This invention relates to a shrink wrap machine, which includes a central column and a shrink film synchronous transmission equipment. Said central column is provided with a first column and a second column which are configured to mutual suspended separation for removing the connection between the first column and the second column so that the shrink wrap machine can be expand to fit onto the desired diameter range of bottles or cans and increase the application of the shrink-film. When the shrink-film is opened by the first column of the center column, the shrink-film will be continuously transport by the label feeding rollers and the label pulling rollers of said shrink film synchronous transmission equipment. After the shrink-film is cut by the cutter equipment, a piece of the shrink-film will be pulled down by the label pulling rollers and the second guide pulleys and the shrink-film will be wrapped on the surface of the bottles or cans. Then the conveying equipment will convey the bottles and cans toward to the next equipment and making the shrink film and the bottles or cans be shrink packaging completely.
SHRINK WRAP MACHINE
CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application is a continuation-in-part of and claims the priority benefit of U.S. application Ser. No. 14/965,747, filed on Dec. 10, 2015. The entirety of the above-mentioned patent application is hereby incorporated by reference herein and made a part of this specification.

BACKGROUND OF THE INVENTION

[0002] 1. Field of the Invention

[0003] This invention relates to a shrink wrap machine, particularly referring to a shrink wrap machine with a first column and a second column on the center column which are separated from each other in suspended means, so that the cutting knife will not be limited by the cutter trough between the first column and the second column when the cutting knife in cutting the shrink-film.

[0004] 2. Description of the Prior Art

[0005] As shown in FIGS. 1 and 2, as the currently marketed shrink wrap machine, which includes center column provided with a first column A0 and a second A1. There are an active transport wheel set and a driven transport wheel set provided on said first column A0 for pulling down the shrink-film, and a cutter trough A4 is provided between the first column A0 and the second column A1. Said cutter trough A4 is surrounded the periphery of said center column, and the first column A0 and the second column A1 are connected by a center rod B.

[0006] However, because of the center rod B between the first column A0 and the second column A1, all of the cutting knives C0, C1, C2 and C3 of the cutter equipment C of the prior shrink wrap machine cannot pass through the center point of the shrink-film, so that the shrink-film cutting ranges D0, D1, D2 and D3 cut by the cutting knives C0, C1, C2 and C3 will be limited, and it must be set at least four or more cutting knives to cut the shrink-film. Therefore, the cutting efficiency of shrink-film D is not good and the size which the bottles or cans can be wrapped will be limited by said center rod B.

[0007] In addition, the shrink-film cut by the cutter equipment C of the prior shrink wrap machine will generate the shrink wrinkles problem when said shrink-film be transported to the most lower end of the center column A, so that the percent defective of wrapping the bottles or cans will be increased and it results a lower economic benefit problem.

[0008] To this end, the present inventor with many years of experience in the design and manufacture of related equipment, studied the structure problem especially for the foregoing prior art to carry out this invention.

SUMMARY OF THE INVENTION

[0009] The purpose of this invention is to provide a transportation equipment with the label feeding rollers, the label pulling rollers and the cutter equipment provided between the label feeding rollers and the label pulling rollers for unhindered transported any thickness of shrink-film down toward the most lower end of the center column, then to be accurately and completely wrapped on the outer surface of the bottles or cans. Moreover, with the detached and suspended first column and second column, the gap of the cutter trough can be adjusted freely and the range cut by the cutting knives of the cutter equipment will not be limited, so that the application of the shrink-film in the present invention is unrestricted and the shrink-film can be wrapped on the outer surface of any desired diameter range of bottles or cans.

