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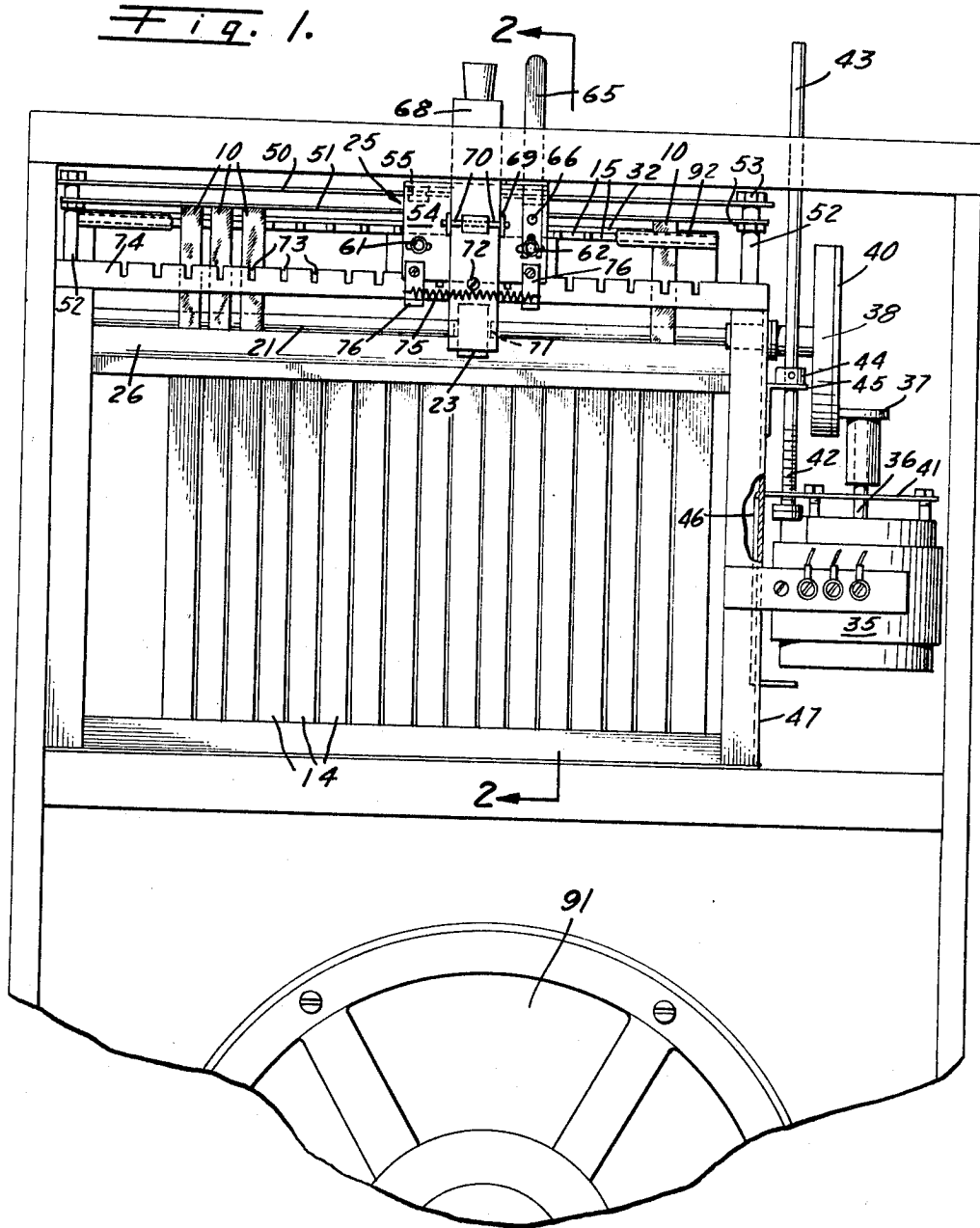
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3,278,188

MULTI-TAPE REPRODUCER WITH SINGLE PICKUP HEAD

Filed Sept. 3, 1963

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

Fig. 2.

