

United States Patent

Posso

[15] 3,700,098

[45] Oct. 24, 1972

[54] **BOXES FOR PACKAGING A REEL**

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[22] Filed: June 22, 1971

[21] Appl. No.: 155,504

[30] **Foreign Application Priority Data**

June 23, 1970 France.....7023225
March 30, 1971 France.....7111158

[52] U.S. Cl.....206/52 F, 220/55 C

[51] Int. Cl.B65d 85/67

[58] Field of Search206/52 F, 52 R, 59 E;
220/55 C, 55 R

[56] **References Cited**

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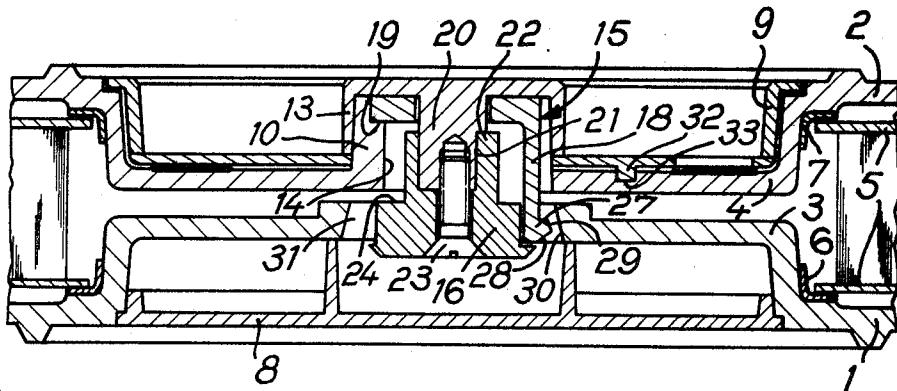
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Primary Examiner—William T. Dixson, Jr.
Attorney—Everett G. Clements

[57] **ABSTRACT**

This invention relates to a box for the packaging of a reel of cinematographic film, magnetic tape or the like, comprising a body and a cover unitary with means provided for centering the reel and in which there is incorporated a locking device comprising an expansible means and a rotary actuation cam, wherein the expansible means comprises at least three flexible blades extending freely in directions substantially parallel to the axis of rotation of the cam rotatably mounted in one of the bosses, the base of each blade is immobilized in this first boss, the free end of each blade bears against the cam and has an outwardly projecting tooth and the second boss defines a central opening bordered by a truncated seat converging towards the first boss and against which the teeth of said blades may be pressed by the cam in order to provoke, at the same time as the locking of the cover on the body, the mutual bringing together of these latter in order to tighten the reel.

10 Claims, 4 Drawing Figures



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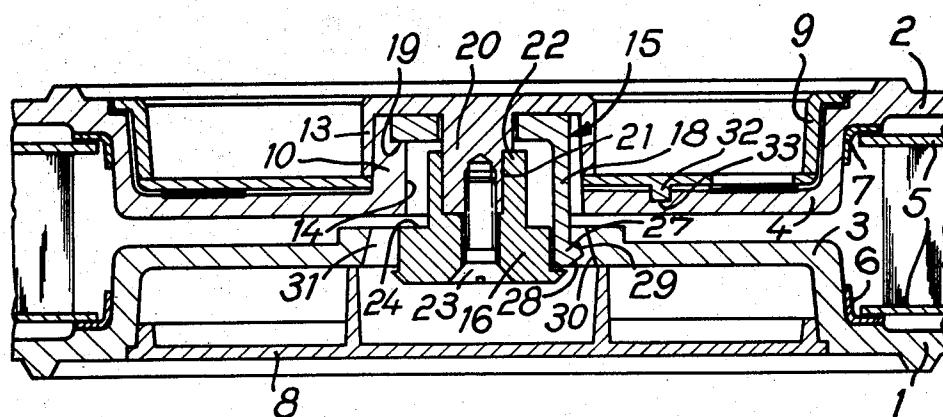