[0010] To achieve the foregoing object, the shrink wrap machine of this invention includes a center column, a shrink film synchronous transmission device and a cutter equipment. Said center column is provided with a first column and a second column which are separated from each other in suspended means, a cutter trough is set between the first column and the second column, at least one pair of symmetrical first guide pulleys with no power are set at two sides of foregoing first column of center column, at least a pair of symmetrical second guide pulleys are set in the rear of the foregoing second column of center column, said second guide pulleys are driven rotation by the power member. Said shrink film synchronous transmission device is set between the first guide pulleys and the second guide pulleys, said shrink film synchronous transmission device is provided with at least a pair of symmetrical label feeding rollers and at least a pair of symmetrical label pulling rollers, the label feeding rollers and the label pulling rollers are driven by the power equipment to synchronous rotation the label feeding rollers and the label pulling rollers, and the first column and the second can be held and suspended in the air respectively by the label feeding rollers and the label pulling rollers. Said cutter equipment is set on the side of the foregoing cutter trough of center column and between the label feeding rollers and the label pulling rollers for cutting the shrink-film on the cutter trough, said cutter equipment is provided with at least one cutting knife(s), the range cut by the cutting knife(s) of the cutter equipment can be equal or more than the radius of the shrink-film.

[0011] The shrink wrap machine of this invention can delete the foregoing first pulleys and the first balanced bearings when the shrink film synchronous transmission device is provided with at least two pair of symmetrical label feeding rollers and at least a pair of symmetrical label pulling rollers.

[0012] The shrink wrap machine of this invention is provided with a plurality of first balanced bearings inside the foregoing first column which are corresponding to each first guide pulleys thereof for co-rotation with the first guide pulleys; a plurality of second balanced bearings are set inside the foregoing second column and corresponding to the upper end and the lower end of each second guide pulleys, the space formed between two adjacent second balanced bearings can contain the second guide pulleys so that the second balanced bearings and the second guide pulleys can be matched with the shrink film synchronous transmission device to jointly balance and position the second column.

[0013] The shrink wrap machine of this invention are respectively set with two first support bearing and two second support bearing inside the foregoing first column and second column and corresponding to the position of each label feeding rollers and each label pulling rollers; the space formed by two adjacent first support bearing is for containing its corresponding label feeding rollers, and the first column of the center column will be held and suspended in the air by the label feeding rollers and the first support bearing; the space formed by two adjacent second support bearing is for containing its corresponding label pulling rollers.
rollers, and the second column of the center column will be held and suspended in the air by the label pulling rollers and the second support bearing.

BRIEF DESCRIPTION OF DRAWINGS

[0014] This invention will be better understood by referring to the accompanying drawings, wherein:

[0015] FIG. 1 is a partial view of the center column of the prior shrink wrap machine;

[0016] FIG. 2 is a partial view of the prior shrink wrap machine, which shows the shrink-film be cut by the cutter equipment;

[0017] FIG. 3 is a partial left side view of the shrink wrap machine in the present invention;

[0018] FIG. 4 is a partial back side view of the shrink wrap machine in the present invention;

[0019] FIG. 5 is a partial right side view of the shrink wrap machine in the present invention;

[0020] FIG. 6 is a partial view of the center column of the shrink wrap machine in the present invention;

[0021] FIG. 7 is a partial view of the center column of the shrink wrap machine in the present invention, which shows the shrink-film be transported by the center column;

[0022] FIG. 8 is a partial view of the shrink wrap machine in the present invention, which shows the shrink-film be cut by the cutter equipment; and

[0023] FIG. 9 is an enlarged view of a part shown in FIG. 7.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0024] Herein below preferred the shrink wrap machine of this invention will be described in detail with reference to the accompanying drawings.

[0025] As shown in FIGS. 3 and 4, the shrink wrap machine of this invention includes at least a center column 1 and a shrink film synchronous transmission device 2 and a cutter equipment 3. Said center column 1 is provided with a first column 1a and a second column 1b which are separated from each other in suspended means, with the separated suspended structure of the first column 1a and the second column 1b, this invention can solve the problem of the prior shrink wrap machine caused by the center rod between the first column 1a and the second column 1b, so that the diameter of the shrink-film 4 used in the shrink wrap machine of this invention will not be limited, and all kinds of diameter of the bottles or cans can be packaged by shrink-film 4 to improve the packing efficiency and application range of the shrink-film 4. There is a cutter trough 1c provided between the first column 1a and the second column 1b, said cutter trough 1c is a kind of through groove and the gap d of the cutter trough 1c can be adjusted freely by adjusting the relative position of the first column 1a and the second column 1b, so that the interval between the cutting knife(s) of the cutter equipment 3 and cutter trough 1c can be reduced for easily to cut the shrink-film.

