

PATENT SPECIFICATION

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(54) STORAGE RECEPTACLE FOR MAGNETIC TAPE CASSETTE

- (71) We, SONY CORPORATION, a Japanese Body Corporate of 7-35 Kitashinagawa 6-chome, Shinagawa-ku, Tokyo, Japan, do hereby declare the invention for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—
- 5 This invention relates generally to storage receptacles for magnetic tape cassettes, and more particularly is directed to improvements in receptacles suitable for storing magnetic tape cassettes in a manner such that each cassette is enclosed in an individual compartment or space and protected from dirt, dust and the like.
- 10 Many types of storage receptacles for magnetic tape cassettes have been proposed. For example, in U.S. Patent No. 3,904,259 a magnetic tape cassette storage container is disclosed to include a generally rectangular casing having an opening along one of its sides through which the cassette itself is slidably inserted in, and removed from the casing. A pivoted door is provided for closing the open side of the casing, and a generally U-shaped spring is mounted, at its center, against the inner surface of the side wall of the casing opposed to the open side thereof. During the insertion of a cassette into the casing, the cassette acts against the normally U-shaped spring so as to flex or relatively flatten the latter, with the result that the spring exerts a force on the cassette tending to eject the latter from the casing.
- 15 In another storage container for a magnetic tape cassette, for example, as disclosed in British Patent Specification No. 1,408,516, a rectangular casing which is open at the front side thereof is provided with a drawer which is guided for rectilinear movements between a closed position, in which the drawer is contained with the casing with the open side of the latter being closed by the drawer front, and an opened or extended position in which a cassette can be placed in, or removed from the extended drawer. A spring is interposed between the drawer and the casing so as to continuously urge the drawer to its opened or extended position, and a latch is provided for releasably holding the drawer in its closed position against the force of such spring.
- 20 In still another existing storage receptacle for a magnetic tape cassette, for example, as disclosed in British Patent Specification No. 1,342,759, the receptacle includes a housing constituted by spaced apart, L-shaped side walls having their vertical and horizontal portions connected by a back wall and a bottom wall, respectively, and a substantially rectangular container which is pivotally connected to the housing for swinging relative to the latter about an axis extending through a corner of the rectangular casing and through ends of the horizontal portions of the L-shaped side walls of the housing. In an opened position of the container in which the latter extends forwardly from the pivoting axis, the upwardly facing side of the rectangular casing is open for the insertion and removal of a cassette therethrough. When the container is pivotally moved to its closed position, the sides thereof interfit with the adjacent L-shaped side walls of the housing and the container and housing cooperate to enclose the cassette therein. Although the pivotal connection of the container with the housing is advantageous in that it is simple and not subject to binding or jamming, the location of the pivoting axis of the container is such that, with the container in its closed position and having a cassette therein, the force of gravity acts to urge the container to such closed position. Thus, when it is desired to remove a cassette from the storage receptacle of the foregoing type, the pivoted container has to be manually displaced from its closed position in respect to the associated housing. Further, as the pivoted container is moved
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toward its opened position, the center of gravity moves a relatively large distance in front of the pivoting axis so that the weight of a cassette in the container may cause an abrupt and potentially harmful final movement of the container to its opened position. It will also be noted that, since the side walls of the container and the L-shaped side walls of the housing interfit to define the opposite side surfaces of the storage receptacle in the closed condition of the latter, a plurality of such storage receptacles cannot be directly secured to each other in side-by-side relation, and an additional magazine engageable only with the relatively narrow L-shaped side walls of the housings is required for that purpose.

According to the present invention, there is provided a storage receptacle for a magnetic tape cassette comprising a housing having spaced apart parallel side walls which, between forward edges thereof, define an opening of the housing, and a holder for a magnetic tape cassette which is pivotally connected with the housing for swinging movement through said opening between an opened position in which said holder projects forwardly from said housing for receiving and relinquishing a cassette, and a closed position in which said holder cooperates with said housing for enclosing a cassette in said holder; wherein the pivotal connection of said holder to said housing provides a fulcrum for said swinging movement of the holder which is spaced rearwardly relative to said housing from the center of gravity of said holder with a cassette therein in all positions of said holder ranging from said closed position to said opened position so that, with the receptacle oriented so that the opening extends vertically and said centre of gravity is above the fulcrum, the force of gravity will tend to urge said holder towards said opened position from said closed position, the arrangement being such that, in use, the axis of pivoting shifts forwardly relative to said housing in the course of swinging movement of said holder from said closed position to said open position.

In use of a storage receptacle according to an embodiment of the invention, the fulcrum defined by the pivotal connection of the holder with the housing is shifted in respect to the latter in the course of the swinging movement of the holder between its closed and opened positions. More particularly, in the case where the housing has substantially rectangular side walls and the holder includes a front wall dimensioned to close the front opening of the housing and a bottom wall directed at right angles to the front wall of the holder to form a corner therewith which moves downwardly in respect to the housing in the

course of the swinging movement of the holder away from its closed position, the fulcrum for the holder is shifted forwardly at an intermediate position of the holder in moving from its closed position to its opened position so that, during further swinging movement of the holder to its opened position, the previously mentioned corner of the holder will move upwardly in respect to the housing. By reason of such forward shifting of the fulcrum for the pivoted holder, even when the vertical dimension of the rectangular housing does not greatly exceed the corresponding dimension of the rectangular housing does the receptacle, the lower corner of the holder will not extend below the housing in the opened position of the holder at which the latter is disposed for conveniently receiving or relinquishing a cassette in the holder.

In accordance with an optional feature the pivoted holder has spaced apart side walls movable between the side walls of the housing, and flexibly resilient stop elements project inwardly from one of the side walls of the holder for engaging the reel hubs of a cassette disposed in the holder and thereby resisting turning of the supply and takeup reels of the cassette.

