This invention relates to a novel amplifying apparatus of extremely simple construction and which is primarily adapted for use in accordances for accurately picking up and amplifying the tone produced by the reed for both the treble and base side of the accordion.

More particularly, it is an aim of the invention to provide an amplifying apparatus wherein the pickup units are located within the accordion bellows so that no stray sounds will be picked up and amplified and wherein greater gains on the amplifier is accomplished due to the proximity of the pickup to the source of the tone.

A further object of the invention is to provide an amplifier for accordances having novel pickup units mounted in close proximity to the reeds and having diaphragms which are vibrated in response to the tones produced by vibration of the reeds and by means of which mechanical vibrations are transferred mechanically from the diaphragms to crystal elements by means of which the mechanical vibrations are converted to electrical impulses which are carried to the amplifier.

Various other objects and advantages of the invention will hereinafter become more fully apparent from the following description of the drawings, illustrating one presently preferred embodiment thereof, and wherein:

Figure 1 is a side elevational view, partly in section showing the amplifying apparatus applied to an accordion which is illustrated with the bellows thereof removed;

Figure 2 is a top plan view of the accordion with the bellows removed;

Figure 3 is a plan view looking toward the inner side of the treble and base sections of the accordion with the pickup units applied thereto;

Figure 4 is a plan view partly broken away of one of the pickup units shown detached from the accordion;

Figure 5 is an edge elevational view thereof looking from right to left of Figure 4;

Figure 6 is a bottom plan view thereof;

Figure 7 is a cross sectional view of the pickup unit taken substantially along a plane as indicated by the line 7-7 of Figure 4;

Figure 8 is an enlarged longitudinal sectional view taken substantially along a plane as indicated by the line 8-8 of Figure 4; and

Figure 9 is a perspective view of a portion of one of the diaphragms.

Referring more specifically to the drawings, the amplifying apparatus in its entirety is designated generally 10 and is shown in Figures 1, 2 and 3 mounted on a conventional accordion, designated generally 11, which is illustrated with the bellows omitted and which includes a treble side, designated generally 12, and a base side, designated generally 13. The treble and base sides of the accordion 11 have inner walls 14, as best illustrated in Figure 3 in which are mounted reed boxes 15.

The amplifying apparatus 10 includes a treble input unit, designated generally 16, and a base input unit, designated generally 17, which units are secured to the inner walls 14 of the treble and base sides 12 and 13, respectively, of the accordion. The units 16 and 17 are identical in construction and only one of said units will therefore be described in detail. Each of the units 16 and 17 includes a box 18, preferably formed of plastic having rigid strap members projecting laterally from the sides thereof. Said strap members 19 are disposed against an inner side wall 14 and over the reed boxes 15 therein, and are secured to the wall 14 by fastenings 20. As best illustrated in Figures 4 and 5, the strap members 19 are provided with cushioning grommets 21 through which the fastenings 20 extend. Each unit box 18 has an end wall 22 in which a pair of electrodes 23 and 24 are anchored and which extend through said end wall. An adjustment screw 25 is threaded inwardly through the rear wall 26 of each box 18 and is adapted to bear against an adjacent wall of a cartridge 27 containing a crystal element 28. The crystal element 28 is supported adjacent one end thereof in the cartridge 27 by a block of cushioning material 29, preferably rubber, which is fixed within the cartridge 27 adjacent one end thereof and through which an end portion of the crystal element 28 extends. The end of the crystal element 28, located adjacent the block 29 and disposed adjacent the end wall 22, has a pair of conductors 30 and 31 connected thereto and which connect with the electrodes 23 and 24, respectively. The opposite end of the crystal element 28 is mounted in the head 32 of a supporting member 33 and which head forms one end of said supporting member and is disposed adjacent the opposite end of the cartridge 27. The supporting member 33 has an internally threaded sleeve portion 34 forming its opposite end which is mounted for turning movement in a rubber bushing 35. The bushing 35 is disposed in and lines the bore of a boss 36 formed in an end wall 37 of the cartridge 27. The threaded bore of the sleeve 34 communicates at its inner end with a bore 39 which extends through the head 32 and is disposed transversely to the bore of the sleeve 34. The said bore 39 receives an end 40 of an arm, designated generally 41. The arm portion 49 is detachably secured in the bore 39 by a screw 42 which is threaded inwardly through the bore of the sleeve 34 against a portion of the arm 40 to clamp the arm to the head 32. The arm 40 extends from the head 32 through a relatively large opening 43 in the top wall 47 of the cartridge 27 and which opening is located adjacent one end of the cartridge. The arm 41 includes an opposite end 44 which is laterally offset from the arm portion 40 and which is disposed above the cartridge 27 and to one side of the opening 43 thereof and which is provided with a head 45 at its terminal upper end.

A diaphragm 46, preferably of metal foil, is suitably secured in a stretched condition over the open top of the box 18 and the head 45 bears against a portion of the inner side of said diaphragm 46. A pair of screws 48 extend through the cartridge 27, one on either side of the crystal element 28, and have threaded ends which threadedly engage openings 49 in the rear wall 26 of the box 18. An expansion spring 50 is mounted on each screw 48 between the head 51 thereof and the top wall 47 of the cartridge 27. The screws 48 are disposed between the adjustment screws 25 and the end of the cartridge 27 defined by the end wall 37 so that said springs 50 tend to urge the cartridge 27 toward the rear wall 26 to thus displace the head 45 away from the diaphragm 46. However, the screw 25 may be advanced inwardly against the bottom of the cartridge 27 to displace the cartridge away from said bottom wall 26 and to cause the head 45 to bear tighter against the diaphragm 46.