[0026] As shown in FIGS. 3-7, a shrink film unfolding sheet 10 is fixed on the top of the foregoing first column 1a, so that the flat shrink-film sheet 4 (as shown in FIG. 7) can be unfolded via the foregoing shrink film unfolding sheet 10. At least a pair of symmetrical first guide pulleys 11 with no power are set at two sides of the foregoing first column 1a of center column 1 for balancing the first column 1a and fixing the position of the center column 1 together with the shrink-film 4 synchronous transmission device 2. Said first guide pulleys 11 are placed at the front side and back side of center column 1, the best is corresponding to the orientation of the second guide pulleys 12. A plurality of first balanced bearings 11a are set inside the foregoing first column 1a and corresponding to the first guide pulleys 11 thereof for co-rotation with the first guide pulleys 11.

[0027] At least a pair of symmetrical second guide pulleys 12 are set in the rear of the foregoing second column 1b of center column 1 and distributed on two side of the second column 1b so that the second column 1b will be held and suspended in the air by the symmetrical second guide pulleys 12, said second guide pulleys 12 are driven rotation by the power member 120. A plurality of second balanced bearings 12a are set inside the foregoing second column 1b and corresponding to the upper end and the lower end of each second guide pulleys 12, the space d1 formed between two adjacent second balanced bearings 12a can contain the second guide pulleys 12 so that the second balanced bearings 12a and the second guide pulleys 12 can be matched with the shrink film synchronous transmission device 2 to jointly balance and position the second column 1b. The shrink-film 4 can be wrap on the outer surface of bottles or cans by using the second column 1b pulled down the shrink-film 4 when the shrink-film 4 be transported down to the second column 1b by the label pulling rollers 21 of the shrink film synchronous transmission device 2.

[0028] The shrink film synchronous transmission device 2 is set at the middle position of the foregoing center column 1 and between the first guide pulleys 11 and the second guide pulleys 12, said shrink film synchronous transmission device 2 is provided with at least a pair of symmetrical label feeding rollers 20 and at least a pair of symmetrical label pulling rollers 21. Furthermore, the foregoing first pulleys 11 and the first balanced bearings 11a can be deleted when the shrink film synchronous transmission device 2 is provided with at least two pair of symmetrical label feeding rollers 20 and at least a pair of symmetrical label pulling rollers 21. Said label feeding rollers 20 are symmetrically set on two side of the first column 1a and said label pulling rollers 21 are symmetrically set on two side of the second column 1b, the best is the orientation of the label feeding rollers 20 and the label pulling rollers 21 respectively perpendicular to the orientation of the foregoing first guide pulleys 11 and second guide pulleys 12. The label feeding rollers 20 and the label pulling rollers 21 are driven by the power equipment 22 (belonging to conventional, no repeat) to synchronous rotation the label feeding rollers 20 and the label pulling rollers 21, so that the shrink-film 4 transported by the label feeding rollers 20 will be continuously pulled down by the label pulling rollers 21 and this shrink film transported mode will not be limited by the shrink-film with different thickness.

[0029] Inside the foregoing first column 1a and second column 1b, corresponding to the position of each label feeding rollers 20 and each label pulling rollers 21 are respectively set with two first support bearing 20a and second support bearing 21a. The space d2 formed by two adjacent first support bearing 20a is for containing its corresponding label feeding rollers 20 (as FIGS. 6 and 7), and the first column 1a of the center column 1 will be held and suspended in the air by the label feeding rollers 20 and the first support bearing 20a. The first support bearing 20a will be driven rotation by the label feeding rollers 20 to
synchronously transport down the shrink-film when the label feeding rollers 20 are driven rotation by the power equipment 22. In the same way, the space d3 formed by two adjacent second support bearing 21a is for containing its corresponding label pulling rollers 21, and the second column 1b of the center column 1 will be held and suspended in the air by the label pulling rollers 21 and the second support bearing 21a. The second support bearing 21a will be driven rotation by the label pulling rollers 21 to synchronously pull down the shrink-film when the label pulling rollers 21 are driven rotation by the power equipment 22. Therefore, with the label feeding rollers 20, the first support bearing 20a, the label pulling rollers 21 and the second support bearing 21a, the center column 1 can complete the separated suspended structure of the first column 1a and the second column 1b in the present invention, and with the label feeding rollers 20 and the label pulling rollers 21 synchronously transport down the shrink-film 4, this invention can prevent the shrink-film 4 cut by the cutter equipment 3 to generate the shrink wrinkles problem, and no matter what various thickness of the shrink-film 4 all can be unhindered transported down toward the most lower end of the center column 1 then to be wrapped on the outer surface of the bottles or cans by the foregoing second guide pulleys 12 and the second balanced bearings 12a.

