

AUTOMATIC TELEPHONE ANSWERING APPARATUS

The present invention relates to an automatic telephone answering apparatus and, more particularly, to an improvement in a tape drive mechanism therefor. A conventional telephone answering apparatus generally has outgoing message tape (endless tape) and
5 incoming message tape (general take-up type cassette tape), and operates by alternately driving these tapes.

The conventional telephone answering apparatus of this type uses two general cassette tape deck mechanisms and a common motor, so that the rotation of the motor may not be transmitted to a
10 take-up spindle of the incoming message tape during the driving period of the outgoing message tape. Examples of the conventional telephone answering apparatus include a telephone answering apparatus described in U.S.P. No. 3,959,591 wherein an idler interposed
15 between the common motor and the take-up roller for the incoming message tape is displaced by a particular plunger coil; or a telephone answering apparatus as described in U.K.P. No. 1,453,948 wherein two pulleys acting in opposite directions are mounted to the shaft
of the common motor through a unidirectional rotary clutch, and a belt is mounted on these pulleys, the outgoing message tape
20 drive flywheel, and the incoming message tape drive flywheel.

However, the former apparatus uses a particular plunger coil, so extra wiring is necessary. Therefore, the apparatus becomes

complex in structure and expensive to manufacture. On the other hand, with the latter apparatus, the unidirectional rotary clutch is easy to break. Therefore, the operation of the apparatus is less reliable and the apparatus requires a mechanism for reversing the direction of rotation of the motor.

According to the invention there is provided an automatic telephone answering apparatus having an outgoing message tape drive mechanism; an outgoing message tape switching mechanism for switching between operative and inoperative conditions of said outgoing message tape drive mechanism; an incoming message tape drive mechanism having a playback mechanism and a rewinding mechanism; an incoming message tape switching mechanism for switching said incoming message tape drive mechanism between the playback and rewinding operations; a single common motor driving said outgoing message tape drive mechanism and said incoming message tape drive mechanism; and an inhibiting mechanism for inhibiting the rewinding operation of incoming message tape while said outgoing message tape drive mechanism is in operation, characterized in that said inhibiting mechanism has an escape mechanism which interrupts transmission of rotational power from said common motor to said incoming message tape drive mechanism in mechanical cooperation with the operation of said outgoing message tape switching mechanism.

The invention will be described by way of example with reference to the accompanying drawing, which is a plan view of the main part of an embodiment of the present invention.

Referring to the drawing, an incoming message tape cassette B
5 and an outgoing message tape cassette C are mounted on a tape deck A. The outgoing message tape cassette C has the same outer shape as the incoming message tape cassette B but houses an endless tape thereon. A motor 1 has a motor pulley 2 to which is mounted an outgoing message tape belt 3 and an incoming message tape belt
10 4. The belt 3 extends over an outgoing message tape drive flywheel 5, while the belt 4 extends over an incoming message tape drive flywheel 6. To the flywheel 5 is mounted an outgoing message tape drive capstan 7 which also functions as a central shaft. To the flywheel 6 is mounted an incoming message tape capstan
15 8 which also functions as a central shaft. A bracket 53 is pivotally mounted to an outgoing message tape slide plate 14 and the bracket 53 is pressed by a spring 52 towards the outgoing message tape capstan 7. The bracket 53 supports an outgoing message tape pinch roller 9. A bracket 55 is pivotally mounted to an incoming message
20 tape slide plate 24 and the bracket is pressed by a spring 54 towards the incoming message tape capstan 8. The bracket 55 supports an incoming message tape pinch roller 10.

On the tape deck A are mounted an outgoing message tape plunger

coin or solenoid coil 11 which displaces a mechanism for pressing the outgoing message tape pinch roller 7 against the outgoing message tape capstan 9 for driving the tape of the outgoing message tape cassette C. The coil 11 has an outgoing message tape plunger or armature 12 which is pulled toward the coil 11 during each operative period thereof. The plunger 12 has, at its front end, the outgoing message tape slide plate 14 which is coupled by pins 56 and 57 and which is biased by a spring 13. The slide plate 14 has an oblong part-circular-ended hole 15. A pin 16 for limiting the range of sliding movement of the slide plate 14 is mounted on the tape deck A and engages in hole 15. The bracket 53 for supporting the outgoing message tape pinch roller 9 is supported at one point at the front end of the slide plate 14. A record/playback head 51 for the outgoing message tape to be described later is arranged in front of the slide plate 14. An incoming message tape plunger coil or solenoid coil 21 for actuating the incoming message tape drive mechanism is arranged on the tape deck A. An incoming message tape plunger or armature 22 to which is mounted one end of a spring 23 is arranged inside the plunger coil 24. The other end of the spring 23 is coupled to the slide plate 24 which transversely moves. The slide plate 24 also has an oblong part-circular-ended hole 25. A pin 26 for limiting the range of movement of the slide plate 24 is arranged on the deck A and engages in hole 25. A spring 27 is mounted to the slide plate 24 so as to control the movement thereof. A record/playback head 50 is fixed to the slide plate 24.

