of high wind pressure, Hope-Jones introduced a tremulant that took many of the voices off pitch so they were considerably on the flat side. The Tibia with its famous sobbing voice is no doubt the best example of the value of the "variable pitch" tremulant to a theatre organ. Now to the types of tremulants.

*The early Hammond was equipped with a "variable intensity" vibrato. They discarded it as soon as their variable pitch trem was perfected after several years.

Figure 1 shows the kind of tremulant commonly used on high pressure unit organs, a "bellows" type. It also shows: the stop action which controls the tremulants (1), the 3" wind conductor (2) which is connected to the regulator (also called reservoir) or the pipe chest. No. 3 is the wind box on which the bellows is mounted, 4 is the bellows, 5 the pallet (also called valve) which opens and closes the bellows, 6 is the adjustable slide controlling the exhaust, 7 the weight, and 8 is a dowel resting on a pneumatic controlled by the stop action (electric circuit not shown) connected to the tremolo stopkey at the console. When the stop action pneumatic deflates, the dowel drops, allowing the tremulant bellows to fall. This opens the pallet, admits wind to the tremulant bellows and starts the tremulant action. Other devices may be used to control the tremulant "Off and On." No. 9 is the adjusting rod which raises or lowers the pallet and determines the amount of air allowed to enter the tremulant bellows.

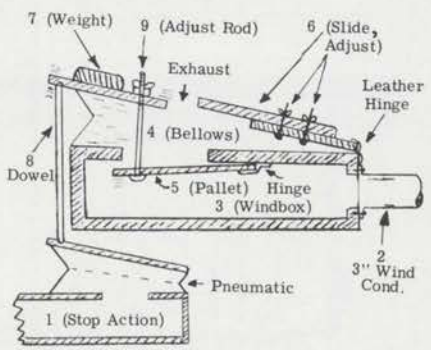

Figure 1. Bellows tremulant cross section.

The function of the tremulant is to allow a small amount of air to escape from the regulator at regular intervals. This causes the regulator to bounce, causing a movement of the air in the pipe chest which, in turn, creates a vibrato in the speech of the pipes. The variation in the vibrato, very light to heavy, is controlled by the amount of air that is allowed to escape from the regulator. This adjustment is made at the tremulant. The vibrato will be very slight if the adjusting rod (9) holds the pallet (5) close to the opening so only a small amount of air is admitted to the bellows (4) and the adjusting slide (6) is nearly closed. Conversely, the vibrato can be strengthened by an opposite adjustment. There is a limitation in the fast and slow adjustment. When a small amount of air is allowed to escape from the regulator the tempo of the bounce is faster than when a greater amount of air escapes with each bounce. The adjusting slide (6) should be opened to a position where the amount of air escaping from the exhaust balances the amount of air entering the bellows at the pallet opening (5). There is also a limit on how great a bounce can be used, for if the escape of air is so great that it lowers the pressure in the regulator to an extreme degree the pitch will go so flat that the speech of the pipes will be ruined. The Tibia is the only stop in a unit organ that responds to an exaggerated tremulant beat. Tremulants on all other unit stops should be adjusted so the speech goes slightly off pitch, flat. The Strings should have a faster and lighter vibrato than the Flutes and Reeds.

The physical placement of the tremulant in relation to the regulator is of great importance. A short article in the December 1964 issue of *Bombarde,* "Technical Advice" by Lee Haggart, stated that the tremulant should be located five to ten feet from the regulator and have at least two elbows in the wind line. A number of people who read the article asked, "Why?". It is possible that there are some enthusiasts who have removed organs from theatres and, after restoring the instruments, have installed them in their homes or elsewhere and because of cramped space or lack of knowledge have installed the tremulants in the wrong manner and had tremulant trouble ever since — especially with the Tibia; a proper adjustment of the wind line will make a Tibia speak with an appealing sob, instead of a belch.

The reason for the extended wind line and the elbows is to do away with the "surge." Surge is thus defined: to rise suddenly to an excessive or abnormal value, a violent rising and falling.

What happens when the tremulant is installed too close to the regulator and connected with a straight conductor? The wind line (2) and the windbox (3) are normally filled with air. The dowel (8) drops, allowing the weight (7) to close the bellows which opens the pallet (5). The air pressure in the windbox raises the bellows, the pallet closes, stopping the escape of air, but THE AIR DOES NOT STOP in the wind line; it keeps right on flowing, compressing the air in the windbox. This raises the pressure. The air in the bellows flows out of the exhaust. The weight drops the bellows, opening the pallet. The air in the windbox, now at an abnormally high pressure, enters the bellows, opening it with a jerk. The pallet closes much sooner than it should, creating an uneven beat or "gallop." The "chop" is transmitted through the wind line to the regulator and then to the pipe chest. This irregularity, or wind line "surge," is plainly distinguishable in the speech of the pipes.

How to cure it? Run a longer wind line with a conductor not over three inches in diameter, or put an elbow in the line, perhaps a number

of elbows if necessary. The friction caused by forcing air through a length of small pipe or sharp turns in a series of elbows reduces the velocity so the surge is dissipated before it reaches the windbox. The three-inch wind line can be up to 25 or 30 feet long, and often is in theatres where the tremulant is installed in a room adjacent to the organ loft so that the beating noise of the tremulant cannot be heard in the theatre.

The wind line of the tremulant can be connected to the regulator or the pipe chest. The pipe chest merely acts as an extension of the wind line when so connected. The choice is a matter of convenience in making the installation.

The tremulant must operate with an even, smooth rhythm. To repeat: the adjusting slide (6) should be opened to a position where the volume of air escaping from the exhaust balances the amount of air entering the bellows at the pallet opening (5). The use of both springs and weights on the regulator helps to establish the proper rhythm. The exhaust hole controlled by the adjusting slide (6) is always open to some extent. The larger the regulator the larger the tremulant required. The amount of weight (7) depends on the wind pressure used in the organ and the size of the tremulant.

