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(54) SOLID PREPARATION PACKAGING DEVICE, AND SOLID PREPARATION PACKAGING PAPER ROLL

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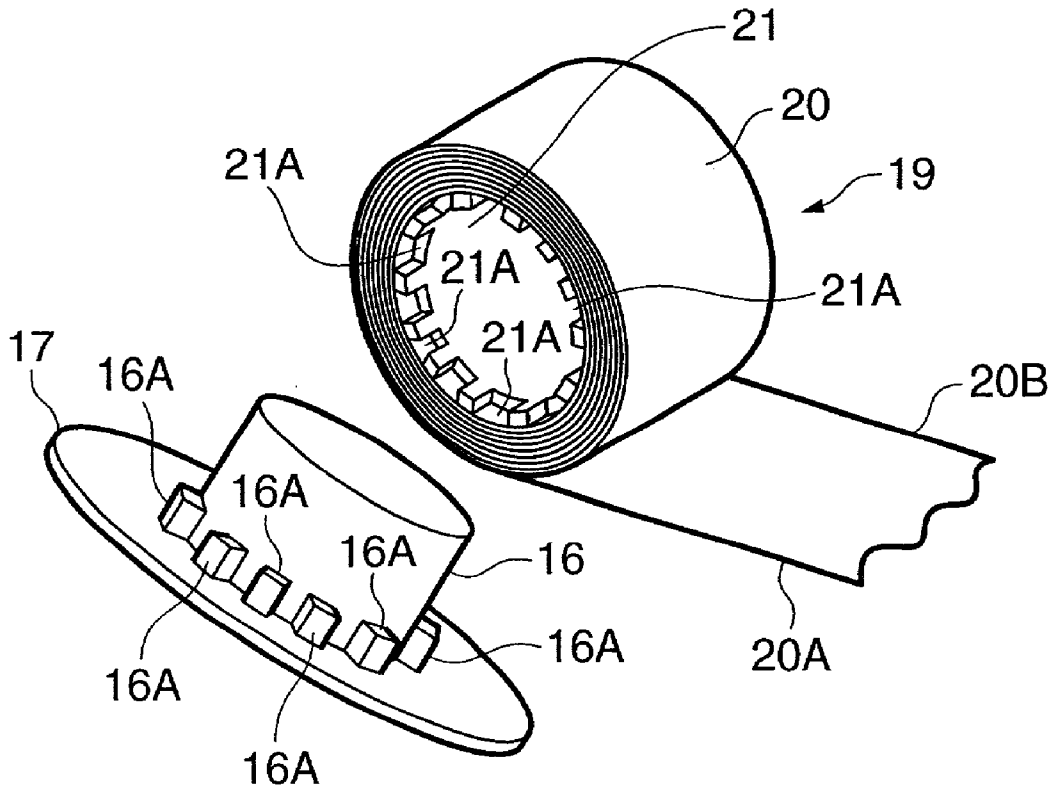
(57) ABSTRACT

There is disclosed a solid preparation packaging apparatus in which a slip can be prevented from being generated between a packaging paper roll and a rotation shaft with the roll attached thereto by a simple constitution without inhibiting a replacing operation. The solid preparation packaging apparatus comprises: a plurality of tablet cases in which respective types of solid preparations are contained; and a thermally fusible packaging paper wound around in a roll shape, so that the solid preparation discharged from the tablet case is packaged in the packaging paper, wherein the packaging paper is wound around a periphery of a shaft member detachably attached to the rotation shaft to form the roll shape, an engaging portion is formed in the rotation shaft, and an engaged portion attachably/detachably joined to the engaging portion is formed in the shaft member.