FIG. 1

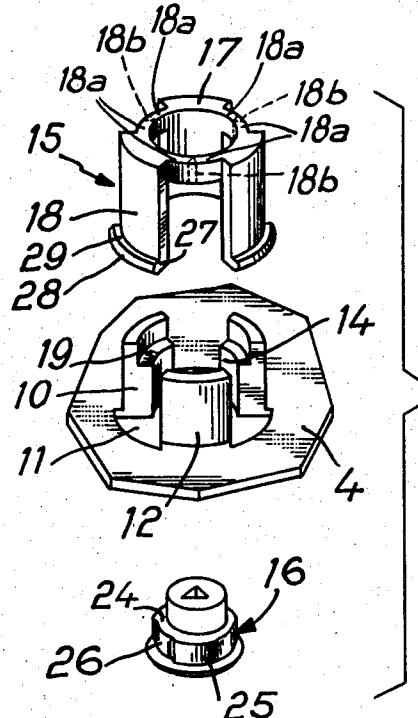


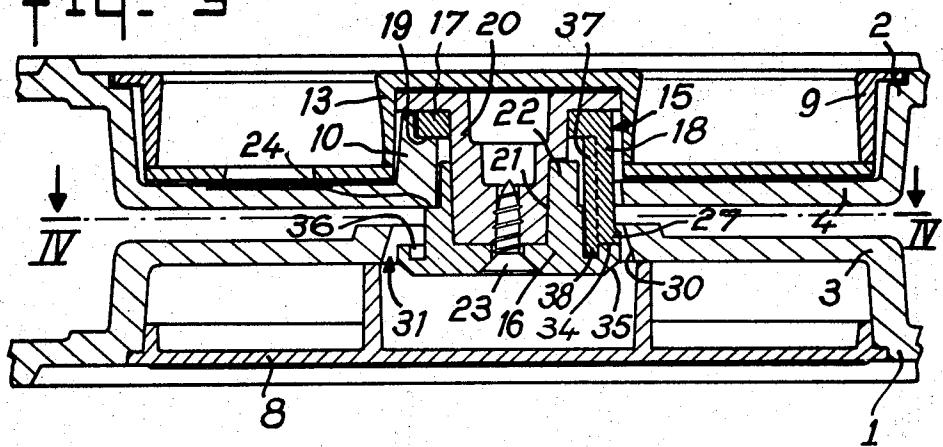
FIG. 2

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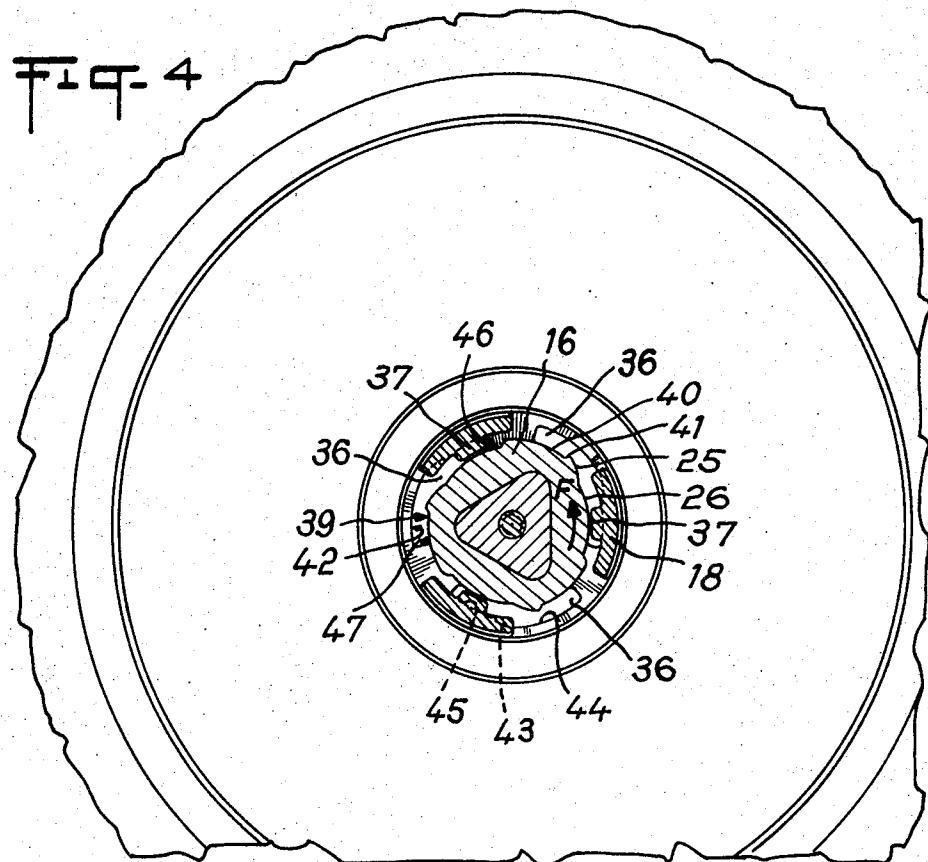
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BOXES FOR PACKAGING A REEL