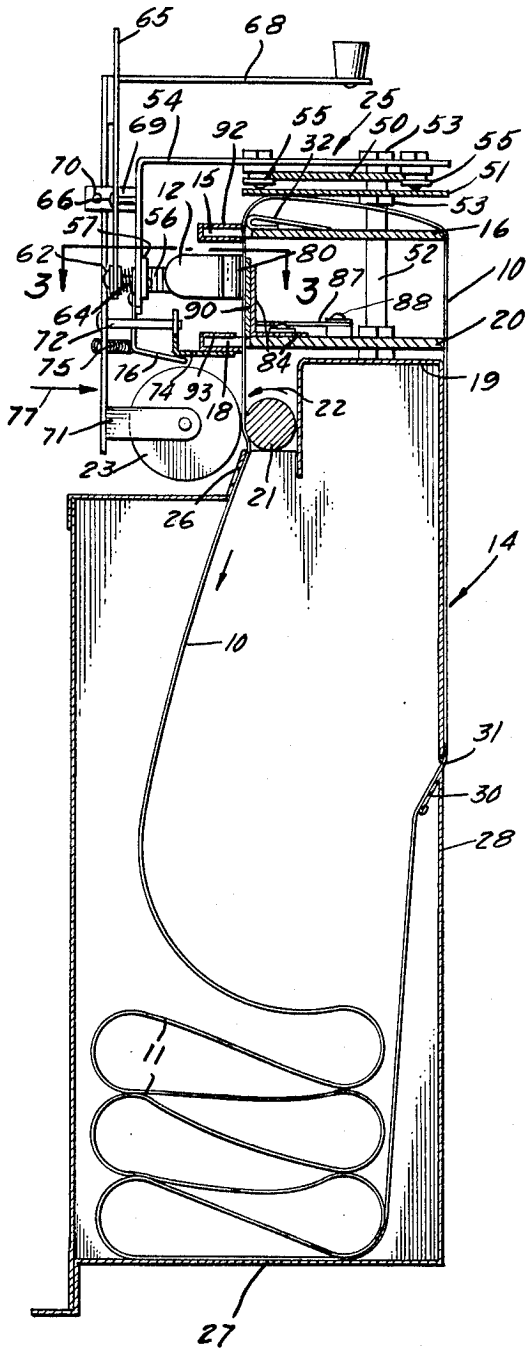
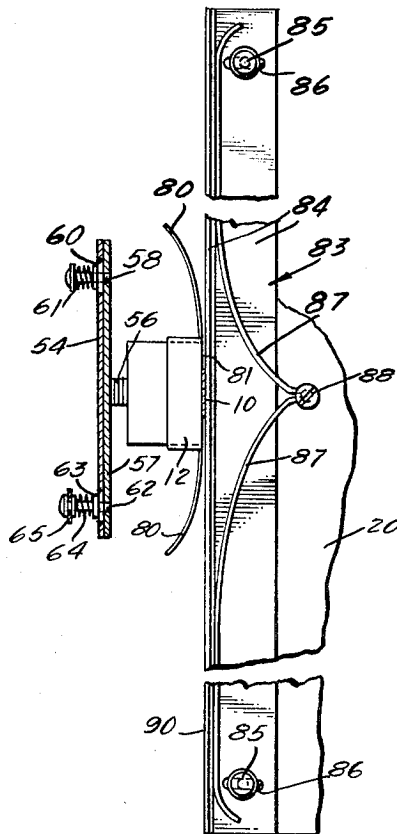


Fig. 3.



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**MULTI-TAPE REPRODUCER WITH SINGLE PICKUP HEAD**

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 6 Claims. (Cl. 274—11)

This invention relates generally to sound reproducing mechanisms and particularly relates to a musical instrument which permits to reproduce a selected musical passage recorded on one of a plurality of magnetic tapes.

The present invention provides a new type of musical instrument which permits to reproduce a particular musical passage such as a rhythm from a plurality of recorded rhythms to accompany a melody played on a conventional instrument such as a guitar, organ or the like. The various rhythms may be recorded by different instruments, preferably percussion instruments such as a kettle drum, snare drum, base drum, cymbal, tambourine, triangle, gong, castanets, glockenspiel, bell, celesta, xylophone or tympany. The various tapes of the instrument of the present invention may have rhythm portions recorded thereon in different tempos suitable for accompanying different types of music such as a fox trot, a waltz and the like. Thus, it is possible to select a rhythm which has been recorded by different instruments or different types of instruments as well as various rhythms of different tempos.