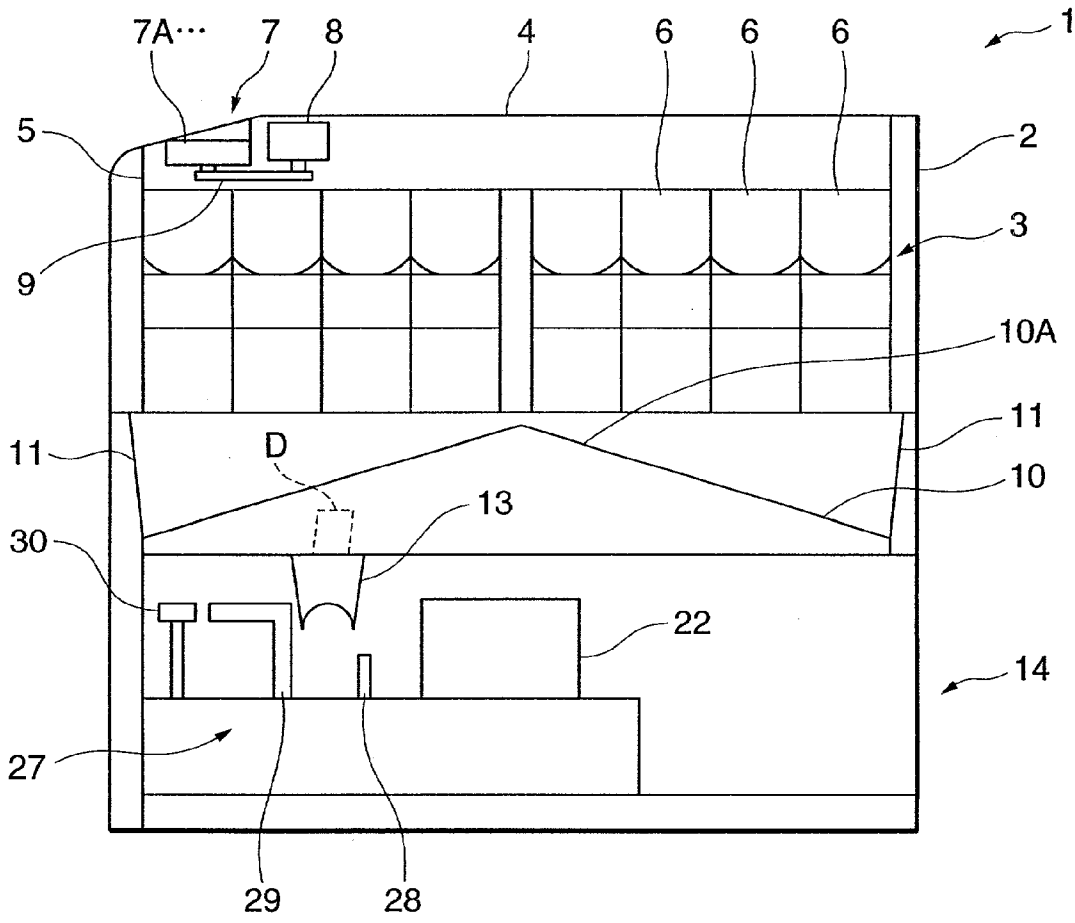


FIG. 1

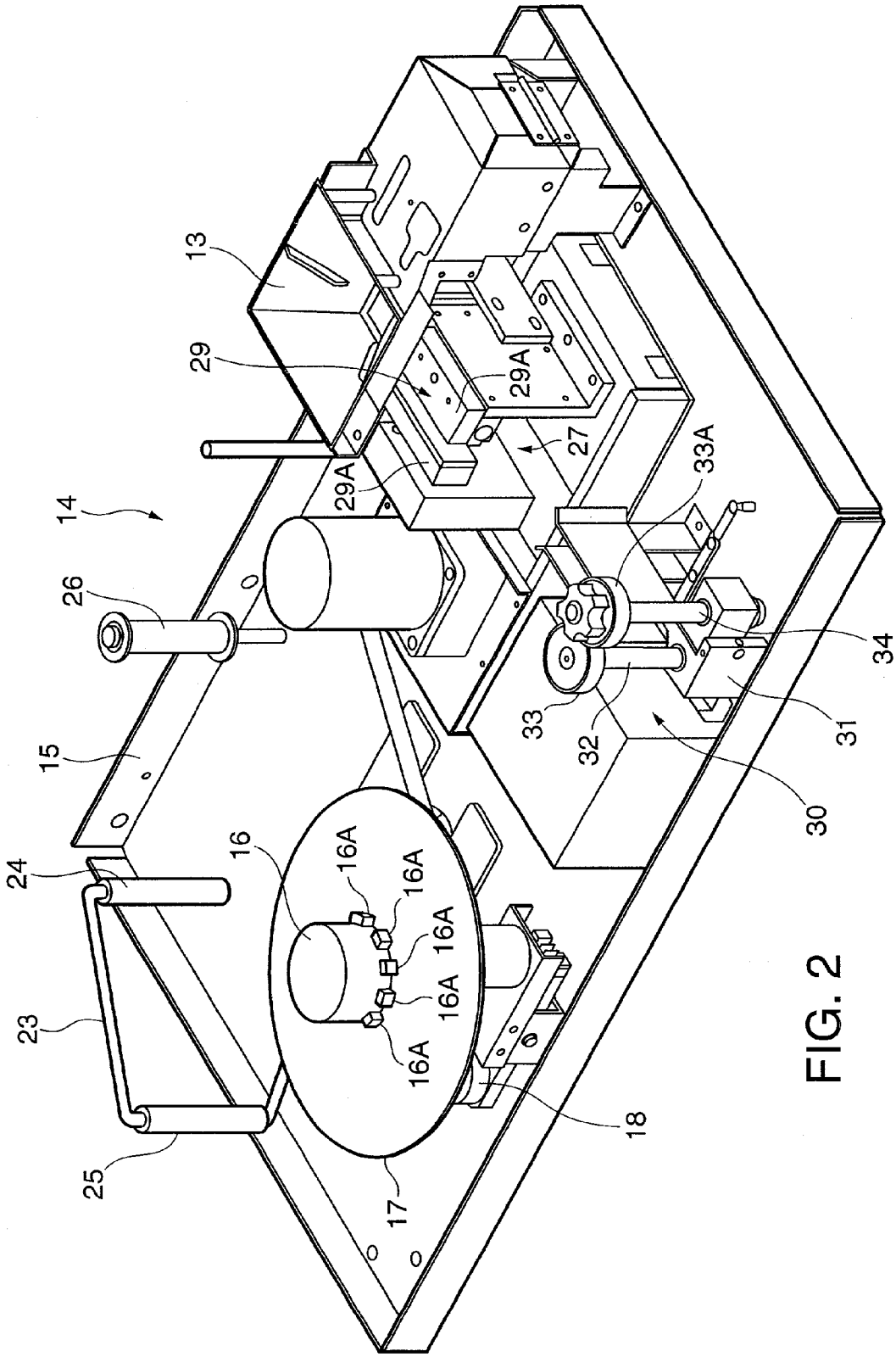
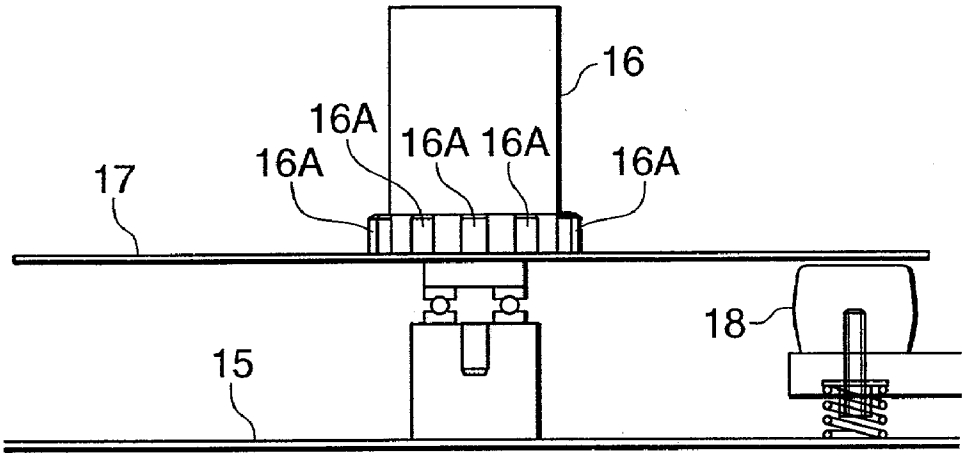


FIG. 2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16A
16A
16A
16A
16A
17
18
15