The present invention relates to a sealed box intended for containing a reel of magnetic tape, cinematographic film or the like and on the one hand enabling it to be insulated in order to preserve it from the effects of external agents and on the other hand enabling it to be protected against shocks and vibrations by holding it tight.

Certain known boxes comprise a body and a cover unitary with inner bosses provided for centering the reel; the body and the cover are provided with a sealing means insulating the reel from the outside and with supple annular beads serving as supports for the sides of said reel; in addition, a locking device is incorporated in the bosses, this device comprising an expandable element generally constituted by a toric ring made of rubber housed in the grooves of sectors guided in radial translation in a first boss and capable of being applied against a seat of the second boss, the sectors being actuated by a cam mounted to rotate coaxially in the first boss.

These known boxes fulfill their functions perfectly because the expandable ring efficiently ensures the central seal and the locking of the cover on the body. These known boxes nevertheless do not enable the reel to be held automatically.

In addition, each box comprising a relatively large number of pieces, the moulds of different types must moulds numerous and precise and the total duration of the manufacturing and assembly operations is long if they are not rendered automatic. Under these circumstances, the series launched must be considerable, otherwise the overall cost of such a box would be relatively high.

The object of the invention is to create a box having the above-mentioned advantages and to improve it:

— by incorporating in this packaging box a locking device which concommittantly ensures on the one hand an efficient tight closure of the two bosses and on the other hand a closeness of these latter producing an actual locking of the reel and a satisfactory peripheral seal;

— by reducing the number of pieces constituting this device and by giving said pieces such a shape that their functioning practically does not depend on their accuracy;

— by determining the shape and relative arrangement of the pieces in order that they may be assembled without glue and dismantled without the use of a tool.

This locking device comprises an expandable means and a rotating actuating cam incorporated in the two bosses of the box and, in accordance with the invention, the expandable means comprises at least three flexible blades extending freely in directions substantially parallel to the axis of rotation of the cam mounted to rotate in one of the bosses, the base of each blade being immobilized in this first boss whilst the free end of this blade bearing against the cam has an outwardly projecting tooth; the second boss delimits a central opening bordered by a truncated seat converging towards the first boss and against which the teeth of said blades are capable of being pressed by the cam in order to provoke, at the same time as the locking of the cover on the body, the mutual approach of these latter in order to hold the reel tight.

According to a particularly advantageous mode of execution enabling the manufacture to be simplified, the assembly to be facilitated and the duration thereof to be reduced, the bases of the flexible blades are connected in order to form a washer interposed between an inner shoulder of a tubular lug of the first boss and a cover mounted to rotate about this lug in which longitudinal grooves are made for the free passage of the flexible blades, these blades abutting against the cam rendered coaxially integral with the cover. The monolithic expandable piece thus obtained is made of moulded thermoplastics material such as a polyformol resin. In addition, the washer connecting the blades preferably presents elements capable of starting a rupture, between the bases of the blades in order that said latter become distinct from one another after assembly of the cam.

The invention will be more readily understood with reference to the accompanying drawings, in which:

FIG. 1 is a partial axial section showing, on a large scale, the central part of a box applying a first embodiment of the locking device according to the invention;

FIG. 2 is a perspective view synoptically illustrating the essential constituent elements of the device shown in FIG. 1;

FIG. 3 is a view similar to FIG. 1, showing a second embodiment of the locking device according to the invention;

FIG. 4 is a section in plan taken along line IV—IV of FIG. 3.