It is accordingly an object of the present invention to provide a musical instrument having a plurality of tapes, each having recorded thereon different passages of music such as rhythms of different instruments or recorded at different tempos and for selecting a desired one of the recorded musical passages.

Another object of the present invention is to provide a musical instrument of the type referred to which has a tape selector for selecting a desired tape and additionally has a track selector for selecting a particular one of several tracks recorded on the same tape. Thus, each of the different tracks of the same tape may have the same tempo but may also be recorded by different instruments.

A further object of the present invention is to provide a musical instrument of the character referred to where the speed of reproduction of each tape may be adjusted within limits to adjust the tempo of the pre-recorded rhythms. Since the pitch or frequency at which percussion instruments are reproduced is of little importance, it is feasible to change the reproduction speed within limits without adversely affecting the quality of the reproduced music.

Still another object of the invention is to provide a carriage having a single pickup head and a single pressure roller movable to select one of a plurality of adjacent tapes for driving the selected tape past the recording head and reproducing the recorded music.

Still a further object of the present invention is to provide a carriage of the type above referred to which additionally has a track selector for moving the pickup head with respect to the locked carriage to position the pickup head adjacent a selected one of a plurality of tracks.

Yet another object of the invention is to provide novel guide means for a tape consisting of a continuous loop to insure a smooth and uninterrupted movement of the tape past the pickup head.

Yet a further object of the present invention is to provide in a musical instrument of the type referred to, a single floating pressure pad for a set of adjacent continuous tapes to insure good contact of a selected tape with the single pickup head.

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In accordance with the present invention there is provided a sound reproducing instrument which includes a plurality of magnetic tapes disposed adjacent to each other. Each of the tapes consist of a continuous loop having sound recorded thereon. For example, the sound recorded on each tape may be a particular rhythm recorded by different instruments or recorded at different tempos. A single pickup head is associated with all of the tapes. Means are provided for positioning the pickup head over a selected tape and for moving the selected tape with respect to the pickup head.

To this end, there may be provided a movable carriage which carries the single pickup head and a pressure roller. The carriage may be moved over tracks to select a particular tape and may then be locked. This presses the pressure roller against a continuously driven drive roller to move the selected tape past the pickup head.

Additionally, there may be provided a track selector for moving the pickup head with respect to its locked carriage to position the head with respect to one of several tracks such as three tracks.

The novel features that are considered characteristic of this invention are set forth with particularity in the appended claims. The invention itself, however, both as to its organization and method of operation, as well as additional objects and advantages thereof, will best be understood from the following description when read in connection with the accompanying drawings, in which:

FIG. 1 is a front elevational view, parts being broken away, and illustrating an embodiment of the musical instrument of the present invention;

FIG. 2 is a side elevational sectional view taken on line 2—2 of FIG. 1 and illustrating particularly the carriage with its pickup head and pressure roller for reproducing sound from a selected tape; and

FIG. 3 is a sectional top plan view taken on line 3—3 of FIG. 2 and illustrating particularly the floating pressure pad common to all tapes and the runners on the pickup head for insuring smooth contact between any selected tape and the pickup head.

Referring now to the drawings there is illustrated a musical instrument embodying the present invention. The instrument has a plurality of tapes 10 disposed adjacent to each other. Each of the tapes 10 is continuous and may, for example, have a length of 6 feet. The normal tape speed may be 7.5 inches per second so that the entire tape is played in 9.6 seconds. However, as will be shown subsequently, the speed at which the tape is moved is adjustable.

Preferably, each of the tapes has more than one track. For example, each tape may be provided with three separate tracks. Preferably, each tape has recorded thereon various rhythms which can be reproduced continuously. In other words, the same rhythm repeats as long as the tape is played. Preferably, the rhythms recorded on the different tracks of a particular tape have the same tempo or double tempo but they may be recorded with different instruments. Since the instrument of the invention only has a single pickup head 12, it is necessary to position the head 12 with respect to a selected tape. This is accomplished by a mechanism which may be referred to as a tape selector. In addition, it is necessary to select one of the several tracks such as three tracks recorded on each tape. This is accomplished by a track selector.