FIG. 3

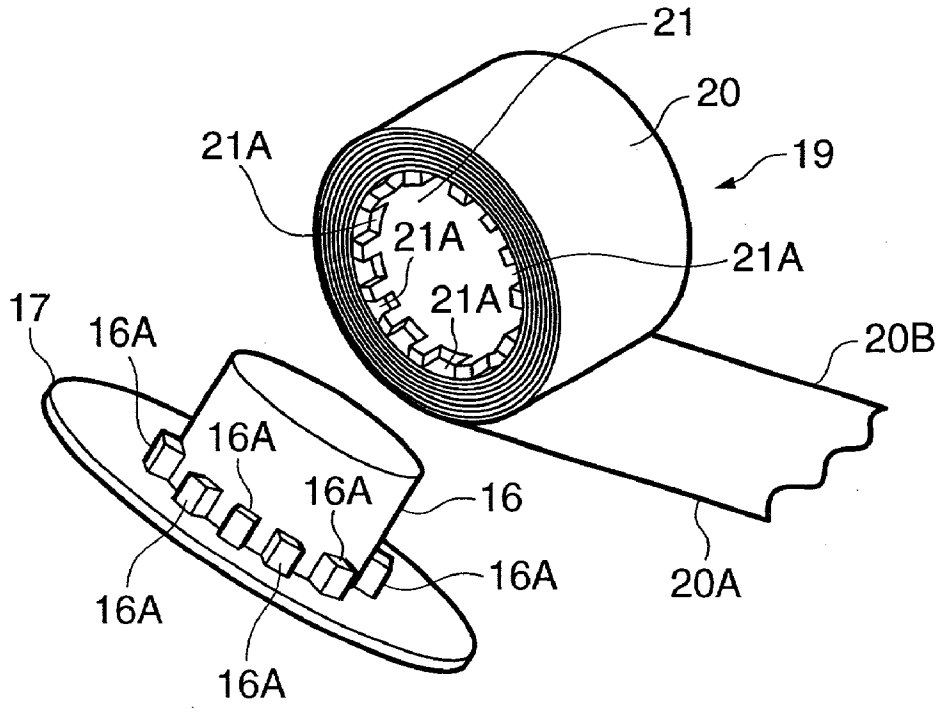

21
20
19
21A
21A
21A
21A
17
16A
20B
16A
16A
16
16A
16A
16A
20A

FIG. 4

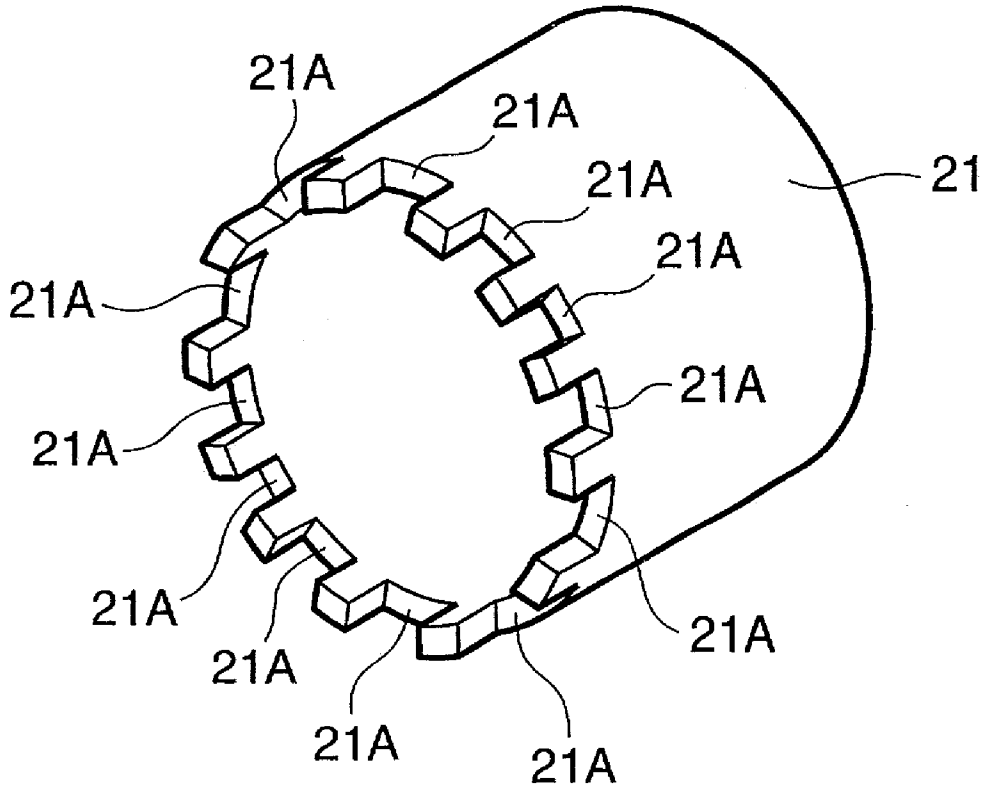
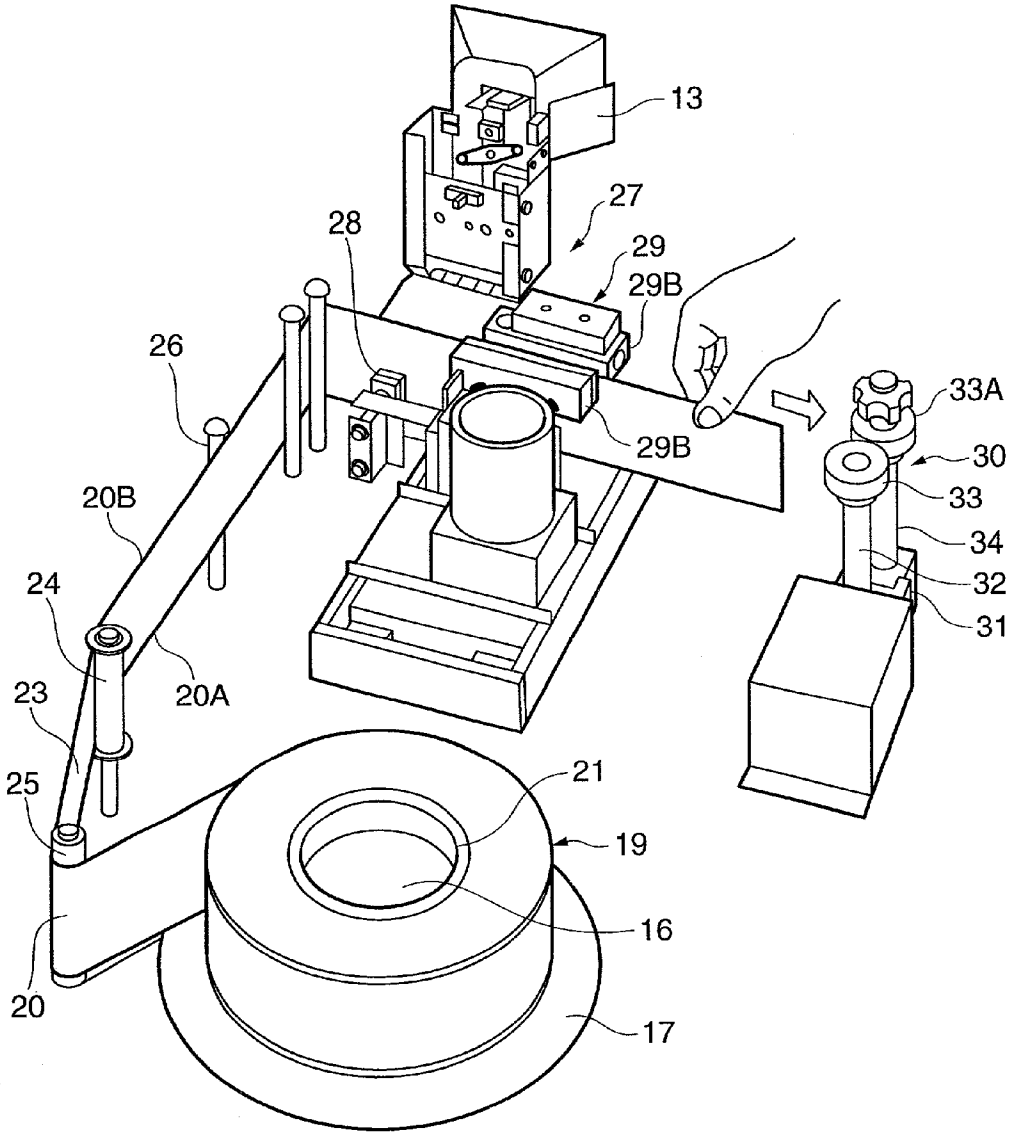


FIG. 5


13
27
28
29
29B
26
29B
33A
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20B
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34
24
32
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20A
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21
25
19
16
20
17