Referring now to the drawings, the box comprises a body 1 and a cover 2 having inwardly 19 coaxial bosses 3 and 4 whose respective lateral walls constitute a centering element for a reel 5.

The body 1 and the cover 2 are provided with annular beads 6 and 7 made of supple material, extending about rounded parts which connect the lateral walls of the bosses to the bases in order to serve as support for the sides of the reel.

The bosses 3 and 4 are hollow and their outer opening is obturated for one by an elastically fitted lid 8 and for the other, by a rotatably mounted dish-shaped member 9 with such a shape as to constitute a grip for maneuvering the locking device.

The boss 4 comprises, integral with the rest of the cover 2, a tubular lug 10 in which are made three longitudinal slots 11 which, of this lug, finally leave only 50 tongues 12. On said latter lies a cover 13 forming an integral part with the dish 9. The cover 13 may advantageously constitute the maneuvering grip of this dish and, in this case, it is integral by its ends and its base respectively with the lateral wall and the base of said dish.

In any case, the tongues 12 and the base of the boss 4 define a cruciform aperture 14 for the passage of an expandable piece 15 and an actuation cam 16 described hereinafter.

60 The expandable piece 15 is monolithic and made by moulding a very resistant, geometrically stable and flexible plastics material with a certain stiffness. This material is preferably a polyformol resin known under the name of "delrin."

The piece 15 comprises a rim 17 having three flexible blades 18 laterally projecting in directions perpendicular to its plane. The rim is intended to be mounted

in an upper annular recess 19 of the tongues 12 of the boss 4 so that the blades 18 are housed in the slots 11. It is then covered by the cover 13 and passed through by a central shaft 20 integral with the inside of this latter. The shaft 20 is extended by a triangular coupling part 21 fitted in a sleeve 22 unitary with the cam 16 and fixed by means of a screw 23. In addition, as this cam is not totally inscribable in the aperture 14, its shoulder 24 constitutes an axial stop.

It results from the preceding that:

- the assembly 9, 13, 20 and 16 is free to rotate but immobilized in axial translation relatively to the boss 4,
- the piece 15 is immobilized in axial translation and in rotation relatively to the said boss,
- the blades 18 are free to bend in radial planes,
- however the three pieces 9, 15 and 16 are easily dismountable.

This embodiment permits a simple and economical manufacture of the piece 15 as well as a suitable and rapid assembly thereof and of the other elements 13, 20, 16 and 23.

However, it is obvious that the flexible blades 18 may be independent of one another, from the moment when their respective bases 18a are suitable held in the boss 4, for example as previously between the base of the annular recess 19 and the cover 13.

Moreover, in order not to lose the advantage of the commodity and rapidity of the assembly resulting from the use of a monolithic piece 15, the blades 18 may be connected by a rim 17 having between the bases 18a elements 18b capable of starting a rupture so that said blades are separated from one another as soon as the first locking is effected.

According to the first embodiment of the device shown in FIGS. 1 and 2, the locking is controlled positively, whilst the unlocking is produced automatically by elastic return of the blades.

In this case, the cam 16 is disposed near the free ends of the blades 18 and near their inner face. It has bulges 25 separated by hollows 26. The bulges are shaped so as to tend, during the rotation of the cam, to cause the blades 18 to bend outwardly. On the contrary, when the hollows are located opposite said blades, the latter are not urged and occupy the rest position shown in FIG. 1, towards which they tend to return by elastic return.

The free ends of the blades 18 are provided with teeth 27 projecting towards the periphery and the outer surface of which is defined by two chamfers 28 and 29. These latter are intended to cooperate with a truncated seat 30 bordering a circular opening 31 made at the center of the base of the boss 3 for the passage of the free end of the assembly, cam 16 and expandable piece 15. The seat 30 converges towards the opposite boss 4, and its slope with respect to the axis of rotation is slight.