As shown in FIGS. 6-9, the cutter equipment 3 is set on the side of the foregoing cutter trough 1c of center column 1 and between the label feeding rollers 20 and the label pulling rollers 21 for cutting the shrink-film 4 on the cutter trough 1c. The cutter equipment 3 can be composed of one or more cutting knife(s), it’s all depending on the requirement of the user. In the embodiment of the three cutting knives 30, 31 and 32 of the cutter equipment 3 shown in FIGS. 8 and 9, with the separated suspended structure of the center column 1 and the through groove structure of the cutter trough 1c, the range cut by the cutting knives 30, 31 and 32 of the cutter equipment 3 can be equal or more than the radius of the shrink-film 4, to make the cutting knives 30, 31 and 32 of the cutter equipment 3 achieve the effect of to increase cutting range, not to be restricted by cutter trough 1c, to reduce the number of cutting knife and to regularly cut off the shrink-film 4, so that, even if with only a cutting knife, it also cut the whole shrink-film. Therefore, the shrink-film 4 with the minimum diameter can be cut off and the application of the shrink-film 4 will not be limited.

In summary, with the label feeding rollers 20, the label pulling rollers 21 and the cutter equipment 3 provided between the label feeding rollers 20 and the label pulling rollers 21, this invention can operate matching shrink-film with a variety of thickness, and the shrink-film will be unhindered transported down toward the most lower end of the center column 1 then to be accurately and completely wrapped on the outer surface of the bottles or cans. Moreover, with the detached and suspended first column 1a and second column 1b, the gap d of the cutter trough 1c can be adjusted freely and the range cut by the cutting knives of the cutter equipment 3 will not be limited, so that the application of the shrink-film 4 in the present invention is unrestricted and it can be wrapped on the outer surface of any desired diameter range of bottles or cans. These are advanced components of this invention.

While the preferred embodiments of this invention have been described above, it will be recognized and understood that various modifications may be made therein and appended claims are intended to cover all such modifications that may fall within the spirit and scope of the invention.

What is claimed is:

1. A shrink wrap machine at least comprising:

- a center column is provided with a first column and a second column which are separated from each other in suspended means, a cutter trough is set between the first column and the second column, said cutter trough is a kind of through groove and the gap of the cutter trough can be adjusted freely by adjusting the relative position of the first column and the second column, a shrink film unfolding sheet is fixed on the top of the foregoing first column, at least one pair of symmetrical first guide pulleys with no power are set at two sides of foregoing first column of center column for balancing and holding the first column, at least a pair of symmetrical second guide pulleys are set in the rear of the foregoing second column of center column and distributed on two side of the second column for holding and suspending the second column in the air, said second guide pulleys are driven rotation by the power member;

- a shrink film synchronous transmission device is set between the first guide pulleys and the second guide pulleys, said shrink film synchronous transmission device is provided with at least a pair of symmetrical label feeding rollers and at least a pair of symmetrical label pulling rollers, said label feeding rollers are symmetrically set on two side of the first column and said label pulling rollers are symmetrically set on two side of the second column, the label feeding rollers and the label pulling rollers are driven by the power equipment to synchronous rotation the label feeding rollers and the label pulling rollers, and the first column and the second column can be held and suspended in the air respectively by the label feeding rollers and the label pulling rollers; and

2. The shrink wrap machine as claimed in claim 1, wherein the orientation of said second guide pulleys is corresponding to the orientation of said first guide pulleys.