In accordance with another optional feature, the holder, when in its closed position, is contained in the housing, and the outer surfaces of the opposite side walls of the housing have mating elongated projections and grooves of dovetail cross-sections extending from the front and rear edges of such side walls for only minor portions of the front-to-rear dimension of the side walls, so that the housings of a plurality of storage receptacles can be conveniently secured together directly in side-by-side relation with each groove of one housing slidably receiving a respective elongated projection of the next adjacent housing.

The invention will be further described with reference to the accompanying drawings, in which:—

Fig. 1 is a perspective view of a magnetic tape cassette storage receptacle according to an embodiment of this invention, and which is shown in its closed condition;

Fig. 2 is a perspective view similar to that of Fig. 1, but showing the opposite side of the storage receptacle;

Fig. 3 is a perspective view similar to that of Fig. 1, but showing the storage receptacle in its open condition with a magnetic tape cassette cradled in the holder of the storage receptacle;

Fig. 4 is a perspective view of the holder which forms a part of the storage receptacle shown on Figs. 1—3;

Fig. 5 is a perspective view similar to that

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of Fig. 4, but showing the holder partly broken away and in section;

Fig. 6 is a perspective view, partly broken away and in section, of the housing which forms a part of the storage receptacle of Figs. 1—3;

Fig. 7 is a vertical sectional view of the housing, with the holder being shown in broken lines in its closed position;

Figs. 8 and 9 are side elevational views of the storage receptacle according to this invention with the housing thereof being shown partly broken away and in section, and with the holder being respectively shown at an intermediate position between its closed and opened positions, and at its opened position;

Fig. 10 is a top plan view of the housing included in the storage receptacle of Figs. 1—9, and particularly showing details of a latch element forming an integral part of such housing;

Fig. 11 is an enlarged, fragmentary top plan view showing another embodiment of a latch assembly that may be employed in a storage receptacle according to this invention;

Fig. 12 is a detail sectional view taken along the line XII—XII on Fig. 11;

Fig. 13 is a sectional view of the holder forming part of a storage receptacle according to this invention, and which is taken along the line XIII—XIII on Fig. 9 for showing details of stop elements provided on the holder;

Fig. 14 is a sectional view similar to that of Fig. 13, but illustrating the manner in which the stop elements are deflected during the insertion of a cassette in the holder;

Figs. 15A—15D are perspective views respectively showing other forms of stop elements that may be provided on the holder of a storage receptacle according to this invention;

Figs. 16, 17 and 18 are perspective views, partly broken away and in section, and respectively showing the holders of storage receptacles according to still other embodiments of the invention;

Fig. 19 is an enlarged, detail sectional view taken along the line XIX—XIX on Fig. 18; and

Fig. 20 is a perspective view illustrating a plurality of storage receptacles according to this invention secured together in side-by-side relation.

Referring to the drawings in detail, and initially to Figs. 1—3 thereof, it will be seen that a magnetic tape cassette storage receptacle 10 according to this invention generally comprises a housing 11 and a holder 12 which is pivotally connected with housing 11 for swinging movement relative to the latter between an opened position

(Fig. 3) in which holder 12 projects forwardly from housing 11 for receiving and relinquishing a cassette 13, and a closed position (Figs. 1 and 2) in which holder 12 cooperates with housing 11 for enclosing a cassette cradled in the holder.

The housing 11 which is preferably molded of a suitable plastics resin is shown to include spaced apart, parallel side walls 14a and 14b which are substantially rectangular (Figs. 1—3 and 6—9), and which are joined together by a back wall 15, a top wall 16, a shelf or abutment 17 directed forwardly from the lower end portion of back wall 15, and a cross piece 18 extending between the lower end portions of side walls 14a and 14b at the front of housing 11. Further, as shown, a stiffening web arrangement 19 may extend along the upper portion of back wall 15 from the back end portion of top wall 16 (Figs. 6 and 7). In the foregoing housing 11, a vertically elongated opening 20 is defined at the front of the housing between the forward edges of side walls 14a and 14b above cross piece 18.

As shown particularly on Figs. 4 and 5, the holder 12, which is also preferably molded of a plastics resin, includes a front wall 21 dimensioned to close opening 20 in the closed position of holder 12, a bottom wall 22 directed substantially at right angles to front wall 21 for defining a corner C at the bottom of the latter, and spaced apart side walls 23a and 23b directed upwardly from bottom wall 22 along the opposite sides of front wall 21. The side walls 23a and 23b of holder 12 are suitably spaced apart to accommodate a magnetic tape cassette 13 therebetween, and preferably have upper edges 24a and 24b, respectively, that are inclined downwardly from front wall 21 and bevelled inwardly.

In order to pivotally connect holder 12 with housing 11, first laterally aligned pivot members 25 project outwardly from side walls 23a and 23b of holder 12 at substantial distances from front wall 21, and second laterally aligned pivot members 26 also project outwardly from side walls 23a and 23b and are located closer to front wall 21 than are pivot members 25 and at a greater distance upwardly from bottom wall 22.