The chamfer 29 of the teeth 27 of the flexible blades 18 has the same slope as the seat 30. As this slope is light, when the operator turns the dish 9 so that the cam 16 provokes the outward bending of the blades 18, the teeth 27 of said latter are applied against the seat 30, thus ensuring the locking, but at the same time, by reaction of the slightly sloping surfaces of these teeth and this seat, respectively, the two bosses 3 and 4 move together while compressing the supple beads 6 and 7 against the reel 5, this having for its effect to immobilize this latter.

When the operator rotates the dish 9 in the reverse direction for the hollows 26 of the cam to be located opposite the blades 18, said latter return, by elastic return, to their rest position (FIG. 1). The box may then be opened and during the separation of the body and the cover, the assembly 15, 16 may freely pass through the opening 31.

Moreover, in order to render the locked position and the unlocked position sensitive, a pine 32 unitary with the dish 9 is engaged in an arcuate groove 33 made in the base of the boss 4, concentrically to its axis and along an angular aperture of 60° in the example shown where the piece 15 comprises three blades 18.

The chamfer 28 of said blades 18 presents a greater slope with respect to the axis of rotation. It is intended, whilst cooperating with the edge of the seat 30, for provoking the obliteration of these blades in the hardly likely case of their not having completely returned to their rest position.

10 Course, the cam 16 could be mounted to rotate in the boss 3, the piece 15 would then be fixed to the boss 4, but so that its blades are free to bend.

According to the second embodiment of the device 15 illustrated by FIGS. 3 and 4, the locking and unlocking are positively controlled, this contributing a longer-lasting operational security.

In fact, during prolonged use, the flexible blades may undergo an ageing effect which may alter the qualities, 30 particularly of elasticity, of the material which constitutes them. In this eventuality, the blades do not return perfectly into their rest position and the unlocking of the box is incomplete.

In this embodiment, the cam 16, mounted on the shaft 20 is fixed by the screw 23, has an annular shoulder 34 located opposite the free ends of the blades 18 of the expandable piece 15, this shoulder hiding the teeth 27 in retracted unlocked position of the box to be opened.

The cam also presents, opposite the shoulder 34, a chamfer 35 intended for centering the cover 2 with respect to the truncated seat 30 of the body 1, during the closing of the box.

The cam 16 finally defines, inside the shoulder 34 and about the sleeve 22, as many arcuate hollows 36 as the piece 15 comprises blades 18, the angular distribution of these hollows being identical to that of said blades.

Each blade 18 is unitary, on its inner face and over the whole of its length, with a rib 37 extended, beyond the corresponding tooth 27, by a catch 38 engaged in a hollow 36.

The inner side 39 of each hollow cooperates with a catch in order to provoke the bending of the blades 18 towards the outside until the expanded locked position of the closed box. To this end, the side 39 comprises an inclined ramp 25 connecting two arcuate areas 26 and 40 of different radii; a notch 41, provided between the area 40 of larger radius and the summit of the ramp 25 holds the catch 38 in the above-mentioned position.

Similarly, the outer side 42 of each hollow cooperates with the corresponding catch 38 but in order to provoke, on the contrary, the inward bending of the blades 18 until the retracted unlocked position of the box. To this end, the side 42 comprises an inclined ramp 43 shifted angularly with respect to the inner inclined ramp 25 of the same hollow, so as to be "be-

hind" said latter, if the direction of rotation of the cam controlling the unlocking is considered; the ramp 43 connects two arcuate areas 44 and 45 of different radii; the area of smaller radius 45 holds the catch 38 in the above-mentioned position, a notch not being necessary since the blades 18 are retracted elastically.

According to a variant embodiment, the cam 16, instead of being hollowed, may be made in relief. In this case, at least one projecting tongue of the cam is engaged in a slot of the blades 18, but this tongue presents sides having, as in the above embodiment, inclined ramps 25 and 43 called lower or outer ones according to whether they are applied against a surface of the internally or externally directed blades.

Whether it is a question of the second embodiment or of its variant as described hereinabove and whether the flexible blades 18 are independent of one another or connected by means of the rim 17, if the cam 16 is rotated in the direction arrow F, the inclined inner ramps 25 cause the expansion of the blades 18 and the application of their teeth 27 against the truncated bearing 30, whilst then assuring the locking of the previously closed box, as well as the bringing together of the body and of the cover due to which the reel is firmly held by tightening. On the other hand, if the cam 16 is rotated in the direction opposite that of arrow F, the inclined inner ramps 25 release the catches 37 and the blades 18 retract elastically, but if their elastic return is insufficient, the inclined outer ramps 43 provoke this retraction in positive manner and thus the complete unlocking of the box which may then be easily opened.