A drive pulley 30 to which rotational force is transmitted from the motor pulley 2 through the belt 4 is arranged on the tape deck A. The drive pulley 30 is supported by a shaft 58 which also supports a roller 33. The shaft 58 is supported by a T-shaped support plate 59 which consists of shaft support plates 31 and 32. The support plate 59 is supported on the tape deck A by a central shaft 34. The T-shaped support plate 59 is biased counterclockwise by a spring 35. The support plate 59 engages with a front end of the incoming message tape slide plate 24 which is operated by the incoming message tape plunger coil 21. When the slide plate 24 pivots the shaft support plate 32 of the T-shaped support plate 59 clockwise, the roller 33 is separated from an incoming message tape take-up roller 61 to engage an idler 60 which is, in turn, in contact with a rewinding roller 40. However, when the slide plate 24 is displaced to the position indicated by the alternate one long and two short dashed line, that is, when the plunger 21 acts to move the incoming message tape slide plate 24 to the left, the roller 33 is brought into position to engage the take-up roller 61 by the spring 35 as indicated by the alternate one long and two short dashed line. In this case, since the pulley 30 rotates clockwise about the shaft 34, the roller 33 which is concentric therewith also rotates clockwise as indicated by the arrow. Then, the roller 33 contacts with the take-up roller 61 which is concentric with an incoming message tape take-up spindle 41 to be described later, so that rotational force is transmitted to the take-up roller 61 which then rotates counterclockwise i.e. in the direction indicated by the arrow.

The description has been made on the playback mode of the incoming message tape. When the incoming message tape plunger coil 21 stops operating, the incoming message tape slide plate 24 is brought to the position indicated by the solid line by the spring 27.

- 5 Then, the incoming message tape pinch roller 10 is separated from the incoming message tape capstan 8, and the record/playback head 50 for the incoming message tape is also separated from the incoming message tape. The roller 33 moves to the position indicated by the solid line, so that the rotational force of the roller 33
- 10 is transmitted to the rewinding roller 40 through the idler 60 so as to rotate the rewinding roller 40 in the rewinding direction, i.e. clockwise. In this manner, the incoming message tape is rewound.

- In the incoming message tape drive mechanism of the construction
- 15 as described above, as may be seen from the figure, if the motor 1 alone is energized, the incoming message tape slide plate 24 is at the position indicated by the solid line. Therefore, the roller 33 which is concentric with the drive pulley 30 transmits rotational force to the rewinding roller 40 through the idler
- 20 60 to rewind the tape. On the other hand, when the incoming message tape is to be driven in the forward direction, the incoming message tape plunger 21 acts to bring the incoming message tape slide plate 24 to the position indicated by the alternate one long and two short dashed line. Therefore, the roller 33 moves to the
- 25 position indicated by the alternate one long and two short dashed line. In this case, as has been described above, rotational force

is transmitted to the take-up roller 61 which is concentric with the take-up spindle 41 so as to take up the tape at the normal speed. Describing the drive mechanism of the outgoing message tape, when the outgoing message tape plunger coil 11 is energized, the outgoing message tape slide plate 41 is pulled toward the coil 11. Then, the outgoing message tape pinch roller 9 is pressed against the outgoing message tape capstan 7 to drive the outgoing message tape. As is well known, since an endless tape is used, the tape can be driven by the contact between the pinch roller and the capstan even if the take-up reel and the supply reel are not incorporated. One problem with this is as follows. When the outgoing message tape plunger coil 11 is energized to drive the outgoing message tape, the motor 1 is rotating. Therefore, the rotation of the motor 1 is transmitted not only to the outgoing message tape drive flywheel 5 but also to the incoming message tape drive flywheel 6. That is, the drive pulley 30 is driven since it is in contact with the belt 4. Since the drive pulley 30 is at the position indicated by the solid line in this instance, the rotation is transmitted to the rewinding roller 40, so that the incoming message tape may be rewound while the outgoing message tape is driven. If this occurs, the incorporation of the separate drive mechanisms for the incoming and outgoing message tapes become meaningless.

The embodiment according to the present invention has a support _____

shaft 38 of a support plate 37 which supports the idler 60, and a spring 39 which pulls the support plate 37 to rotate it counterclockwise. By these members, the idler 60 is normally pressed against the rewinding roller 40. The idler 60 is disengaged from the rewinding roller 40 by clockwise pivoting of the support plate 37 by means of a pivot plate 42 which functions as a cam. More specifically, the pivot plate 42 is pivotally supported by a shaft 43. The lower end of the pivot plate 42 is coupled by a pin 57 to the outgoing message tape slide plate 14 which is operated by the outgoing message tape plunger coil 11. When the slide plate 14 moves in the direction indicated by the arrow, the pivot plate 42 slightly pivots counterclockwise about the shaft 43. A part-circular cam face is formed at the front end of the pivot plate 42, and is engaged with the support plate 37. When the pivot plate 42 transversely pivots about the shaft 43, the pivot plate 42 slightly presses upward the underside of the support plate 37 supporting the idler 60 so as to disengage the idler 60 from the rewinding roller 40 against the biasing force of the spring 39. The pivot plate 42 has a notch to prevent the engagement with the central shaft of the rewinding roller 40.