3. The shrink wrap machine as claimed in claim 1, wherein a plurality of first balanced bearings are set inside the foregoing first column and corresponding to each first guide pulleys thereof for co-rotation with the first guide pulleys.

4. The shrink wrap machine as claimed in claim 1, wherein a plurality of second balanced bearings are set inside the foregoing second column and corresponding to the upper end and the lower end of each second guide pulleys, the space d1 formed between two adjacent second balanced bearings can contain the second guide pulleys so that the second balanced bearings and the second guide pulleys can be matched with the shrink film synchronous transmission device to jointly balance and position the second column.
5. The shrink wrap machine as claimed in claim 1, wherein the orientation of the label feeding rollers and the label pulling rollers are perpendicular to the orientation of the first guide pulleys and the second guide pulleys.

6. The shrink wrap machine as claimed in claim 1, wherein inside the foregoing first column, corresponding to the position of each label feeding rollers is set with two first support bearing, the space formed by two adjacent first support bearing is for containing its corresponding label feeding rollers and the first column of the center column will be held and suspended in the air by the label feeding rollers and first support bearing.

7. The shrink wrap machine as claimed in claim 1, wherein inside the foregoing second column, corresponding to the position of each label pulling rollers is set with two second support bearing, the space d3 formed by two adjacent second support bearing is for containing its corresponding label pulling rollers, and the second column of the center column will be held and suspended in the air by the label pulling rollers and the second support bearing.

8. A shrink wrap machine at least comprising:
   a center column is provided with a first column and a second column which are separated from each other in suspended means, a cutter trough is set between the first column and the second column, said cutter trough is a kind of through groove and the gap of the cutter trough can be adjusted freely by adjusting the relative position of the first column and the second column, a shrink film unfolding sheet is fixed on the top of the foregoing first column, at least a pair of symmetrical second guide pulleys are set in the rear of the foregoing second column of center column and distributed on two side of the second column for holding and suspending the second column in the air, said second guide pulleys are driven rotation by the power member;
   a shrink film synchronous transmission device is set between the first guide pulleys and the second guide pulleys, said shrink film synchronous transmission device is provided with at least two pair of symmetrical label feeding rollers and at least a pair of symmetrical label pulling rollers, said label feeding rollers are symmetrically set on two side of the first column and said label pulling rollers are symmetrically set on two side of the second column, the label feeding rollers and the label pulling rollers are driven by the power equipment to synchronous rotation the label feeding rollers and the label pulling rollers, and the first column and the second can be held and suspended in the air respectively by the label feeding rollers and the label pulling rollers; and
   a cutting equipment is set on the side of the foregoing cutter trough of center column and between the label feeding rollers and the label pulling rollers for cutting the shrink-film on the cutter trough, said cutting equipment is provided with at least one cutting knife(s), and the range cut by the cutting knife(s) of the cutting equipment can be equal or more than the radius of the shrink-film.

9. The shrink wrap machine as claimed in claim 8, wherein a plurality of second balanced bearings are set inside the foregoing second column and corresponding to the upper end and the lower end of each second guide pulleys, the space formed between two adjacent second balanced bearings can contain the second guide pulleys so that the second balanced bearings and the second guide pulleys can be matched with the shrink film synchronous transmission device to jointly balance and position the second column.

10. The shrink wrap machine as claimed in claim 8, wherein the orientation of the label feeding rollers and the label pulling rollers are perpendicular to the orientation of the first guide pulleys and the second guide pulleys.

11. The shrink wrap machine as claimed in claim 8, wherein inside the foregoing first column, corresponding to the position of each label feeding rollers is set with two first support bearing, the space formed by two adjacent first support bearing is for containing its corresponding label feeding rollers and the first column of the center column will be held and suspended in the air by the label feeding rollers and first support bearing.

12. The shrink wrap machine as claimed in claim 8, wherein inside the foregoing second column, corresponding to the position of each label pulling rollers is set with two second support bearing, the space formed by two adjacent second support bearing is for containing its corresponding label pulling rollers, and the second column of the center column will be held and suspended in the air by the label pulling rollers and the second support bearing.

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