FIG. 6

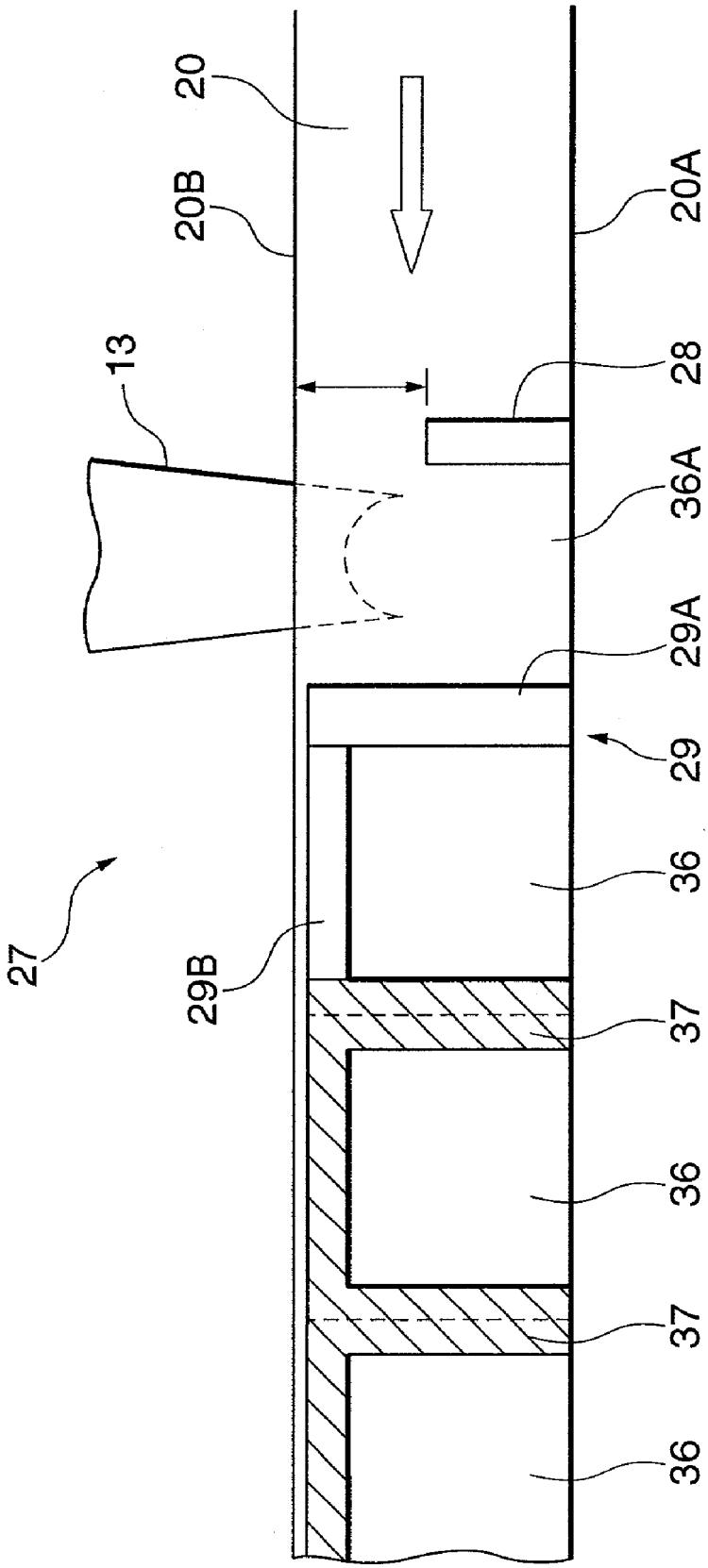

FIG. 7

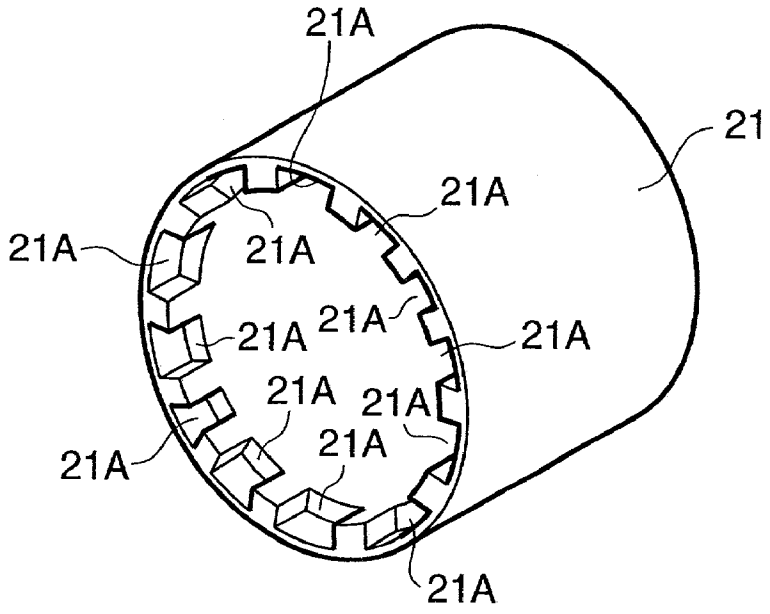

FIG. 8

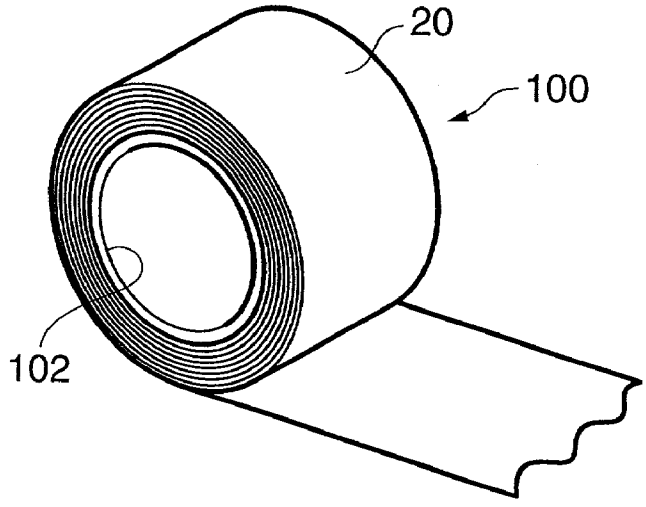

FIG. 9

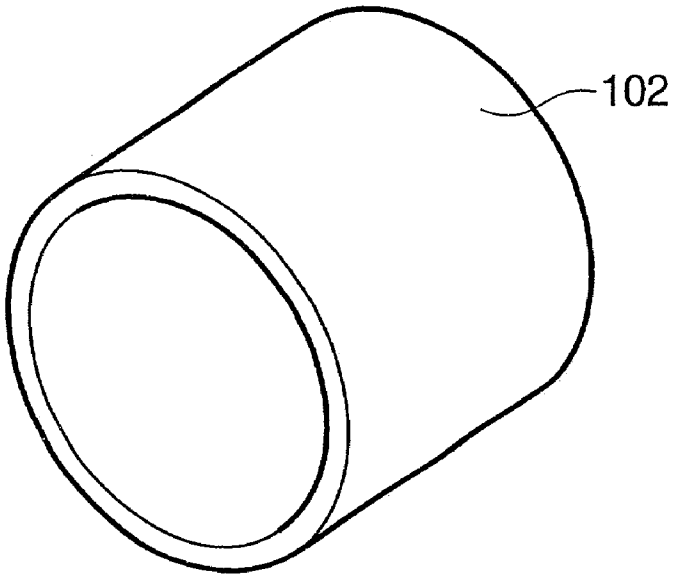

FIG. 10

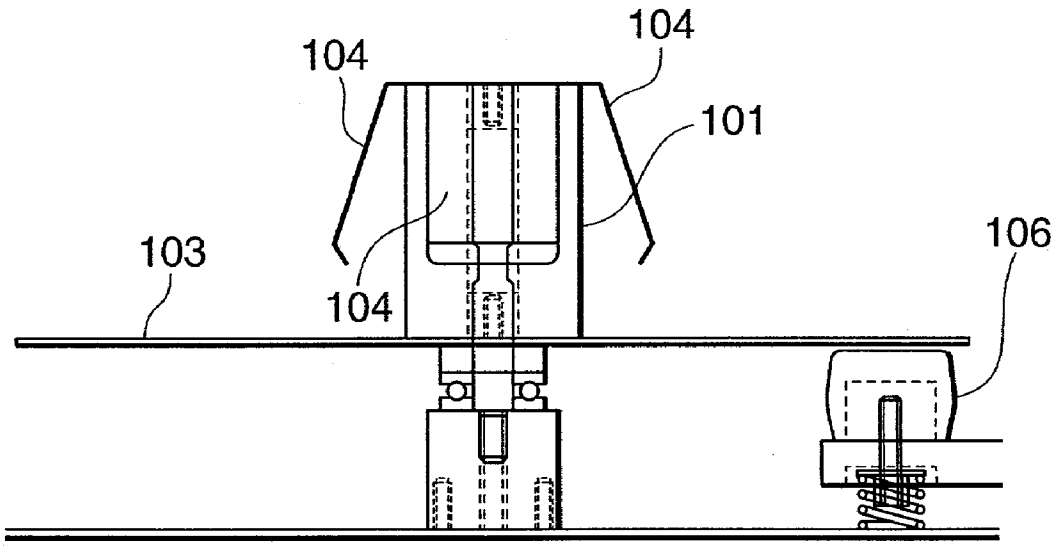

FIG. 11

SOLID PREPARATION PACKAGING DEVICE, AND SOLID PREPARATION PACKAGING PAPER ROLL

TECHNICAL FIELD

[0001] The present invention relates to a solid preparation packaging apparatus for packaging a solid preparation (hereinafter, the solid preparation refers to all solidified preparations such as a tablet, capsule, pill, and troche) designated by a prescription in a packaging paper in a hospital, pharmacy, and the like, and a packaging paper roll for the solid preparation for use in the solid preparation packaging apparatus.