The side walls 23a and 23b of holder 12 are movable between side walls 14a and 14b of housing 11, and such side walls 14a and 14b are formed with arcuate slots 27 therein which extend generally vertically, and which are adapted to slidably receive the first pivot members 25 extending from the adjacent side walls 23a and 23b of holder 12. The slots 27 are located so that, with pivot members 25 of holder 12 engaging first seats defined at the lower ends 27a of slots 27 and with front wall 21 of the holder

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extending vertically, such front wall 21 will be disposed between the forward edges of side walls 14a and 14b above cross piece 18 and will close front opening 20 of housing 11 (Figs. 1 and 2). Further, as shown particularly on Figs. 6 and 7, the inner surfaces of side walls 14a and 14b of the housing have recesses 28 extending forwardly in respect to the slots 27 and opening at the forward edges of side walls 14a and 14b for loosely accommodating the second pivot members 26 which project from the adjacent side walls 23a and 23b of holder 12 (Figs. 7-9). The lower margin of each recess 28 has an upwardly curved portion 28a (Fig. 7) defining a second seat for the respective second pivot member 26 and which is at approximately the same level as the first seat 27a defined at the bottom of the respective slot 27. Further, the upper margin of each recess 28 has a downwardly curved portion 28b which forms a stop for limiting the upward movement of the respective second pivot member 26. Finally, each recess 28, at its end adjacent the respective slot 27 has an inclined ramp 28c leading from the recess to the inner surface of the respective side wall 14a or 14b.

When assembling together the described housing 11 and holder 12 of storage receptacle 10, the holder 12 is initially tilted relative to housing 11, for example, as shown on Fig. 8, and the lower end portion of holder 12 is inserted into opening 20 above cross piece 18 with the first and second pivot members 25 and 26 at the opposite sides of holder 12 successively entering the respective recesses 28 at the forward edges of side walls 14a and 14b. As the inclined or tilted holder 12 is further displaced rearwardly in respect to housing 11, first pivot members 25 ride on inclined ramps 28c so as to leave recesses 28 with consequent inward flexing of the respective side walls 23a and 23b until pivot members 25 come into registry with, and snap outwardly into the respective slots 27.

As shown particularly on Fig. 5, a leaf spring 29 extends rearwardly from bottom wall 22 of holder 12 so as to be movable with the latter. In order to secure leaf spring 29 to holder 12, the forward end portion of leaf spring 29 may have a downwardly and rearwardly inclined tab 29a struck therefrom while a downwardly offset rear portion of bottom wall 22 is formed with an opening 22a to receive the tab 29a. Further, side walls 23a and 23b of holder 12 are shown to be formed with inwardly directed bars 30 spaced upwardly from the rear portion of bottom wall 22 by a small distance approximately equal to the thickness of leaf spring 29. Thus, in assembling together spring 29 with holder

12, the forward end portion of the leaf spring is moved slidably over the rear portion of bottom wall 22 under bars 30 until tab 29a snaps into opening 22a for securing spring 29 to the holder. Spring 29 is formed with a bifurcated rear end portion 29b (Figs. 4 and 5) which, in the closed position of holder 12, as indicated in broken lines on Fig. 7, bears downwardly on the shelf of abutment 17 provided within the lower portion of housing 11.

In order to releasably retain holder 12 in its closed position (Figures 1, 2 and 7) storage receptacle 10 further includes a latch mechanism 31. Such latch mechanism 31 is shown to include a resilient tongue 32 formed as a forwardly directed extension of top wall 16 of housing 11. Tongue 32 is separated from the adjacent top edge portions of side walls 14a and 14b by slots 33a and 33b so as to permit tongue 32 to be depressed downwardly between the top edge portions of walls 14a and 14b, for example, by the manual application of pressure on tongue 32 at a pad 34 provided thereon. A latch element 35 (Figures 3, 6 and 7) is provided at the free end of resilient tongue 32 in the form of an upwardly directed raked tooth 35 having an upwardly and rearwardly sloping front surface. The latch 31 is completed by a latch element 36 (Figures 3-5) in the form of a raked tooth depending from the back edge of a flange 37 directed rearwardly from the upper end of front wall 21 of holder 12. When holder 12 is moved to its closed position (Figures 1, 2 and 7) latch tooth 36 at the top of the holder snaps over and engages latch tooth 35 on tongue 32 so as to retain holder 12 in its closed position. On the other hand, when tongue 32 is depressed by the application of downwardly directed pressure to pad 34, latch tooth 35 is moved downwardly and thus disengaged from latch tooth 36 so as to free holder 12 for movement from its closed position to its opened position.

Since housing 11 is preferably molded of a plastics resin, side walls 14a and 14b are somewhat resiliently flexible, particularly at their forward upper portions where slots 33a and 33b separate the side walls from tongue 32. Thus, if side walls 14a and 14b are grasped and pressed toward each other at the forward upper portions thereof when a force is being applied downwardly to pad 34 for releasing latch 31, there is a possibility that side walls 14a and 14b will be flexed toward each other to seize the upper part of holder 12 and thereby impede the movement of holder 12 toward its open position even though latch 31 is released. In order to avoid the foregoing, projections 38 (Figures 7 and 10) extend from the opposite longitudinal edges of tongue 32 across slots