A socket 52 is provided in one end of one of the walls 14, preferably the wall 14 forming a part of the treble
side 12 of the accordion. The said socket 52 is provided with two spring contacts 53 and 54 which electrically engage the two prongs 55 of an electric plug 56 which is detachably mounted in the socket 52. A conductor 57 extends from the spring contact 53 and is connected at its opposite end by a spring or cat whisker of electrical conducting material 58 to the outer end of the electrode 24. A conductor 59 is connected at one end to an end of a conductor 60 by a fastening 61 forming a binding post and which is secured to the upper end of the wall 14 of the treble section 12. The opposite end of the conductor 59 is connected by a conductor spring 62 to the outer end of the electrode 23. The opposite end of the conductor 60 is connected to one end of a conductor 63 by a binding post 64 mounted in the upper end of the wall 14 of the base section 13. The conductor 63 has a conducting spring or cat hair 65 at its opposite end which is connected to an electrode 24a of the pickup unit 17. The other electrode 25a of the unit 17 is connected by a collector conductor 66 to one end of a conductor 67, the opposite end of which is connected to a binding post 68 secured to the lower end of the wall 14 of the base section 13 and which is connected to a binding post 69, similarly secured to the lower end of the other wall 14 by a conductor 70. The conductor 70 is connected by the binding post 69 to one end of a shorter conductor 71 which is electrically connected to the other spring contact 54 of the socket 52. The conductors 60 and 70 comprise contractile springs which accommodate the movement of the accordian section toward and away from one another while maintaining the electrical contact through the input units 16 and 17 to the socket 52. Two conductors 72 which are connected to the prongs 55 extend from the plug 56 through a shielded cable 73 and are connected by two input jacks 74 at their opposite ends to a conventional amplifier 75 which is adapted to be connected by an electric cord and plug unit 76 to a conventional electric outlet.

When the reeds 15 of the two accordion sections are vibrated by the tones resulting from playing of the accordian 11, the true sound of the tones thus produced within the bellows of the accordian, not shown, causes the diaphragms 46 to be vibrated, the diaphragm 46 of the input unit 16 being vibrated by the tones from the reeds 15 of the treble section 12 and the diaphragm 46 of the input unit 17 being similarly vibrated by the tones produced from the reeds 15 of the base section 13. Vibration of each diaphragm 46 thus constitutes a mechanical impulse or force which is imparted to the arm 41 by the head 45 which contacts the diaphragm and thus receives the impulses of the vibrations thereof. The arm 41 is thus rocked to impart oscillating movement to the supporting member 33 which in turn oscillates to thus transmit mechanical impulses to the crystal element 28. The mechanical energy thus transmitted to the crystals 28 is converted thereby to electrical energy. The electrical impulses are carried from the crystals 28 through the circuit previously described and best illustrated in Figure 3 to the high gain amplifier 7f. The pickup units 16 and 17 are shielded by the accordion bellows, not shown, to avoid the picking up of stray sounds and by being mounted directly adjacent the source of the accordion tones will accurately receive and transmit these tones and will provide a maximum gain, not obtainable with the use of a conventional microphone. The responsiveness of the crystal elements to the mechanical impulses received from the diaphragms may be varied by adjustment of the screws 25 to vary the pressure of the heads 45 against the diaphragms 46.

Various modifications and changes are contemplated and may obviously be resorted to, without departing from the spirit or scope of the invention as hereinafter defined by the appended claims.

I claim as my invention:
1. A microphone pickup unit for a musical instrument comprising a supporting housing, a cartridge mounted in said housing, an elongated crystal element, means supporting said crystal element adjacent one end of the element, said crystal element being mounted by said supporting means within the cartridge, a supporting member turnably mounted in said cartridge and connected to and supporting the end of the crystal element disposed remote from said supporting means, said supporting means and supporting member providing the only support for the crystal element, an arm having ends laterally offset relative to one another and an intermediate portion, one of said ends extending loosely through a wall of the cartridge and being connected to said supporting member and disposed with its axis substantially perpendicular to the axis of the crystal element and supporting member, said intermediate portion being disposed with its axis transverse to the axis of the crystal element and supporting member, and a diaphragm responsive to sounds and tones forming one wall of the housing, the other end of said arm being laterally offset from the longitudinal axes of the supporting member and crystal element in a direction crosswise thereof and engaging against an inner side of the diaphragm for imparting a mechanical torque to the supporting member and crystal element when the diaphragm is vibrated.

2. A microphone pickup unit as in claim 1, and manually adjustable means supported by the housing and engaging said cartridge for displacing the cartridge and said arm toward and away from the diaphragm to vary the extent that the vibrations of the diaphragm will be transmitted as mechanical impulses to the crystal element.

3. A microphone pickup unit as in claim 1, spring means disposed within said housing and yieldably urging the cartridge arm away from the diaphragm, and manually actuated means supported by the housing and bearing against the cartridge for displacing the cartridge and arm toward the diaphragm for varying the pressure of the arm on the diaphragm to vary the extent of movement of the arm in response to vibrations of the diaphragm.

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