BACKGROUND ART

[0002] In a hospital, and the like, a tablet filling machine disclosed, for example, in Japanese Patent Publication No. 59/1991 (A61J3/00) has heretofore been used to divide and package a plurality of types of solid preparations prescribed by a doctor for each one dosage so that the preparations are dispensed to a patient. In this case, the plurality of types of solid preparations are discharged for each one dosage via each tablet case, and collected by a hopper, conveyor, and the like, subsequently a packaging paper is drawn from a packaging paper roll and thermally welded, and the preparations are divided and packaged in small pouches.

[0003] Moreover, there is a tablet packaging apparatus for filling a bag or the like with each type of prescribed solid preparation and dispensing the preparation to a patient. In a structure of the packaging apparatus, the packaging paper roll having a packaging paper wound around a shaft member in a roll shape is attached in a predetermined position, an end of the packaging paper is drawn from the roll, and the paper is passed through various rollers, solid preparation chute section, heat seal mechanism, and the like.

[0004] Such a conventional packaging paper roll **100** and a packaging apparatus rotation shaft **101** with the roll attached thereto are shown in FIGS. **9** to **11**. The conventional packaging paper roll **100** is constituted of a hollow tubular shaft member (hereinafter referred to as a paper tube) **102** of a boxboard shown in **FIG. 10**, and a packaging paper **20** wound around the member. The packaging paper **20** is used to contain and package the solid preparation, and constituted of a thermally fusible thin paper using an auxiliary medium of polyethylene or another thermally fusible material which melts at a predetermined temperature. The longitudinal paper with a predetermined width is wound around the shaft member **102** in a roll shape.

[0005] Moreover, the packaging paper **20** is folded into two from substantially a central portion of a width direction, and doubly folded/bent. A double folded/bent portion forms a folded portion **20**A, and opposite ends of the double folded/bent portion form an opening **20**B (on a side opposite to the folded portion **20**A). The packaging paper **20** is wound around the shaft member **102** in a double folded state, and the wound packaging paper **20** is drawn from a terminal end of the paper.

[0006] On the other hand, the rotation shaft **101** with the packaging paper roll **100** attached thereto is rotatably and vertically formed in a not-shown packaging apparatus, and a disc-shaped base plate **103** is disposed in a bottom portion of the roll. A plurality of spring members **104** directed downward from an upper end, expanding outwardly and descending are attached to a periphery of the rotation shaft **101**, and a brake **106** driven by a solenoid is disposed under the base plate **103**. The brake **106** abuts on the base plate **103** (rotation shaft **101**), applies a resistance to rotation of the shaft and is disposed in order to adjust a tension applied to the drawn packaging paper **20**.

[0007] Moreover, when the packaging paper roll **100** is attached to the rotation shaft **101**, the rotation shaft **101** is inserted into shaft member **102** and the packaging paper roll **100** is laid on the base plate **103**. In this case, the spring member **104** of the rotation shaft **101** expands outside from an inner diameter of the shaft member **102** in a stationary state, and the rotation shaft **101** advances into the shaft member **102** while the spring member **104** is compressed inward by the shaft member **102**. Thereby, the spring member **104** is pressed onto an inner peripheral surface of the shaft member **102** by its restoring force.

[0008] When the solid preparation is packaged, the packaging paper **20** is drawn from the packaging paper roll **100** attached to the rotation shaft **101**, disposed along a predetermined path and used. However, since the conventional spring member **104** is pressed and connected to the inner peripheral surface of the shaft member **102**, a slip is inevitably caused by deterioration with age. If the spring member **104** slips on the inner peripheral surface of the shaft member **102**, a disadvantage occurs: even when the tension is applied to the packaging paper **20** as described above and the paper tries to be drawn, only the packaging paper roll **100** freely rotates.

[0009] In order to solve this problem, the spring member **104** is strengthened, or extended more outwardly so that a press-contact strength of the spring member **104** and shaft member **102** is increased. In this case, when the new packaging paper roll **100** is attached to rotation shaft **101**, or when the shaft member **102** of the used packaging paper roll **100** is pulled from the rotation shaft **101**, an excessively large force is required, and a replacing operation becomes excessively troublesome.

[0010] The present invention has been developed to solve the aforementioned conventional technical problem, and an object thereof is to provide a solid preparation packaging apparatus and a packaging paper roll for a solid preparation in which a slip can be prevented from being generated between a packaging paper roll and a rotation shaft with the roll attached thereto by a simple constitution without inhibiting a replacing operation.

DISCLOSURE OF THE INVENTION

[0011] According to the present invention, there is provided a solid preparation packaging apparatus comprising: a plurality of tablet cases in which respective types of solid preparations are contained; and a thermally fusible packaging paper wound around in a roll shape, so that the solid preparation discharged from the tablet case is packaged in the packaging paper, wherein the packaging paper is wound around a periphery of a shaft member detachably attached to a rotation shaft to form the roll shape, an engaging portion is formed in the rotation shaft, and an engaged portion attachably/detachably joined to the engaging portion is formed in the shaft member.

[0012] Moreover, in the solid preparation packaging apparatus of the present invention, the aforementioned engaging portion is formed to project outside from a base portion of the rotation shaft disposed in an upright manner, the shaft member has a hollow tubular shape, and the engaged portion is notched/formed in an edge of the shaft member.

[0013] Furthermore, in the solid preparation packaging apparatus of the present invention, a plurality of engaging portions and engaged portions are formed.

[0014] Additionally, according to the present invention, there is a packaging paper roll for a solid preparation, comprising: a hollow tubular shaft member; and a thermally fusible packaging paper wound around a periphery of the shaft member, wherein a notch is formed in an edge of the shaft member.

[0015] Moreover, in the packaging paper roll for the solid preparation of the present invention, a plurality of notches are formed.

[0016] Furthermore, in the packaging paper roll for the solid preparation, the notch is formed by cutting an edge of the shaft member to an outer portion from an inner portion of the edge.

[0017] Additionally, in the packaging paper roll for the solid preparation of the present invention, the notch is formed such that an inner portion of an edge of the shaft member is cut/removed, and an outer portion thereof remains uncut.

[0018] According to the present invention, since the engaged portion is formed in the shaft member with the packaging paper wound therearound in the roll shape, the engaging portion formed on the rotation shaft of the solid preparation packaging apparatus with the shaft member attached thereto is attachably/detachably joined into the engaged portion, so that the slip between the rotation shaft and the shaft member can be prevented.

[0019] In this case, since a spring member is not pressed onto the shaft member as in a conventional art, it is extremely easy to attach/detach the shaft member to/from the rotation shaft, and therefore a replacing operation of the packaging paper roll is not inhibited. Particularly, when the engaging portion is formed to project outside from the base portion of the rotation shaft disposed in an upright manner, and the engaged portion is notched/formed in the edge of the hollow tubular shaft member, the engaging portion engages with the engaged portion in a final stage of a series of operation for inserting the rotation shaft into the shaft member, and therefore attaching operability is further enhanced.

[0020] Moreover, when a plurality of engaging and engaged portions are formed, an engaging relation of the shaft member and rotation shaft is further strengthened, and the slip can more firmly be prevented from occurring.

[0021] Furthermore, when the notch is formed by cutting the edge of the shaft member to the outer portion from the inner portion of the edge, the shaft member is easily formed, and a rise of component cost can be minimized.

[0022] Additionally, the notch is formed such that the inner portion of the shaft member edge is cut/removed and the outer portion thereof remains uncut. Then, a disadvantage that the edge of the shaft member is collapsed by a pressure during winding of the packaging paper can be prevented or inhibited.