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33a and 33b into engagement with the adjacent side walls 14a and 14b of housing 11. Thus, even if the forward upper portions of side walls 14a and 14b are pressed toward each other, projections 38 prevent the narrowing of the space between the side walls and thereby ensure that holder 12 will be free to move toward its opened position upon the release of latch 31.		
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10	As is shown on Figure 3, the conventional magnetic tape cassette 13 having a generally rectangular cassette housing 39 is disposed or cradled between side walls 23a and 23b of holder 12 with one of the relative long sides of cassette housing 39 extending along front wall 21, and with a relatively short side of the cassette housing resting against bottom wall 22 of the cassette housing. When holder 12 is in its opened position (Figures 3 and 9) cassette 13 may be conveniently withdrawn therefrom in the forward and upward direction, as indicated by the arrow 40. In order to ensure that flange 37 and latch tooth 36 thereon will not interfere with such withdrawal of the cassette 13 from holder 12, inclined projections 41 (Figures 3, 8 and 9) are formed on front wall 21 a short distance below flange 37 and act to upwardly deflect the adjacent corner of cassette housing 39 as the cassette is being withdrawn from holder 12.	75
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35	In the closed position of holder 12 (Figure 7) a cassette cradled in the holder is held against substantial movement in the forward and rearward directions between web structure 19 and the back of housing 11 and front wall 21 of the holder and, in vertical direction, between bottom wall 22 of the holder and the projections 41 adjacent the upper end of front wall 21. Further, in the closed position of holder 12, pivot members 25 engage the respective seats 27a at the lower ends of slots 27 for initially defining the fulcrum of pivotal movement of holder 12, while pivot members 26 engage the respective stops 28b defined by the upper margins of recesses 28 to prevent lifting of holder 12, and hence disengagement of latch tooth 36 from latch tooth 35, under the influence of the upwardly directed force of spring 29 bearing on abutment 17.	100
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55	Pivot members 25 are disposed so that the fulcrum for holder 12 defined by the engagement of such pivot members 25 with seats 27a in the closed position of holder 12 will be spaced rearwardly in respect to the center of gravity of holder 12 with a cassette in the latter. Thus, when latch 31 is released by depressing tongue 32, the force of spring 29 in combination with the force of gravity will cause forward pivotal movement of holder 12 away from its closed position about the fulcrum defined	120
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	by the engagement of pivot members 25 with seats 27a. Following the initial pivotal movement of holder 12 from its closed position, leaf spring 29 will lift off seat or abutment 17 and thus no longer influence the movement of holder 12.	
	In the course of the forward pivotal movement of holder 12 away from its closed position about the fulcrum defined by the engagement of pivot members 25 with seats 27a, pivot members 26 move downwardly in an arcuate path within recesses 28 and, when holder 12 attains the intermediate position shown on Figure 8, will engage the seats 28a defined at the lower margins of recesses 28. It will be apparent that, during the pivotal movement of holder 12 from its closed position to the intermediate position of Figure 8, the corner C at the lower end of holder 12 has been moving downwardly and attains approximately the level of the lower edges of side walls 14a and 14b of the housing when holder 12 reaches the intermediate position of Figure 8. Upon the engagement of pivot members 26 with seats 28a which are disposed substantially vertically above corner C with holder 12 in the intermediate position of Figure 8, further forward pivotal movement of the holder about the fulcrum defined by the engagement of pivot members 25 with seats 27a is prevented. However pivot members 26 are located so that, when holder 12 attains the intermediate position of Figure 8, the engagement of pivot members 26 with seats 28a defines a fulcrum for holder 12 which is disposed rearwardly in respect to the center of gravity of holder 12 with a cassette therein. Therefore, forward pivotal movement of holder 12 continues beyond the intermediate position of Figure 8 about the fulcrum defined by the engagement of pivot members 26 with seats 28a. During such further forward pivotal movement of holder 12, pivot members 25 move upwardly in arcuate slots 27 until pivot members 25 engage the upper ends 27b of the respective slots and thereby limit the forward pivotal movement of holder 12 at the opened position thereof (Figure 9).	
	It will be apparent from the above that, in all positions of holder 12 ranging from its closed position to its opened position, the fulcrum for pivotal movement of holder 12 is spaced rearwardly from the center of gravity of the holder with a cassette therein. Thus, upon the release of latch 31, and after the initial forward pivotal motion of holder 12 away from its closed position, the holder 12 is automatically moved by the force of gravity to its opened position. It will further be seen that, in the storage receptacle 10, the fulcrum for pivotal movement of holder 12 is shifted forwardly in respect to housing	

11, that is, from the position of engagement of pivot members 25 with seats 27a to the position of engagement of pivot members 26 with seats 28a, in the course of the forward pivotal movement of holder 12 from its closed position to its opened position. Such shifting of the fulcrum is advantageous in several respects. First of all, in the course of the pivotal movement of holder 12 from its intermediate position (Figure 8) to its opened position (Figure 9) about the fulcrum defined by the engagement of pivot members 26 with seats 28a, the lower corner C of holder 12 moves rearwardly and upwardly from its lowermost level attained at the intermediate position of Figure 8. Thus, even though housing 11 extends downwardly only a relative small distance below holder 12 in the closed position of the latter, holder 12 can be displaced through a large angle from its closed position to its opened position for convenience and ease in inserting and removing a cassette with holder 12 in its opened position without causing corner C of the holder to project downwardly beyond the lower end of housing 11. Thus, holder 12 can be moved through a large angle from its closed position to its opened position without requiring an undesirably large vertical dimension of housing 11 merely for the purpose of continuing to contain the corner C of the holder within the housing in the opened position of the holder.

Furthermore, it will be seen that, as holder 12 moves pivotally from its closed position toward its opened position, the center of gravity of holder 12 with a cassette therein moves forwardly with respect to pivot members 25. If the fulcrum for holder 12 was continuously defined by pivot members 25, the force of gravity urging the holder toward its opened position would progressively increase and result in a rapid or abrupt final movement of the holder to its opened position. However, by forwardly shifting the fulcrum for holder 12 from the engagement of pivot members 25 with seats 27a to the engagement of pivot members 26 with seats 28a when holder 12 attains the intermediate position of Figure 8, the moment arm of the force of gravity continuing to urge holder 12 toward its opened position is reduced with the result that holder 12 undergoes a smooth and gentle continuous movement from its closed position to its opened position.