For example, it is feasible to record rhythms with different tempos on the different tapes. The three rhythm portions recorded on the three tracks of a single tape may have the same tempo but may be recorded with different instruments to obtain different musical effects.

Before describing the tape selector and the track selector and the drive for the tapes, it may be convenient to first describe the path of one of the tapes through the

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instrument. As shown particularly in FIG. 2, the main portion of the tape 10 is contained in a tape tank generally indicated at 14. The tape 10 forms loops in the bottom of the tank 14 as indicated at 11.

Starting from the top, the tape first moves past a rectangular cutout 15 in an upper support 16 secured by posts 52 to a horizontal portion 19 of the tape tank 14. Subsequently, the tape moves past the pickup head 12 and passes through a similar rectangular cutout 18 in a lower support 20, also secured to the horizontal tank portion 19. Then the tape 10 moves past a drive roller 21 which, as clearly shown in FIG. 1, extends across the path of all the tapes 10. The drive roller 21 rotates in a counterclockwise direction as viewed in FIG. 2 and shown by the arrow 22, thus driving the tape downwardly into the tank 14. Disposed adjacent to the drive roller 21, there is a pressure roller 23 mounted on a pickup carriage generally indicated at 25. Since there is only a single pressure roller 23, only the selected tape is moved by being pressed against the drive roller 21 while the other tapes remain stationary.

The tape tank 14 has an upwardly extending guide lip 26 which guides the tape 10 away from the pressure roller 23 and into the tank 14 where the tape sinks to the bottom and forms loops 11. The tape rests on the bottom 27 of the tape tank.

Extending approximately midway from the rear wall 28 of the tape tank 14 is another guide lip 30. Adjacent to the guide lip 30 is a slot 31 to permit the tape 10 to leave the tape tank 14.

After a tape has been played for some time it may have a tendency to form loops near the exit slot 31 due to electrostatic charges. The guide lip 30 serves the purpose to prevent said loops from being pulled through the slot 31 and thus prevents entangling of the tapes. The tape then travels along the rear wall 28 of the tape tank past the lower support 20 and the upper support 16. The tape then loops about the upper support 16 and is guided by an upper tape guide 32 which may, for example, consist of a turned-over piece of sheet metal as shown. Opposite the tape guide 32 there may be provided a tape retainer 92 on the upper support 16. The tape is then fed between the tape guide 32 and tape retainer 92, toward the pickup head 12 and prevents the tape from looping out before it enters the pickup head and the drive roller.

It may be noted that the two sets of cutouts 15 and 18 in the upper and lower supports 16 and 20 respectively, serve the purpose to space the respective tapes 10 from each other and assure that the tapes move in spaced-apart, adjacent relationship. The tape may also be retained below the pickup head 12 by a lower tape retainer 93 on the lower support 20 and by an L-shaped bracket 74.

The drive roller 21 is driven by an electric motor 35 (see FIG. 1) having a vertical drive shaft 36 to which is secured a horizontal drive wheel 37. The drive wheel 37 cooperates with the outer flat rubber surface 40 of a vertical drive wheel 38 secured to the drive roller 21. Accordingly, the drive wheel 37 engages the flat rubber surface 40 of the wheel 38.

In accordance with the present invention, the speed with which the drive roller 21 is driven and hence the selected tape is moved, may be adjustable. To this end, the electric motor 35 is secured to a horizontal plate 41 by rubber grommet mounts to minimize vibration through which extends in threaded relationship a screw 42. The screw 42 may be connected to a drive rod 43 which may have a control knob, not shown, for rotating the screw 42. The drive rod 43 has a head 44 which rests on an L-shaped bracket 45 secured to a fixed frame 47. Accordingly, when the drive rod 43 is rotated, the plate 41 is either lifted or lowered. As a result, the radius on which the drive wheel 37 acts may be increased or decreased thereby decreasing or increasing the speed of the drive roller 21.

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The motor 35 may be guided by a vertical bracket 46 which may be made integral with the horizontal top plate 41 of the motor and which slides along the fixed frame 47. The frame 47 has suitable slots to permit the bracket 46 with the motor 35 to move up and down as required.

As a result of this adjustment, the nominal speed of the tape of 7.5 inches per second may be increased or decreased, within predetermined limits thereby to increase or decrease the tempo of the rhythm which has previously been recorded on the tapes.