In an automatic telephone answering apparatus, an announcement (outgoing message) is generally recorded in the manual record/playback mode on the outgoing message tape for monitoring. In this case, the incoming message tape is not involved in the operation. When the subscriber returns home to listen to the recorded content of the calling party on the incoming message tape, the incoming

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9

message tape plunger 21 and the motor 1 alone are actuated. Then, the roller 33 is pressed against the take-up roller 61 which is concentric with the take-up reel to drive the tape in the forward direction. In this case, the outgoing message tape must not be driven. When a telephone call is received, the outgoing message tape is driven. While the outgoing message tape is driven, the incoming message tape is not driven. When the terminal end of the outgoing message tape is detected, the operation of the outgoing message tape plunger 11 is interrupted and the incoming message tape plunger 21 is energized, so that the incoming message tape is now driven. If the incoming message tape runs even slightly while the outgoing message tape is driven, it is not desirable. Similarly, the outgoing message tape must not run while the incoming message tape is driven.

15 According to the embodiment of the present invention, when the outgoing message tape plunger 11 moves, the pivot plate 42 always pivots counterclockwise to disengage (escape) the idler 60 from the rewinding roller 40 while the outgoing message tape is driven. Therefore, even if the rotational force is transmitted from the common motor 1 to the pulley 33 through the belt 4, the incoming message tape cannot be affected.

If fast forward is desired during the forward drive of the incoming message tape, the capstan is disengaged from the pinch roller in the normal playback operation by the manual lever.

In the description presented above, the recording part, that is, the head, and the amplifying part are not described. However, it is to be understood that they are of conventional arrangement.

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Claims:-

1. An automatic telephone answering apparatus having an outgoing message tape drive mechanism; an outgoing message tape switching mechanism for switching between operative and inoperative conditions of said outgoing message tape drive mechanism; an incoming message tape drive mechanism having a playback mechanism and a rewinding mechanism; an incoming message tape switching mechanism for switching said incoming message tape drive mechanism between the playback and rewinding operations; a single common motor driving said outgoing message tape drive mechanism and said incoming message tape drive mechanism; and an inhibiting mechanism for inhibiting the rewinding operation of incoming message tape while said outgoing message tape drive mechanism is in operation, characterized in that said inhibiting mechanism has an escape mechanism which interrupts transmission of rotational power from said common motor to said incoming message tape drive mechanism in mechanical cooperation with the operation of said outgoing message tape switching mechanism.

2. An apparatus according to claim 1, wherein said outgoing message tape drive mechanism comprises an outgoing message tape belt which is mounted to a motor pulley of said common motor and an outgoing message tape drive flywheel with an outgoing message tape capstan mounted thereon, and an outgoing message tape pinch roller which in operation is pressed against said outgoing message tape capstan.

12



3. An apparatus according to claim 1 or 2, wherein said outgoing message tape switching mechanism comprises an outgoing message tape slide plate which is coupled to an outgoing message tape plunger or armature operable by an outgoing message tape plunger coil or solenoid coil and which has an outgoing message tape pinch roller.

4. An apparatus according to claim 1, 2 or 3, wherein said playback mechanism consists of an incoming message tape belt which is mounted to a motor pulley of said common motor and an incoming message tape drive flywheel with an incoming message tape capstan mounted thereon, an incoming message tape pinch roller pressed against said incoming message tape capstan, a drive pulley to which rotational power is transmitted through said incoming message tape belt, a roller supported by a shaft which also supports the last-mentioned drive pulley, and a take-up roller operative in cooperation with said roller, and said rewinding mechanism consists of a rewinding roller operative in cooperation with said roller through an idler.

5. An apparatus according to claim 1, 2, 3 or 4, wherein said incoming message tape switching mechanism comprises an incoming message tape slide plate which is coupled to an incoming message tape plunger or armature operable by an incoming message tape plunger coil or solenoid coil and which has an incoming message tape pinch roller, and a support plate which engages with said incoming message tape slide plate and which supports a shaft of a roller and said drive pulley for switching between transmission



of rotational power from said roller to a take-up pulley and transmission of rotational power from said roller to a rewinding roller.

6. An apparatus according to claim 1, wherein said outgoing message tape switching mechanism comprises an outgoing message tape slide plate which is coupled to an outgoing message tape plunger or armature operable by an outgoing message tape plunger coil or solenoid coil; an incoming message tape switching mechanism comprises an incoming message tape slide plate which is coupled to an incoming message tape plunger or armature operable by an incoming message tape plunger coil or solenoid coil and which has an incoming message tape pinch roller, and a support plate which engages with said incoming message tape slide plate and which supports a shaft of a roller and said drive pulley for switching between transmission of rotational power from said roller to a take-up pulley and transmission of rotational power from said roller to a rewinding roller; and said escape mechanism comprises a pivotal plate which is coupled to said outgoing message tape slide plate and which has a cam at a front end thereof, and a pivotal support plate which engages with said pivot plate and which supports an idler interposed between said roller and said take-up pulley.