Referring now to Figs. 11 and 12, it will be seen that, in a storage receptacle 10' which is otherwise similar to the previously described storage receptacle 10, the latch 31' for releasably retaining the holder 12' in

its closed position relative to the housing 11' may again include a resilient tongue 32' extending forwardly from the top wall 16 of housing 11' and being separated from the adjacent top edges of side walls 14a and 14b by slots 33a and 33b. In the latch 31', the free end portion of tongue 32' has a keystone-shaped cutout 35' therein to define one latch element, while the other latch element is constituted by a complementary keystone-shaped projection 36' directed rearwardly from the top end of front wall 21 of holder 12'. When keystone-shaped projection 36' is engaged in the similarly shaped cutout 35', that is, when latch 31' is engaged, holder 12' is retained in its closed position. However, when tongue 32' is depressed, projection 36' is released from cutout 35' so as to free holder 12' for movement toward its opened position. In order to effect engagement of projection 36' in cutout 35' upon return of holder 12' to its closed position, the free end edge 32'a of tongue 32' is bevelled at the opposite sides of cutout 35', and the end edge 36'a (Fig. 12) of projection 36' is similarly bevelled. Thus, as holder 12' returns to its closed position, bevelled edge surface 36'a will ride over bevelled edge surfaces 32'a to depress tongue 32' until projection 36' engages in cutout 35'.

As is shown particularly on Fig. 16, the conventional magnetic tape cassette 13 to be contained in a storage receptacle is of the type in which the cassette housing 39 contains tape supply and takeup reels disposed in side-by-side relation and having reel hubs 42 exposed at openings 43 in the cassette housing. The reel hubs are shown to have inwardly directed projections or splines 44 by which the respective reels are rotatably coupled with reel drive shafts of a tape recording and/or reproducing apparatus when the cassette 13 is in use. In one embodiment of the present invention, a storage receptacle for containing the described cassette 13 is provided with means by which the reel hubs 42 are held against rotation, whereby to avoid loosening of the tape within cassette housing 39 during the storage of cassette 13 in the storage receptacle.

Referring now to Figs. 5, 13 and 14, it will be seen that such means for preventing rotation of the reel hubs of a cassette 13 stored in the receptacle 10 according to this invention includes flexibly resilient stop elements 45 projecting inwardly from side wall 23b of holder 12 at locations spaced apart along the latter so as to extend into openings 43 and engage the respective reel hubs 42 of a cassette 13 when the latter is cradled or disposed in holder 12. In Figs. 5, 13 and 14, the flexibly resilient stop elements 45 are in the form of tabs normally

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extending at right angles from the opposite ends of an elongated strip 46 of a suitably flexibly resilient plastics resin. The strip 46 is shown to be disposed against the outer surface of side wall 23b and secured to the latter at locations spaced from the ends of strip 46, as by lugs 47 on wall 23b that are upset in corresponding holes formed in strip 46. Further, side wall 23b of holder 12 is formed with spaced apart openings 48 through which the flexibly resilient stop elements or tabs 45 can extend into holder 12 from the respective ends of strip 46. As is shown on Fig. 14, when a cassette 13 is being inserted in the direction of the arrow 49 in holder 12, the cassette housing 39 deflects stop elements or tabs 45 into openings 48 with consequent flexing of the respective end portions of strip 46 so that the resiliently flexible stop elements or tabs 45 do not interfere with the insertion of cassette 13. When cassette 13 is fully inserted in holder 12, the openings 43 of its housing 39 register with openings 48 in side wall 23b so that stop elements 45 can then return to their normal positions shown on Fig. 13, in which normal positions stop elements or tabs 45 extend into the respective reel hubs 42 and engage between projections or splines 44 of such reel hubs for holding the latter against rotation.

Referring now to Figs. 15A—15D, it will be seen that the resiliently flexible stop elements for preventing rotation of the supply and takeup reels of a cassette cradled in holder 12 may have various forms other than those described above with reference to the embodiment of Figs. 5, 13 and 14. Thus, for example, as shown on Fig. 15A, an endless loop of flexibly resilient plastics resin is first flattened, and then the end portions of the flattened loop are formed to extend at right angles to the remainder of the flattened loop and thereby define the tabs or stop elements 45a extending from opposite ends of the strip 46a, with such tabs and strip being each formed of two layers of the flexibly resilient material that are movable relative to each other so as to decrease the resistance of tabs 45a to the insertion or removal of a cassette in the respective holder. In the arrangement shown on Fig. 15B, the tabs 45b extending from the opposite ends of the flexibly resilient strip 46b are bifurcated or provided with medial slots to increase the flexibility thereof. In the arrangement shown on Fig. 15C, the tabs or stop elements 45c extending from the opposite ends of the strip 46c have substantially V-shaped cross-sections so that, when such tabs 45c are engaged in the reel hubs of a cassette, one or the other of the sides of each V-shaped stop element will be angled in opposition to the direction of turning of

the respective reel for unwinding the tape therefrom, and thus will provide increased resistance to such unwinding rotation. In the arrangement shown on Fig. 15D, each of the tabs or stop elements 45d extending from the ends of strip 46d is formed with a central thickened portion or post 45'd for increasing the rigidity of the tab when engaged in a respective reel hub of a cassette. It will be apparent that the arrangements shown on Figs. 15A—15D may be mounted on the holder 12 of a storage receptacle according to this invention in the same manner as the stop elements 45 and associated strip 46 described above with reference to Figs. 5, 13 and 14. Of course, in the case of the arrangement shown on Figs. 15C and 15D in which the respective stop elements 45c and 45d are relatively stiff, the deflection of such stop elements out of the path of a cassette during the insertion or removal of the latter is achieved primarily by flexing of the adjacent end portions of the strip 46c or 46d.

Referring now to Fig. 16, it will be seen that, in another embodiment of this invention, the holder 12A of a storage receptacle which is otherwise similar to the previously described holder 12 is provided with stop elements in the form of clusters of flexibly resilient pins 145 extending from two circular bases 146a and 146b which are cemented or otherwise suitably secured in spaced circular holes 148a and 148b, respectively, formed in side wall 23b of the holder. Thus, when a cassette 13 is being inserted in holder 12A, the clusters of flexibly resilient pins 145 are deflected by the cassette housing 39 until the latter is fully inserted in holder 12A, whereupon the pins 145 return to their normal positions and engage in the reel hubs 43 between the projections or splines 44 of the latter for preventing rotation of the reels of the cassette 13 cradled in holder 12A.