The tape and track selector mechanisms will now be described. The tape selector includes the carriage 25. The carriage 25 is adapted to reciprocate across the various tapes 10 by means of track 50 secured to the horizontal portion 19 of the tape tank 14 and the frame 47 by means of the posts 52 having suitable nuts 53 for maintaining the track 50 in spaced relationship. A plate 51 is spaced from the track 50 by the posts 52 and nuts 53 and serves the purpose of preventing the carriage 25 from cutting on one of the tapes when the carriage is reciprocated to select a tape. The carriage 25 includes an L-shaped bracket 54 having four fixed grooved guides 55 which may be of Teflon or any other low-friction materials. The guides 55 run along the front and rear edges of the track 50.

The pickup head 12 is adjustably carried on the L-shaped bracket 54 of the carriage 25. Thus, as clearly shown in FIG. 3, the pickup head 12 is secured by a screw 56 to a slidable plate 57. A rivet 58 (see particularly FIG. 3) is secured to one end of the slidable plate 57 and extends through a slot 60 in the bracket 54 and is held yieldably against the plate 54 by a spring 61 which bears against the head of the rivet 58. At the other end of the slidable plate 57, another rivet 62 is secured to the plate 57 and extends through a slot 63 in the bracket 54. A spring 64 again yieldably retains the plate 57 against the bracket 54 by bearing against the head of rivet 62.

A lever 65 is pivoted at 66 to the bracket 54. The lower end of the lever 65 is bifurcated to form a slot through which extends the screw 62. Thus, by moving the lever 65 to the right or left as viewed in FIG. 1, the slidable plate 57 may be moved downwardly or upwardly as shown in FIG. 3, or to the right or left as shown in FIG. 1 to adjust the pickup head 12 with respect to the tracks on the tape 10. This permits to select one of the three or more tracks recorded on each of the tapes 10. If desired, a track indicator may be mounted adjacent the upper end of the lever 65 to indicate, for example, the selected one of the three tracks.

The carriage 25 is provided with a locking mechanism for locking the carriage in a selected position with respect to one of the tapes 10. This locking mechanism also carries the pressure roller 23. The locking mechanism includes an L-shaped lever 68 extending above the carriage 25. The lever 68 may have an actuating knob as shown and is pivoted by a pin 70 held by ears 69 on the bracket 54 to permit clockwise movement of the lever 68 with respect to the bracket 54 as viewed in FIG. 2. The lower end of the L-shaped lever 68 carries a fork 71 extending therefrom and in which the pressure roller 23 is rotatably mounted. In addition, the lower portion of the pivoted lever 68 carries a pin 72 which may, for example, be secured to the lever 68 by a screw and extends therefrom. The pin 72 cooperates with slots 73 provided in the L-shaped bracket 74 which is secured to the platform or support 20. The locations of the slots 73 correspond to that of the tapes so that the rod 72 may engage one of the slots 73 to lock the carriage in position with respect to one of the tapes 10.

A spring 75 has its ends secured to two generally L-shaped brackets 76. Each of the brackets 76 has one end secured to the carriage bracket 54. The spring 75 extends across the lever 68 and hence urges it to rotate or move in a counterclockwise direction as shown by the arrow 77 in FIG. 2.

Thus, it will be seen that any particular tape can be selected in the following manner:

At first, the upper portion of the lever 68 is depressed to rotate the lever in a clockwise direction as viewed in FIG. 2. This will disengage the rod 72 from its slot 73 and will remove the pressure roller 23 from the drive roller 21. Thereupon, the carriage 25 may be moved to the right or left as viewed in FIG. 1 to select a particular tape 10. After the carriage 25 is in position, the lever 68 is released whereupon the spring 75 will rotate the lever in a counterclockwise direction. As a result, the rod 72 engages one of the slots 73 and the pressure roller 23 engages the drive roller 21.

The selected tape is now driven by the electric motor 35. It will be appreciated that only the selected tape moves while the other tapes are unable to move because they are not pressed by a pressure roller against the drive roller 21. The particular track that it is desired to play may be selected by rotation of the lever 65 as previously described.