A number of the classic builders used the bellows type tremulant such as described, except that they used springs instead of weights. Where pipe tones are held to nearly exact pitch and the tremolo is only a waver, the springs work well. To theatre organ buffs who own such classic organs, I suggest trading the springs for weights and adjusting the tremulant to a slower beat. This will give a classic organ a bit of theatre organ quality.

Figure 2 shows a "beater" tremulant used on classic organs with pressure up to ten inches. The installation is the same as for the bellows type. The beater is faced with felt and leather. The rush of air from the wind box

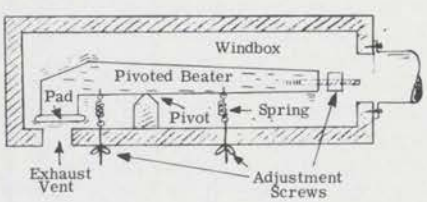

Figure 2. Beater tremulant cross section.

causes the beater to close the exhaust hole thereby stopping the flow of air. The springs then return the beater to its normal position and the operation is repeated. Regulation is made by tightening one spring and loosening the other and moving the weight mounted on a threaded rod at the end of the beater. The beater type is effective on classic organs where the tone is held to nearly exact pitch and the tremolo is a wavering of sound intensity or undulation in the speech of the pipe.

Figure 3 shows a tremulant that is mounted inside a regulator. It is simple in design and used in classic organs of not over five-inch wind pressure. The beater is made of flexible

hard wood. The principle is the same as the "beater" type, the flexible arm bending up and down as the current of air through the exhaust hole draws the beater head down to cover the hole and the spring of the wood returning it to the open position. The adjusting is done by loosening one screw and tightening the other, moving the halfround mounting roller which raises or lowers the beater arm.

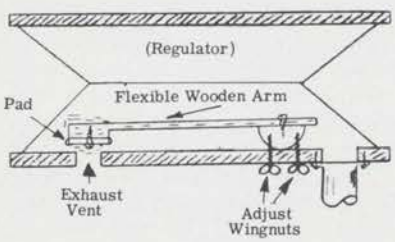

Figure 3. Beater trem inside regulator.

Theatre organ-minded owners of classic organs using beater- or regulator-type tremulants can come nearer to theatre organ sound by changing to bellows-type tremulants.

Every unit organ of ten stops or over has a different vibrato in the celeste effect, a string rank tuned to unison pitch plus a second string rank (of the same scale and tone quality) tuned slightly sharp or flat, usually sharp. When used together the two strings generate a delicate tremolo of lovely vibrant quality and warmth of tone, a beautiful voice when used as a solo stop.

The celeste effect is a vibrato in itself and it is unthinkable for an organist to use the regular tremulant with the Celeste. Why mention it? It has been done in theatres, and on organ recordings. It is "tremoloing" a tremolo, resulting in a "battle of the beats." Use of Celeste relieves the monotony of continual use of the regular tremulant and offers a contrast in the variety of tone colors, which all organists should strive to achieve.

The celeste effect is not confined to strings. Years ago I used a Celeste created from two Oboe Horn ranks. The result was most pleasing and many people thought I had invented a new tonal quality. I have even heard about some hobbyists experimenting with a Tibia Celeste. I didn't hear the result, but it probably would have a somewhat raunchy sound. More power to the enthusiast with the will to experiment. That's how my "Bartolina" voice came into being.

Organ tremulants have been much criticized because they seem too fast. Compared to the vibrato in vocal music or that of violinists or cello players, and even from trombone and trumpet players, the organ vibrato is much faster. An eminent musical authority states, "the organ tremolo is so fast (or deep) that it is impossible for the ear to recognize the true musical tone of the pipes' natural speech."

The Midmer-Losh and Austin organ companies developed tremulants that overcame this criticism. There may be others unknown to the writer. Mr. John Austin invented the universal wind chest, an air-tight room about six feet high, the length of a 73-note straight organ chest and wide enough to accommodate up to 12 ranks of pipes mounted on top of this wind-box. The pipe valves are in the ceiling and all the mechanisms controlling the organ action are inside the box. While the organ is playing, a person can enter the wind chest through an air lock which is a small hallway with an airtight door at either end. Thus the wind chest can be entered for inspection and maintenance of all working parts while the organ is being played.

Because of the volume of air inside the room-size universal chest, the ordinary tremulant cannot be used. Instead, Mr. Austin devised a chamber "fan," a thin board about three feet long and two feet wide, pivoted on an axle in the center, which was mounted directly above the pipes. This fan arrangement was rotated by an electric motor. By using a variable speed control the undulation in the pipe tones could be of the lightest kind, beating as fast or slow as desired. Mr. Austin later perfected an arrangement whereby the tremolo could be created inside the wind chest, because of the lack of sufficient head room encountered in some organ chambers.

Midmer-Losh used a mechanical means that bounced the regulator, light or heavy, fast or slow. There is no exhaust of air from the regulator, consequently the pressure rises and the pipes go sharp instead of flat, as with the usual tremulant. The tremulants on the large seven-manual Midmer-Losh organ in the Atlantic City auditorium are of this design.

Whatever the design, the well-adjusted tremulant is all-important to the theatre organ sound. I hope I have succeeded in penetrating some of the mystery which seems to surround the various adjustments, ranging from shimmer to sob, depending on the ranks involved and the personal taste of the organ buff. His taste is often more refined now than in previous generations but he still likes his Tibias trem'd for maximum sexiness. So do I. □

Reprinted from ***The Bombarde,*** *a quarterly publication of ATOE, Fall, 1965.*