In the holder 12B according to another embodiment of this invention, the stop elements for preventing rotation of the reels of a cassette cradled in the holder 12B (Fig. 17) are again constituted by two clusters of flexibly resilient pins 245 which, in this case, extend from a common base plate 246. Such base plate 246 has bevelled edges 246' so as to be of dovetail cross-section. Side wall 23b of holder 12B is shown to have a recess 248 in its inner surface which is adapted to receive base plate 246 and which has undercut edges 248' so as to be of complementary dovetail cross-section. Thus, base plate 246 can be slidably inserted in recess 248 and retained in the latter.

In all of the foregoing embodiments of the invention, the resiliently flexible stop

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elements have been shown to be formed independently of the holder 12, 12A or 12B, and thus can be formed of a plastics resin, a rubbery material or the like, which is more flexible than that of the respective holder. However, as shown on Figs. 18 and 19, stop elements 345 for preventing rotation of the reels in a cassette cradled in a holder 12C may be formed integrally with the latter. More specifically, it will be seen that the stop elements or tabs 345 formed integrally with side wall 23b of holder 12C are provided with the requisite resilient flexibility by being joined to wall 23b at thin cross-sections 345' (Fig. 19) forming resiliently flexible hinges between stop elements 345 and side wall 23b. Further, as shown, the inner surface of side wall 23b is preferably formed with recesses 248 adjacent stop elements 345 and into which the stop elements can fold or nest when being deflected in response to the insertion of a cassette 13 into holder 12C.

As shown on Fig. 20, a plurality of storage receptacles embodying this invention, for example, the storage receptacles 10A, 10B and 10C, can be adapted to be secured to each other in side-by-side relation so that, when thus secured to each other, the holders 12 of the storage receptacles may be moved independently of each other between their opened and closed positions. In order to provide for securing together of the storage receptacles in such side-by-side relation, the outer surface of side wall 14a of housing 11 has elongated projections 50 (Fig. 1) of dovetail cross-section extending rearwardly from the forward edge of wall 14a for only a minor portion of the front-to-rear dimension D of such side wall. The elongated projections 50 are shown to be spaced apart along the forward edge of side wall 14a, for example, disposed adjacent the top and bottom of such wall and at the middle thereof. The other side wall 14b of housing 11 has grooves 51 (Fig. 2) in its outer surface in lateral alignment with the elongated projections 50, with each of the grooves 51 extending from the forward edge of side wall 14b and having a length and dovetail cross-section corresponding to the length and cross-section of the respective projection 50 on the other side wall 14a. Further, the outer surface of side wall 14a has grooves 52 (Fig. 1) of dovetail cross-section extending forwardly from the rear edge of side wall 14a in longitudinal alignment with the projections 50 adjacent the top and bottom of housing 11. The length of each of the grooves 52 is selected to provide a substantial distance between the forward end of such groove 52 and the back end of the projection 50 with which it is aligned. The other side wall 14b of

housing 11 has elongated projections 53 (Fig. 2) on its outer surface in lateral alignment with the grooves 52, with each projection 53 extending forwardly from the rear edge of side wall 14b and having a length and dovetail cross-section corresponding to the length and cross-section of the respective groove 52 in side wall 14a. Side wall 14b is further shown to have a detent projection 54 with sloping front and rear faces which extends from the rear portion of wall 14b in alignment with the central one of the grooves 51 in such side wall. Finally, as shown on Fig. 1, the outer surface of side wall 14a is formed with a recess 57 at a location corresponding to that of the detent projection 54 on side wall 14b. Such recess 57 is separated by a barrier 56 from an aligned recess 55 extending to the rear edge of wall 14a.

By reason of the foregoing arrangement of projections 50 and 53 and of grooves 51 and 52 on each housing 11 the securing together of two storage receptacles according to this invention is facilitated. Thus, for example, when securing the storage receptacle 10A to the storage receptacle 10B on Fig. 20, the housings 11 of such storage receptacles are initially positioned laterally side-by-side, but with the housing of receptacle 10B disposed ahead of the housing of receptacle 10A by a distance slightly greater than the length of each elongated projection 50. Thus, the flat surface of side wall 14b of receptacle 10A can facially abut against the flat surface of side wall 14a of receptacle 10B. After such initial positioning of receptacles 10A and 10B, the housing of receptacle 10A is moved forwardly relative to the housing of receptacle 10B so as to cause elongated projections 50 of receptacle 10B to enter grooves 51 of receptacle 10A while projections 53 of the latter simultaneously enter the grooves 52 of receptacle 10B. In order to facilitate the entry of elongated projections 50 and 53 into grooves 51 and 52, respectively, the forward ends of grooves 51 and the back ends of grooves 52 may be widened, as shown on Figs. 1 and 2.

In the course of the above described forward movement of the housing 11 of receptacle 10A relative to the housing of receptacle 10B, the detent projection 54 of receptacle 10A will move along recess 55 of receptacle 10B and finally snap past barrier 56 into recess 57 for releasably securing the housings 11 of receptacles 10A and 10B in lateral alignment with each other as shown on Fig. 20.

It will be seen that, since the holder 12 of each of the secured together receptacles 10A, 10B and 10C is substantially fully contained within the respective housing 11

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when the holder is in its closed position, the direct securing together of the housings 11 in side-by-side relation does not interfere with the individual movements of the holders 12 between their opened and closed positions.