BRIEF DESCRIPTION OF THE DRAWINGS

[0023] **FIG. 1** is a longitudinal side view of a solid preparation packaging apparatus of the present invention,

[0024] **FIG. 2** is a perspective view of a solid preparation packaging mechanism of the solid preparation packaging apparatus excluding a packaging paper roll according to the present invention,

[0025] **FIG. 3** is a side view of a periphery of a rotation shaft of the solid preparation packaging mechanism of the present invention,

[0026] **FIG. 4** is a perspective view of the rotation shaft and packaging paper roll in the present invention,

[0027] **FIG. 5** is a perspective view of a shaft member of the packaging paper roll of the present invention,

[0028] **FIG. 6** is a perspective view of the solid preparation packaging mechanism in which the packaging paper roll is being charged in the present invention,

[0029] **FIG. 7** is a side view of a heat seal mechanism in the present invention,

[0030] **FIG. 8** is a perspective view of the shaft member of the packaging paper roll according to another embodiment of the present invention,

[0031] **FIG. 9** is a perspective view of a conventional packaging paper roll,

[0032] **FIG. 10** is a perspective view of the shaft member of the packaging paper roll of **FIG. 9**, and

[0033] **FIG. 11** is a side view of the periphery of the rotation shaft of the conventional solid preparation packaging apparatus.

BEST MODE FOR CARRYING OUT THE INVENTION

[0034] An embodiment of the present invention will be described hereinafter in detail with reference to the drawings. **FIG. 1** is a longitudinal side view of a solid preparation packaging apparatus **1** according to one embodiment of the present invention, **FIG. 2** is a perspective view of a solid preparation packaging mechanism **14** of the solid preparation packaging apparatus **1** excluding a packaging paper roll **19** of the present invention, **FIG. 3** is a side view of a periphery of a rotation shaft **15** of the solid preparation packaging mechanism **14**, **FIG. 4** is a perspective view of the rotation shaft **15** and packaging paper roll **19**, **FIG. 5** is a perspective view of a shaft member **21** of the packaging paper roll **19**, **FIG. 6** is a perspective view of the solid preparation packaging mechanism **14** in which the packaging paper roll **19** is being charged, and **FIG. 7** is a side view of a heat seal mechanism **27**.

[0035] The solid preparation packaging apparatus **1** of the present invention is installed in a hospital, dispensing pharmacy, and the like, and constituted of a solid preparation containing mechanism **3** disposed in a rectangular outer case **2**, and the solid preparation packaging mechanism **14** disposed under the containing mechanism. A tablet case con-

tainer **5** of the solid preparation containing mechanism **3** is constituted in an upper portion of the outer case **2**, and an upper surface opening of the tablet case container **5** is openably/closably closed by a top table **4**.

[**0036**] A plurality of tablet cases **6** . . . are contained in the tablet case container **5**, and a sub-container **7** is disposed in a front upper portion of the container. The sub-container **7** contains a solid preparation (e.g., a half cut tablet, and the like) which cannot be contained in the tablet case **6**, and a not-shown belt conveyor (which may be connected via a chain, gear, and the like in this case) is driven by a belt **9** extended to a not-shown rotation shaft pulley of a motor **8**. Moreover, a plurality of container divisions **7**A are continuously disposed in the belt conveyor.

[**0037**] Moreover, discharge counters such as a not-shown photosensor are disposed under the respective tablet cases **6** . . . The discharge counter is connected to the respective upper-side tablet cases **6** . . . , and a motor driven type discharge drum is built in the counter. Furthermore, the discharge drum is structured such that solidified preparations such as a tablet, capsule, pill, and troche are inserted in one upper/lower row into a plurality of grooves in a side surface of the drum. Additionally, when the discharge drum rotates, the solid preparations are dropped one by one from each groove, and the number of the solid preparations is detected and counted by the photosensor.

[**0038**] Moreover, a drop path is formed in one end of the sub-containers **7** . . . , and connected onto a turntable **10** described later. In the constitution, each solid preparation is contained in the container division **7**A of the sub-container **7** as described above, and the solid preparations in the respective container divisions **7**A . . . drop one by one onto the turntable **10** from the drop path during rotation of the motor **8** by an operator's switch operation.

[**0039**] The disc-shaped turntable **10** for collecting the solid preparations is disposed under the respective tablet cases **6** . . . and the drop path, and this turntable **10** has a corresponding area under all the tablet cases **6** . . . and drop path. A ridge **10**A raised in a conical shape is formed in a center portion of the turntable **10**, and the turntable **10** is rotated/driven at a predetermined speed by a not-shown turntable motor disposed under the ridge **10**A.

[**0040**] Moreover, an annular guide **11** is disposed in an upright manner around the turntable **10**, and a discharge port D is notched/formed in an appropriate portion of the guide **11**. A chute **13** described later is disposed under the discharge port D, and in the constitution the solid preparations gathered on a guide **11** side by rotation of the turntable **10** drop into the chute **13**. This chute **13** has an inverse four-sided truncated pyramid shape, the upper end opening thereof is disposed opposite to the discharge port D of the turntable **10**, and a lower open end (tip end) thereof is disposed above the two-folded packaging paper **20** described later.

[**0041**] On the other hand, the solid preparation packaging mechanism **14** is disposed under the turntable **10**. The solid preparation packaging mechanism **14** is constituted by disposing attaching means for attaching the packaging paper roll **19**, guide means for guiding the drawn packaging paper **20** into a predetermined position, and drawing means for pulling a tip end of the packaging paper **20** on a base **15**. The packaging paper attaching means is, as shown in **FIG. 3**, constituted of a rotation shaft **16** rotatably and vertically disposed on the base **15**, a disc-shaped base plate **17** positioned in a bottom of the rotation shaft **16** and projecting outside, a solenoid driven brake **18** disposed under the base plate **17** (between the base plate and the base **15**), and the like.

[**0042**] The rotation shaft **16** has a cylindrical shape with an outer diameter which is substantially equal to (or slightly smaller than) an inner diameter of the shaft member **21** of the packaging paper roll **20** described later, and a plurality of engaging portions **16**A projecting outside from the periphery at a constant interval are formed on a base portion as a base plate **17** side. This engaging portion **16**A has a height of about 5 to 10 mm, and an outward projecting size thereof is substantially equal to a thickness of the shaft member **21**. Moreover, the rotation shaft **16** is attachably/detachably inserted and fit into the shaft member **21** of the packaging paper roll **19**.

[**0043**] Here, the packaging paper roll **19** of the present invention will be described. As shown in **FIG. 5**, the packaging paper roll **19** is constituted of the hollow tubular shaft member (usually referred to as a paper tube) **21** of a boxboard (a hard synthetic resin may be used), and the packaging paper **20** wound around the member. The packaging paper **20** is used to contain and package the solid preparation, and constituted of a thermally fusible thin paper using an auxiliary medium of polyethylene or another thermally fusible material which melts at a predetermined temperature. The longitudinal paper with a predetermined width is wound around the shaft member **21** in the roll shape.

[**0044**] Moreover, the packaging paper **20** is folded into two from substantially a central portion of a width direction, and doubly folded/bent. A double folded/bent portion forms a folded portion **20**A, and opposite ends of the double folded/bent portion form an opening **20**B (on a side opposite to the folded portion **20**A). The packaging paper **20** is wound around the shaft member **21** in a double folded state while the folded portion **20**A is disposed on a lower edge of the shaft member **21**. The wound packaging paper **20** is drawn from a terminal end of the paper (**FIG. 4**).

[**0045**] Furthermore, as shown in **FIG. 5, a** plurality of engaged portions **21**A are notched/formed at a constant interval around a lower edge of the shaft member **21** of the packaging paper roll **19** of the present invention. The engaged portion **21**A is formed by cutting the lower edge of the shaft member **21** to the outer portion from the inner portion of the edge in a rectangular shape, and sized and disposed such that the engaging portion **16**A of the rotation shaft **16** can substantially tightly be fitted.