In order to limit the angular amplitude of the rotation of the cam, the ends 46 and 47 of at least one of the hollows 36 may constitute stops for the corresponding catch 38.

The box provided with the device of the invention is applicable to the packaging of reels of magnetic tape, cinematographic film or the like.

I claim:

1. Box for the packaging of a reel of cinematographic film, magnetic tape or the like, comprising a body and a cover unitary with means provided for centering the reel and in which there is incorporated a locking device comprising an expandable means and a rotary actuation cam, wherein the expandable means comprises at least three flexible blades extending freely in directions substantially parallel to the axis of rotation of the cam rotatably mounted in one of the bosses, the base of each blade is immobilized in this first boss, the free end of each blade bears against the cam and has an outwardly projecting tooth and the second boss defines a central opening bordered by a truncated seat converging towards the first boss and against which the teeth of said blades may be pressed by the cam in order to provoke, at the same time as the locking of the cover on the body, the mutual bringing together of these latter in order to tighten the reel.

2. Box as claimed in claim 1, wherein the bases of the flexible blades are connected together in order to form a washer, the monolithic piece thus obtained is made of moulded plastics material and the washer is interposed, for holding the bases of the blades between an inner shoulder of a tubular lug of the first boss and a cover mounted to rotate about this lug in which longitudinal grooves are made for the free passage of the flexible blades, these blades being in abutment on the cam rendered coaxially unitary with the cover.

3. Box as claimed in claim 2, wherein the above-mentioned washer has elements for starting a rupture between the bases of the blades in order that said latter become distinct from each other after assembly of the cam.

4. Box as claimed in claim 1, wherein the at least flexible blades are made of polyformol resin.

5. Box as claimed in claim 1, wherein the rotary cam positively controls the locking and presents, in order to cooperate with each flexible blade, an inclined ramp applied against the inner surface of this latter and the outer surface of each tooth has two chamfers converging towards the periphery, the terminal centering chamfer being inclined in opposite direction to the holding chamfer, whose slope corresponds to that of the truncated seat of the second boss.

6. Box as claimed in claim 1, wherein the rotary cam positively control the locking and unlocking and has, in order to cooperate with each flexible blade, actuation elements constituted in particular by an inner inclined ramp and an outer inclined ramp shifted angularly with respect to each other.

7. Box as claimed in claim 6, wherein another actuation element cooperating with each flexible blade is constituted by a locking notch in closed position, this notch extending the inner inclined ramp at its end furthest away from the axis of rotation of the cam.

8. Box as claimed in claim 6, wherein another actuation element cooperating with each flexible blade is constituted by an arcuate area for holding in opened position, this area being substantially concentric to the axis of rotation of the cam and extending the outer inclined ramp at its end closest to this axis.

9. Box as claimed in claim 6, wherein the rotary cam defines frontal hollows in which are engaged catches inwardly extending the extreme teeth of the flexible blades, the inner and outer sides of the hollows presenting the above mentioned actuation elements in order to control the catches and therefore the bending of the blades and the ends of at least one hollow cooperate with the corresponding catch by abutment in order to limit the rotation of the cam.

10. Box as claimed in claim 9, wherein the base of the cam defining the above-mentioned hollows covers by its circular contour the teeth of the flexible blades in open position and has a centering chamfer.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,700,098 Dated October 24, 1972

Inventor(s) Pierre A. Posso

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 1, line 29, "mounds" should read --moulds--; line 30, "moulds" should read --be--. Column 2, line 33, "inwardly 19" should read --inwardly projecting--. Column 3, line 24, "are suitable held" should read --are suitably held--.

Signed and sealed this 8th day of May 1973.

(SML)

Attest:

EDWARD M. FITCHER, JR.
Attesting Officer

ROBERT GOTTSCHAALK
Commissioner of Patents