Although illustrative embodiments of this invention have been described in detail herein with reference to the accompanying drawings, it is to be understood that the invention is not limited to those precise embodiments, and that various changes and modifications may be effected therein by one skilled in the art without departing from the scope of this invention as defined in the appended claims.

WHAT WE CLAIM IS:—

1. A storage receptacle for a magnetic tape cassette comprising a housing having spaced apart parallel side walls which, between forward edges thereof, define an opening of the housing, and a holder for a magnetic tape cassette which is pivotally connected with the housing for swinging movement through said opening between an opened position in which said holder projects forwardly from said housing for receiving and relinquishing a cassette, and a closed position in which said holder cooperates with said housing for enclosing a cassette in said holder; wherein the pivotal connection of said holder to said housing provides a fulcrum for said swinging movement of the holder which is spaced rearwardly relative to said housing from the center of gravity of said holder with a cassette therein in all positions of said holder ranging from said closed position to said opened position so that, with the receptacle oriented so that the opening extends vertically and said centre of gravity is above the fulcrum, the force of gravity will tend to urge said holder towards said opened position from said closed position, the arrangement being such that, in use, the axis of pivoting shifts forwardly relative to said housing in the course of swinging movement of said holder from said closed position to said open position.

2. A storage receptacle according to Claim 1; and comprising a latch for releasably securing said holder in said closed position thereof.

3. A storage receptacle according to Claim 2: in which said latch includes a resilient tongue which is depressible between said side walls of the housing at the top of the latter, and latch elements on said tongue and at the top of said holder, said latch elements engaging each other in said closed position and being released from each other when said resilient tongue is depressed.

4. A storage receptacle according to

Claim 3; in which said latch elements are oppositely raked teeth.

5. A storage receptacle according to Claim 3; in which said latch element on the holder is a keystone-shaped projection, said latch element on the tongue is a complementary keystone-shaped cutout in the free end portion of said tongue for receiving said projection and the free end edge of the tongue is bevelled at each side of said cutout.

6. A storage receptacle according to any one of Claims 3, 4 and 5; in which said housing further has a top wall joined to the side walls and from which the tongue extends with slots between the tongue and the adjacent side walls, and projections extending from the opposite sides of the tongue into the slots to prevent closing of the latter if the side walls are pressed toward each other when depressing the tongue for releasing the latch.

7. A storage receptacle according to any one of the preceding claims; and comprising a spring acting between the housing and the holder in the closed position of the latter for initiating forward swinging movement of the holder away from its closed position.

8. A storage receptacle according to Claim 7; in which said spring is a leaf spring secured to said holder for movement with the latter and arranged to act against an abutment in the housing when the holder is in its closed position.

9. A storage receptacle according to any one of the preceding claims; in which said side walls of the housing are substantially rectangular, and said holder includes a front wall dimensioned to close said opening in the closed position of the holder and a bottom wall directed at right angles to said front wall to form a corner therewith which moves downwardly in respect to said housing in the course of said swinging movement of the holder away from its closed position, and said pivotal connection includes means to selectively provide first and second positions for said fulcrum at different distances rearwardly from said front wall of the holder; and in which, at an intermediate position of the holder in moving from its closed position to its opened position, said fulcrum for the holder is shifted forwardly from said first position to said second position disposed above said corner so that the latter moves upwardly in respect to the housing during further swinging movement of the holder to its opened position.

10. A storage receptacle according to Claim 9; in which said pivotal connection includes first pivot members extending from the opposite sides of the holder and being engageable with first seats in said

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when the holder is in its closed position, the direct securing together of the housings 11 in side-by-side relation does not interfere with the individual movements of the holders 12 between their opened and closed positions.

Although illustrative embodiments of this invention have been described in detail herein with reference to the accompanying drawings, it is to be understood that the invention is not limited to those precise embodiments, and that various changes and modifications may be effected therein by one skilled in the art without departing from the scope of this invention as defined in the appended claims.

WHAT WE CLAIM IS:—

1. A storage receptacle for a magnetic tape cassette comprising a housing having spaced apart parallel side walls which, between forward edges thereof, define an opening of the housing, and a holder for a magnetic tape cassette which is pivotally connected with the housing for swinging movement through said opening between an opened position in which said holder projects forwardly from said housing for receiving and relinquishing a cassette, and a closed position in which said holder cooperates with said housing for enclosing a cassette in said holder; wherein the pivotal connection of said holder to said housing provides a fulcrum for said swinging movement of the holder which is spaced rearwardly relative to said housing from the center of gravity of said holder with a cassette therein in all positions of said holder ranging from said closed position to said opened position so that, with the receptacle oriented so that the opening extends vertically and said centre of gravity is above the fulcrum, the force of gravity will tend to urge said holder towards said opened position from said closed position, the arrangement being such that, in use, the axis of pivoting shifts forwardly relative to said housing in the course of swinging movement of said holder from said closed position to said open position.

2. A storage receptacle according to Claim 1; and comprising a latch for releasably securing said holder in said closed position thereof.

3. A storage receptacle according to Claim 2; in which said latch includes a resilient tongue which is depressible between said side walls of the housing at the top of the latter, and latch elements on said tongue and at the top of said holder, said latch elements engaging each other in said closed position and being released from each other when said resilient tongue is depressed.