[**0046**] On the other hand, a tension lever **23** is disposed as guide means beside the rotation shaft **16** in the solid preparation packaging mechanism **14**, and the tension lever **23** is extended between two rollers **24**, **25**. In this case, the roller **24** is fixed to the base **15**, and the roller **25** can rock centering on the roller **24**. The roller is biased in a direction apart from the rotation shaft **16** by a not-shown spring member. Moreover, a position of this roller **25** is detected by a not-shown switch. Additionally, a guide roller **26** is vertically disposed on the base **15** beside the roller **24**.

[**0047**] A drawing roller **30** as drawing means is disposed on the base **15** on a opposite side of the tension lever **23** via

the rotation shaft **16**. The drawing roller **30** is constituted of a pair of narrow rubber rollers (i.e., rollers of a natural rubber, synthetic rubber, and the like) **33**, **33**A, and rotatably attached to upper ends of rotation shafts **32**, **34**. Moreover, the rotation shaft **32** with one rubber roller **33** attached thereto is a rotation shaft of a drawing motor **31**.

[**0048**] Furthermore, the rotation shaft **34** of the other rubber roller **33**A is biased by a not-shown coil spring, one rubber roller **33**A is pressed onto the rubber roller **33** with a predetermined pressure, and in the constitution both the rubber rollers **33**, **33**A rotate by rotation of the drawing motor **31**. Moreover, when the packaging paper **20** (on an opening **20**B side) is held between both the rubber rollers **33**, **33**A, the packaging paper **20** is drawn from the packaging paper roll **19**.

[**0049**] Additionally, the heat seal mechanism **27** is disposed between the guide roller **26** and the drawing roller **30**. The heat seal mechanism **27** for sealing the opening **20**B of the packaging paper **20** by thermal welding and dividing the paper for each dosage is constituted of a pair of tentative heaters **28**, **28** disposed opposite to each other at a predetermined interval, and a pair of main heaters **29**, **29**. Moreover, either one tentative heater **28** and main heater **29** include a not-shown operation apparatus, and are arbitrarily pressed onto or disconnected from the opposite tentative heater **28** and main heater **29**. Furthermore, when the respective tentative heaters **28**, and main heaters **29** are energized, the heaters are heated at a predetermined temperature.

[**0050**] Moreover, the main heaters **29**, **29** are constituted of vertical portions **29**A, **29**A and parallel portions **29**B, **29**B, respectively, the parallel portion **29**B has a width substantially equal to the width of the tentative heater **28**, and the vertical portion **29**A has a width double the width of the parallel portion **29**B. Furthermore, when the packaging paper **20** is held and heated by the tentative heaters **28** on opposite sides, the packaging paper **20** is thermally welded from a folded portion **20**A side to substantially a middle portion between the folded portion and the opening **20**B (a range shown by a solid line arrow of **FIG. 7** is not thermally welded/fixed).

[**0051**] Furthermore, the vertical portion **29**A of the main heater **29** further holds and heats an upper portion above the portion heated and thermally welded by the tentative heaters **28** on opposite sides, and thermally welds and fixes the packaging paper **20** from the folded portion **20**A side to the opening **20**B, so that a pouch **36**A having the opening **20**B on one side is formed on a tentative heater **28** side. Additionally, the parallel portion **29**B is constituted to thermally weld the opening **20**B on the opposite side of the tentative heater **28** (a size between the main heater **29** and the tentative heater **28** in this case).

[**0052**] After the packaging paper **20** is thermally welded by the heat seal mechanism **27**, the paper moves by a predetermined distance on a drawing roller **30** side (in a direction of a hollow arrow of **FIG. 7**) by rotation of the drawing roller **30**, that is, the portion thermally welded by the tentative heater **28** moves toward the main heater **29** (the thermally welded portion of the main heater **29** between the folded portion **20**A and the opening **20**B). Subsequently, when the main heater **29** thermally welds the packaging paper **20**, the pouch **36**A having the opening **20**B is successively formed between the tentative heater **28** and the vertical portion **29**A of main heater **29**, and a thermally welded pouch **36** excluding the folded portion **20**A is formed on the drawing roller **30** side.

[**0053**] Moreover, when the main heater **29** thermally welds the packaging paper **20** on the tentative heater **28** from the folded portion **20**A to the opening **20**B, a plurality of perforation shaped holes **37** are cut/formed substantially in a center of the width of the thermally welded portion (between the folded portion **20**A and the opening **20**B). Thereby, three sides (remaining one side being the folded portion **20**A) of the packaging paper **20** are thermally welded, the pouch **36** having all peripheries sealed is formed, and the pouch **36** can be separated from a cut of the perforation shaped holes **37**.

[**0054**] An operation procedure and action of the solid preparation packaging apparatus **1** constituted as described above according to the present invention will next be described. First, the packaging paper roll **19** is attached to the rotation shaft **16**. In this case, while the rotation shaft **16** is inserted into the shaft member **21**, the packaging paper roll **19** is laid on the base plate **17**. In this case, the engaging portions **16**A . . . of the base portion of the rotation shaft **16** enters the engaged portions **21**A . . . of the lower edge of the shaft member **21** immediately before the packaging paper roll **19** abuts on the base plate **17**.

[**0055**] Subsequently, when the packaging paper roll **19** is laid on the base plate **17**, the engaging portions **16**A . . . of the rotation shaft **16** are attachably/detachably joined into the engaged portions **21**A . . . of the shaft member **21**. Here, for the packaging paper roll **19**, as described above, the packaging paper **20** is folded into two and wound around the shaft member **21**, and has the folded portion **20**A and opening **20**B. Therefore, if the packaging paper roll **19** is attached upside down, the folded portion **20**A and opening **20**B are reversed, and the solid preparation cannot be packaged in the solid preparation packaging mechanism.

[**0056**] Additionally, a user has heretofore sometimes attached the packaging paper roll upside down to the solid preparation packaging mechanism. This is because the upper and lower ends of the packaging paper roll cannot easily be distinguished. In this case, the user does not first notice a mistake until the wrongly attached packaging paper is drawn and attached to the solid preparation packaging mechanism.

[**0057**] However, in the present embodiment, the engaged portions **21**A . . . of the shaft member **21** are formed only in the lower edge of the member. Therefore, even if the user attaches the packaging paper roll **19** upside down, the engaging portion **16**A does not engage with the engaged portion **21**A, and the wrong attachment can be avoided.

[**0058**] After the packaging paper roll **19** is attached to the rotation shaft **16**, the packaging paper **20** of the packaging paper roll **19** is drawn from the tip end thereof, successively passed outside the rollers **25**, **24** of the tension lever **23** and inside the guide roller **26**, subsequently passed between the tentative heater **28** and main heater **29** (chute **13** is turned down), and drawn to the drawing roller **30** (**FIG. 6**).

[**0059**] Subsequently, the tip end of the packaging paper **20** is inserted between both the rubber rollers **33**, **33**A of the drawing roller **30**, and the drawing motor **31** is driven. Then, the rubber rollers **33**, **33**A are pressed onto each other, while

the packaging paper **20** is pulled toward the opposite side (forward side) from the heat seal mechanism **27** side. Therefore, the packaging paper **20** is drawn by the drawing roller **30** and drawn forward.

[**0060**] Here, the roller **25** of the tension lever **23** moves toward the rotation shaft **16** when the tension of the packaging paper **20** becomes strong, and moves apart from the rotation shaft **16** when the tension becomes weak. Subsequently, the movement of the roller **25** is detected by the switch as described above. When the roller is detached from the rotation shaft **16**, the solenoid is driven by a not-shown controller, and the brake **18** is pressed onto the base plate **17**. Subsequently, when the roller **25** moves toward the rotation shaft **16**, the brake **18** is in turn disconnected. Thereby, an appropriate tension is constantly added to the packaging paper **20** drawn from the packaging paper roll **19**.