The pickup head 12 is provided with two laterally extending runners 80 as clearly shown in FIG. 3. The center portion of the two runners 80 are preferably flush with the recording surface 81 of the pickup head 12; then each runner 80 curves gradually away from the tape as shown. The purpose of the runners 80 is to smooth the tape 10 when the carriage 25 is reciprocated over the tapes. Thus, they insure that any tape will smoothly move between one of the runners 80 and across the recording surface 81 of the pickup head 12 without being crumpled or without danger of looping of the tape.

The respective tapes 10 are pressed against the pickup head 12 by a single floating pressure pad generally indicated at 83 and illustrated particularly in FIG. 3. To this end, there is provided a rigid bracket 84 which may be of L-shape, as shown, and which is secured by two screws 85 at either end of the bracket 84, to the support 20. However, as clearly shown in FIG. 3, the bracket 84 is provided with two elongated slots 86 at either end so that the entire bracket can pivot with respect to the support 20 or move away from or toward the pickup head 12. A leaf spring 87 is secured to the support 20 by a screw 88. The free ends of the spring 87 bears against the upright portion of the bracket 84. The outer surface of the bracket 84 is provided with a yieldable pad 90 which may, for example, consist of felt.

This arrangement provides a floating pressure pad for pressing any selected tape 10 against the pickup head 12. Since the pressure pad is floating and is able to pivot about the two slots 86 against the pressure of the spring 87, a substantially uniform pressure may be maintained between any selected tape 10 and the single pickup head 12.

It will be understood that the sound picked up by the head 12 may be reproduced in a conventional manner. Thus, an audio amplifier may be connected to the output of the pickup head 12 and may in turn be connected to a loudspeaker 91 shown in FIG. 1.

While the various tapes 10 preferably have recorded thereon, various rhythms, it will be understood that the tapes 10 may also have other pieces of music continuously recorded thereon.

The operation of the instrument of the invention will now be obvious. A particular tape is selected by unlocking the carriage 25 by rotating the lever 68 in a clockwise direction. This may be accomplished by pressing down the actuating knob on the lever 68. Thereafter, the carriage may be moved back or forth along the row of tapes to select a desired tape. Thereafter, the carriage is locked by releasing the lever 68. As a result, the pressure roller 23 presses against the drive roller 21 so that the tape is driven downwardly. Any one of the three or more tracks recorded on the tape may be selected by rotation of the track selector lever 65. The tape 10 is continuous and hence the selected rhythm will be placed continuously until another track or another tape is selected.

The tape is guided between the upper tape guide 32 and the upper tape retainer 92 and between the lower tape guide 26 and the bracket 74 or the lower tape retainer 93 to insure smooth movement of the tape without the possibility of the tape looping over or being caught on one of the rollers 21 or 23. In addition, this arrangement insures that the tape is pressed against the pressure pad 83.

The runners 80 insure that the carriage may be moved past all the tapes without fouling up any one of the tapes. Finally, the floating pressure pad 23 insures uniform pressure of any selected tape against the pickup head 12.

It will also be understood that the various tapes 10 may be numbered or any indicator may be provided to facilitate selection of any desired tape. Furthermore, the adjustment rod 43 may also be provided with an indicator to indicate the speed with which the drive roller 21 is driven which in turn determines the tempo of the recorded piece. For example, the indicator for the adjustment rod 43 may be calibrated in the manner of a metronome.

The invention and its attendant advantages will be understood from the foregoing description. It will be apparent that various changes may be made in the form, construction and arrangement of the parts of the invention without departing from the spirit and scope thereof or sacrificing its material advantages, the arrangement hereinbefore described being merely by way of example. I do not wish to be restricted to the specific form shown or uses mentioned except as defined in the accompanying claims, wherein various portions have been separated for clarity of reading and not for emphasis.

I claim:

1. In a musical instrument, a sound reproducing mechanism including:

- (a) a plurality of magnetic tapes disposed adjacent to each other, each of said tapes consisting of a continuous loop, each tape having a plurality of separate tracks having sound recorded thereon;
- (b) a single drive roller extending across the path of said tapes;
- (c) controllable means for rotating said drive roller at a selected speed;
- (d) a carriage movable across the path of said tape;
- (e) a single pickup head on said carriage;
- (f) a pressure roller on said carriage;
- (g) means for selectively unlocking said carriage and for locking it in a desired position and for moving said pressure roller out of engagement and into engagement with said drive roller for driving a selected tape and reproducing sound therefrom; and
- (h) means for adjusting the relative position of said pickup head with respect to said tape to select a desired one of the tracks recorded thereon.