4. A storage receptacle according to

Claim 3; in which said latch elements are oppositely raked teeth. 65

5. A storage receptacle according to Claim 3; in which said latch element on the holder is a keystone-shaped projection, said latch element on the tongue is a complementary keystone-shaped cutout in the free end portion of said tongue for receiving said projection and the free end edge of the tongue is bevelled at each side of said cutout. 70 75

6. A storage receptacle according to any one of Claims 3, 4 and 5; in which said housing further has a top wall joined to the side walls and from which the tongue extends with slots between the tongue and the adjacent side walls, and projections extending from the opposite sides of the tongue into the slots to prevent closing of the latter if the side walls are pressed toward each other when depressing the tongue for releasing the latch. 80 85

7. A storage receptacle according to any one of the preceding claims; and comprising a spring acting between the housing and the holder in the closed position of the latter for initiating forward swinging movement of the holder away from its closed position. 90

8. A storage receptacle according to Claim 7; in which said spring is a leaf spring secured to said holder for movement with the latter and arranged to act against an abutment in the housing when the holder is in its closed position. 95

9. A storage receptacle according to any one of the preceding claims; in which said side walls of the housing are substantially rectangular, and said holder includes a front wall dimensioned to close said opening in the closed position of the holder and a bottom wall directed at right angles to said front wall to form a corner therewith which moves downwardly in respect to said housing in the course of said swinging movement of the holder away from its closed position, and said pivotal connection includes means to selectively provide first and second positions for said fulcrum at different distances rearwardly from said front wall of the holder; and in which, at an intermediate position of the holder in moving from its closed position to its opened position, said fulcrum for the holder is shifted forwardly from said first position to said second position disposed above said corner so that the latter moves upwardly in respect to the housing during further swinging movement of the holder to its opened position. 100 105 110 115 120

10. A storage receptacle according to Claim 9; in which said pivotal connection includes first pivot members extending from the opposite sides of the holder and being engageable with first seats in said 125

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housing to define said first position of the fulcrum for the holder, and second pivot members extending from the opposite sides of said holder forwardly in respect to said first pivot members and being engageable with second seats in said housing to define said second position of the fulcrum for the holder.

11. A storage receptacle according to Claim 10; in which said first seats are defined at the lower ends of generally vertically extending slots formed in the side walls of the housing and slidably receiving said first pivot members and said side walls have recesses in their inner surfaces extending forwardly in respect to said slots and loosely accommodating said second pivot members to define said second seats at lower margins of said recesses.

12. A storage receptacle according to Claim 8 and Claim 11; in which said leaf spring extends rearwardly from said holder and bears downwardly on said abutment in said closed position of the holder, and said second pivot members bear upwardly against upper margins of said recesses when the holder is in said closed position for maintaining engagement of said first pivot members with said first seats.

13. A storage receptacle according to Claim 11 or 12; in which said first pivot members engage the upper ends of said slots for limiting the swinging movement of said holder to said opened position.

14. A storage receptacle according to any one of the preceding claims; in which said holder has spaced apart side walls movable between said side walls of the housing and said holder has flexibly resilient stop elements projecting inwardly from one of said side walls of the holder and to engage reel hubs of a cassette when the latter is disposed in the holder for resisting turning of supply and take-up reels of such cassette.

15. A storage receptacle according to Claim 14; in which said stop elements are directed inwardly from the opposite ends of an elongated strip which is mounted on said one side wall of the holder.

16. A storage receptacle according to Claim 15; in which said elongated strip extends at the outside of said one side wall and is secured to the latter at locations spaced from said opposite ends of the strip, and said stop elements extend from said strip through openings in said one side wall of the holder.

17. A storage receptacle according to Claim 14; in which said holder is molded of a plastics resin, and said stop elements are integral parts of said molded holder and are joined to said one side wall of the latter at thin cross-sections forming resiliently flexible hinges therebetween.

18. A storage receptacle according to Claim 14; in which said stop elements extend from at least one base plate which is secured in said one side wall of the holder.

19. A storage receptacle according to Claim 18; in which said one side wall of the holder has a recess of dovetail cross-section extending to an edge thereof, and said base plate is of complementary dovetail cross-section so as to be slidably engaged in said recess.

20. A storage receptacle according to Claim 18; in which said one side wall of the holder has an opening for each said base plate and in which the latter is secured.

21. A storage receptacle according to any one of the preceding claims; in which said holder is contained in said housing in said closed position of the holder, the outer surface of one of said side walls of the housing has at least one elongated projection of dovetail cross-section extending rearwardly from its forward edge for only a minor portion of the front-to-rear dimension of said one side wall and the other of said side walls of the housing has a groove in its outer surface laterally aligned with each said elongated projection, each said groove extending from the forward edge of said other side wall and having a length and dovetail cross-section corresponding to the length and cross-section of the respective projection on said one side wall so that the housings of a plurality of storage receptacles can be secured together in side-by-side relation with each said groove of one housing slidably receiving a respective elongated projection of the next adjacent housing.

22. A storage receptacle according to Claim 21; in which said one side wall of the housing has a plurality of said elongated projections spaced apart along said forward edge thereof.

23. A storage receptacle according to Claim 21 or 22; in which said one side wall of the housing has a groove of dovetail cross-section in its outer surface extending forwardly from the rear edge of said one side wall in longitudinal alignment with each said projection, the length of each said groove in said one side wall is selected to provide a substantial distance between the forward end of said groove and the rear end of said projection with which it is aligned, and said other side wall of the housing has an elongated projection on its outer surface in lateral alignment with each said groove in said one side wall, each said projection on the other side wall extending forwardly from the rear edge of the latter and having a length and dovetail cross-section corresponding to the length and cross-section of the respective groove in said one side wall.

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24. A storage receptacle according to Claim 22 and Claim 23: in which the outer surface of said one side wall of the housing further has a recess therein spaced forwardly from said rear edge, and said other side wall of the housing has a complementary detent projection extending from its outer surface in lateral alignment with said recess, so that, when the housings of a plurality of storage receptacles are secured together in a side-by-side relation, said recess of one housing can receive said detent projection of a next adjacent housing for releasably retaining the secured-together housings in lateral alignment. 15
25. A storage receptacle for a magnetic tape cassette substantially as hereinbefore described, with reference to and as shown by the accompanying drawings. 20

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