[**0061**] When the packaging paper roll **19** is attached to the rotation shaft **16** in this manner, and the solid preparation packaging apparatus **1** with the drawn packaging paper **20** attached thereto is operated, a counted value indicating the number of drops of the solid preparation is reset. Moreover, the tentative heater **28** and main heater **29** are heated at the predetermined temperature, and the turntable **10** is energized and constantly rotated. When an operator inputs prescription data into a not-shown input apparatus (personal computer, and the like) based on a doctor's prescription, the discharge drum of the tablet case **6** with the solid preparation contained therein is rotated/driven, and the type of solid preparation designated by the prescription data drops one by one onto the turntable **10**. Moreover, the solid preparation also similarly drops onto the turntable **10** from the sub-container **7** in accordance with a user's arbitrary operation.

[**0062**] The number of solid preparations having dropped from the tablet case **6** is counted by the not-shown controller based on a photosensor output. When the counted number of dropped solid preparations agrees with the number of solid preparations based on the prescription data, the rotation of the discharge drum is stopped, and the dropping of the solid preparation ends. The solid preparations (including the solid preparations from the sub-container **7**) having dropped onto the turntable **10** are moved toward the outside guide **11** and collected by a centrifugal force of the rotating turntable **10**, and drop into the chute **13** disposed below the discharge port D of the guide **11**. Thereby, the solid preparation is passed through the chute **13** and introduced into the pouch **36**A of the packaging paper **20** positioned below the chute.

[**0063**] After the solid preparation is contained in the pouch **36**A of the packaging paper **20** in this manner, the controller pulls the packaging paper **20** by the drawing roller **30**, and thermally welds and seals the pouch in the heat seal mechanism **27** as described above.

[**0064**] Here, a not-shown shutter for entering the pouch **36**A and expanding the opening **20**B is attached to the lower end of the chute **13**. In this case, the tentative heater **28** of the heat seal mechanism **27** thermally welds the packaging paper **20** up to substantially the middle portion between the folded portion **20**A and the opening **20**B of the paper, and the upper portion of the paper is not thermally welded. Therefore, the packaging paper **20** can be drawn by the drawing roller **30** (in the direction of the arrow of **FIG. 7**) without lifting up the shutter of the chute **13**.

[**0065**] Subsequently, when the packaging paper **20** stops moving, the packaging paper **20** is thermally welded again by the main heater **29**, and the solid preparation is packaged into the pouch **36** and contained into the pouch **36**A from the turntable **10** via the chute **13**. This is repeated to automatically package a predetermined number of solid preparations of the type designated based on the prescription data.

[**0066**] With this drawing movement of the packaging paper **20**, the shaft member **21** of packaging paper roll **19** and the rotation shaft **16** also rotate. Additionally, as described above, the engaged portions **21**A . . . are formed in the shaft member **21** of the packaging paper roll **19**, and the engaging portions **16**A . . . attachably/detachably engaging the engaged portions **21**A . . . are formed in the rotation shaft **16**. Therefore, even when the brake **18** for applying the tension to the paper abuts on the base plate **17**, the slip can firmly be prevented from occurring between the rotation shaft **16** and the shaft member **21**.

[**0067**] In this case, the spring member is not pressed onto the shaft member **21** as in the conventional art. Therefore, the shaft member **21** can extremely easily be attached to/detached from the rotation shaft **16**, and the replacing operation of the packaging paper roll **19** is not inhibited. Particularly, since the engaging portions **16**A . . . are formed to project outside from the base portion of the rotation shaft **16** disposed on the base **15** in the upright manner, and the engaged portions **21**A . . . are notched/formed in the lower edge of the hollow tubular shaft member **21**, the engaging portions **16**A . . . engage with the engaged portions **21**A . . . in a final stage of a series of operation for inserting the rotation shaft **16** into the shaft member **21**, and therefore attaching operability is further enhanced.

[**0068**] Moreover, since a plurality of engaging portions **16**A . . . and engaged portions **21**A . . . are formed, an engaging relation of the shaft member **21** and rotation shaft **16** is further strengthened, and slip can more firmly be prevented from occurring.

[**0069**] Additionally, in the present embodiment, the engaged portions **21**A . . . are formed by completely cutting the lower edge of the shaft member **21** of the packaging paper roll **19** as shown in **FIG. 5**. However, as shown in **FIG. 8**, the engaged portions **21**A . . . are formed such that the inner portion of the lower edge of the shaft member **21** is cut/removed, and the outer portion thereof remains uncut. Then, a disadvantage that the lower edge of the shaft member **21** is collapsed by a pressure during winding of the packaging paper **20** can be prevented or inhibited. Additionally, in this case a projecting size of the engaging portion **16**A of the rotation shaft **16** is adjusted in accordance with a size of the engaged portion **21**A.

[**0070**] Moreover, in the present embodiment the present invention is applied to the apparatus for collecting the solid preparation by the turntable, but the present invention is also effective for the apparatus for collecting the solid preparation by a belt conveyor, and the like.

[**0071**] Possibility of Industrial Utilization

[**0072**] As described above, according to the present invention, since an engaged portion is formed in a shaft member with a packaging paper wound therearound in a roll shape, an engaging portion formed on a rotation shaft of a solid preparation packaging apparatus with the shaft member attached thereto is attachably/detachably joined into the

engaged portion, so that a slip between the rotation shaft and the shaft member can be prevented.

[0073] In this case, since a spring member is not pressed onto the shaft member as in a conventional art, it is extremely easy to attach/detach the shaft member to/from the rotation shaft, and therefore a replacing operation of the packaging paper roll is not inhibited. Particularly, when the engaging portion is formed to project outside from a base portion of the rotation shaft disposed in an upright manner, and the engaged portion is notched/formed in an edge of the hollow tubular shaft member, the engaging portion engages with the engaged portion in a final stage of a series of operation for inserting the rotation shaft into the shaft member, and therefore attaching operability is further enhanced.

[0074] Moreover, when a plurality of engaging and engaged portions are formed, an engaging relation of the shaft member and rotation shaft is further strengthened, and the slip can more firmly be prevented from occurring.

[0075] Furthermore, when the notch is formed by cutting the edge of the shaft member to an outer portion from an inner portion of the edge, the shaft member is easily formed, and a rise of component cost can be minimized.

[0076] Additionally, the notch is formed such that the inner portion of the shaft member edge is cut/removed and the outer portion thereof remains uncut. Then, a disadvantage that the edge of the shaft member is collapsed by a pressure during winding of the packaging paper can be prevented or inhibited.

1. A solid preparation packaging apparatus comprising: a plurality of tablet cases in which respective types of solid preparations are contained; and a thermally fusible packaging paper wound around in a roll shape, so that the solid preparation discharged from said tablet case is packaged in said packaging paper,

wherein said packaging paper is wound around a periphery of a shaft member detachably attached to a rotation shaft to form the roll shape, an engaging portion is formed in said rotation shaft, and an engaged portion attachably/detachably joined to said engaging portion is formed in said shaft member.

2. The solid preparation packaging apparatus according to claim 1 wherein the engaging portion is formed to project outside from a base portion of the rotation shaft disposed in an upright manner, the shaft member has a hollow tubular shape, and the engaged portion is notched/formed in an edge of the shaft member.

3. The solid preparation packaging apparatus according to claim 1 or **2** wherein a plurality of engaging portions and engaged portions are formed.

4. A packaging paper roll for a solid preparation, comprising: a hollow tubular shaft member; and a thermally fusible packaging paper wound around a periphery of the shaft member,

wherein a notch is formed in an edge of said shaft member.

5. The packaging paper roll for the solid preparation according to claim 4 wherein a plurality of notches are formed.

6. The packaging paper roll for the solid preparation according to claim 5 wherein the notch is formed by cutting an edge of the shaft member to an outer portion from an inner portion of the edge.

7. The packaging paper roll for the solid preparation according to claim 5 wherein the notch is formed such that an inner portion of an edge of the shaft member is cut/removed, and an outer portion of the edge of the shaft member remains uncut.

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