2. In a musical instrument, a sound reproducing mechanism including:

- (a) a plurality of magnetic tapes disposed adjacent to each other, each of said tapes consisting of a continuous loop, each tape having a plurality of separate tracks having sound recorded thereon;
- (b) a single drive roller extending across the path of said tapes;
- (c) means for rotating said drive roller;
- (d) a carriage movable across the path of said tape;
- (e) a single pickup head on said carriage;
- (f) a pressure roller;
- (g) means pivoted to said carriage and carrying said pressure roller for selectively unlocking said carriage and for locking it in a desired position and for moving said pressure roller out of engagement and into engagement with said drive roller for driving a selected tape and reproducing sound therefrom; and
- (h) additional means pivoted to said carriage and operably connected to said pickup head for adjusting the relative position of said pickup head with respect

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to said tape to select a desired one of the tracks recorded thereon.

3. In a musical instrument, a sound reproducing mechanism including:

- (a) a plurality of magnetic tapes disposed adjacent to each other, each of said tapes consisting of a continuous loop having sound recorded thereon; 5
- (b) a single drive roller extending across the path of said tapes;
- (c) means for rotating said drive roller; 10
- (d) a carriage movable across the path of said tapes;
- (e) a single pickup head on said carriage;
- (f) a runner extending laterally from each side of said pickup head across said tape and having a center portion substantially flush with the recording surface of said head; 15
- (g) a pressure roller on said carriage; and
- (h) means for moving said carriage into a selected position and for engaging said pressure roller with said drive roller to move a selected tape. 20

4. In a musical instrument, a sound reproducing mechanism including:

- (a) a plurality of magnetic tapes disposed adjacent to each other, each of said tapes consisting of a continuous loop having sound recorded thereon; 25
- (b) a single drive roller extending across the path of said tapes;
- (c) means for rotating said drive roller;
- (d) a carriage movable across the path of said tapes;
- (e) a single pickup head on said carriage positioned to reproduce sound from a selected tape; 30
- (f) a runner extending laterally from each side of said pickup head and having a center portion substantially flush with the recording surface of said head for smoothing the tapes past said pickup head when said carriage is moved past said tapes; 35
- (g) a pressure roller on said carriage; and
- (h) means for engaging said pressure roller with said drive roller to move a selected tape. 40

5. In a musical instrument, a sound reproducing mechanism including:

- (a) a plurality of magnetic tapes disposed adjacent to each other, each of said tapes consisting of a continuous loop having sound recorded thereon; 45
- (b) a single drive roller extending across the path of said tapes;
- (c) means for rotating said drive roller;
- (d) a carriage movable across the path of said tapes;

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- (e) a single pickup head on said carriage;
- (f) a runner extending laterally from each pickup head and having a center portion substantially flush with the recording surface of said head;
- (g) a pressure pad extending across said tapes and pivotally mounted on a fixed element;
- (h) spring means urging said pressure pad against said tapes and said pickup head;
- (i) a pressure roller on said carriage; and
- (j) means for moving said carriage into a selected position and for engaging said pressure roller with said drive roller to move a selected tape.

6. In a musical instrument, a sound reproducing mechanism including:

- (a) a plurality of magnetic tapes disposed adjacent to each other, each of said tapes consisting of a continuous loop, each tape having a plurality of separate tracks having sound recorded thereon;
- (b) a single drive roller extending across the path of said tapes;
- (c) means for rotating said drive roller;
- (d) a carriage movable across the path of said tapes;
- (e) a single pickup head on said carriage;
- (f) a plate disposed between said carriage and said tapes to prevent movement of said carriage without interference with said tapes;
- (g) a pressure roller;
- (h) means pivoted to said carriage and carrying said pressure roller for selectively unlocking said carriage and for locking it in a desired position and for moving said pressure roller out of engagement and into engagement with said drive roller for driving a selected tape and reproducing sound therefrom; and
- (i) additional means pivoted to said carriage and operably connected to said pickup head for adjusting the relative position of said pickup head with respect to said tape to select a desired one of the tracks recorded thereon.

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