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Plasticizing device, injection molding apparatus, and three-dimensional shaping apparatus

Abstract

A plasticizing device includes a plasticizing mechanism including a feeding port for receiving a material and configured to plasticize the material to generate a melted material and a material feeding mechanism configured to feed the material to the plasticizing mechanism. The material feeding mechanism includes a housing including a depositing port communicating with the feeding port, the housing storing the material, and a rotating member housed in the housing and capable of rotating along an inner edge of the housing. A plurality of through-holes are provided in the rotating member at intervals along an outer circumference of the rotating member. When the rotating member rotates and any one of the plurality of through-holes and the depositing port communicate, the material stored in the housing is fed from the feeding port to the plasticizing mechanism through the depositing port.

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Background/Summary

(1) The present application is based on, and claims priority from JP Application Serial Number 2020-140803, filed Aug. 24, 2020, the disclosure of which is hereby incorporated by reference herein in its entirety.
BACKGROUND
1. Technical Field

(2) The present disclosure relates to a plasticizing device, an injection molding apparatus, and a three-dimensional shaping apparatus.

2. Related Art

(3) There has been known an injection molding apparatus that feeds a material plasticized by a plasticizing device to a cavity formed by a pair of molds and ejects the material from a nozzle.

(4) For example, JP-A-2010-241016 (Patent Literature 1) describes a plasticizing and delivering device including a rotor on which a spiral groove is formed, a barrel that is in contact with an end face of the rotor, a material inflow pas sage communicating with the spiral groove being formed in the center of the barrel. Pellet-like resin used as a material is stored in a hopper and fed from the hopper to a feeding port located at the radial direction outer side end portion of the spiral groove.

(5) In the plasticizing and delivering device described in Patent Literature 1, the material is fed to the rotor when the rotor rotates and the feeding port of the rotor and a depositing port of the hopper overlap. Accordingly, if a large amount of the material is deposited in the hopper, in some case, the hopper is clogged with the material near the depositing port and the material is not fed to the rotor.

SUMMARY

(6) A plasticizing device according to an aspect of the present disclosure includes: a plasticizing mechanism including a feeding port for receiving a material and configured to plasticize the material to generate a melted material; and a material feeding mechanism configured to feed the material to the plasticizing mechanism. The material feeding mechanism includes: a housing including a depositing port communicating with the feeding port, the housing storing the material; and a rotating member housed in the housing and capable of rotating along an inner edge of the housing. A plurality of through-holes are provided in the rotating member at intervals along an outer circumference of the rotating member. When the rotating member rotates and any one of the plurality of through-holes and the depositing port communicate, the material stored in the housing is fed from the feeding port to the plasticizing mechanism through the depositing port.

(7) An injection molding apparatus according to an aspect of the present disclosure includes: a plasticizing device that plasticizes a material into a melted material; and a nozzle that ejects, to a mold, the melted material fed from the plasticizing device. The plasticizing device includes: a plasticizing mechanism including a feeding port for receiving the material and configured to plasticize the material to generate the melted material; and a material feeding mechanism configured to feed the material to the plasticizing mechanism. The material feeding mechanism includes: a housing including a depositing port communicating with the feeding port, the housing storing the material; and a rotating member housed in the housing and capable of rotating along an inner edge of the housing. A plurality of through-holes are provided in the rotating member at intervals along an outer circumference of the rotating member. When the rotating member rotates and any one of the plurality of through-holes and the depositing port communicate, the material stored in the housing is fed from the feeding port to the plasticizing mechanism through the depositing port.

(8) A three-dimensional shaping apparatus according to an aspect of the present disclosure is a three-dimensional shaping apparatus that shapes a three-dimensional shaped object, the three-dimensional shaping apparatus including: a plasticizing device that plasticizes a material into a melted material; and a nozzle that discharges, toward a stage, the melted material fed from the plasticizing device. The plasticizing device includes: a plasticizing mechanism including a feeding port for receiving the material and configured to plasticize the material to generate the melted material; and a material feeding mechanism configured to feed the material to the plasticizing mechanism. The material feeding mechanism includes: a housing including a depositing port communicating with the feeding port, the housing storing the material; and a rotating member housed in the housing and capable of rotating along an inner edge of the housing. A plurality of through-holes are provided in the rotating member at intervals along an outer circumference of the rotating member. When the rotating member rotates and any one of the plurality of through-holes

and the depositing port communicate, the material stored in the housing is fed from the feeding port to the plasticizing mechanism through the depositing port.

Description

BRIEF DESCRIPTION OF THE DRAWINGS
(1) FIG. **1** is a side view schematically showing an injection molding apparatus according to an embodiment.
(2) FIG. **2** is a sectional view schematically showing the injection molding apparatus according to the embodiment.
(3) FIG. **3** is a perspective view schematically showing a flat screw of the injection molding apparatus according to the embodiment.
(4) FIG. **4** is a plan view schematically showing a barrel of the injection molding apparatus according to the embodiment.
(5) FIG. **5** is a sectional view schematically showing a plasticizing device of the injection molding apparatus according to the embodiment.
(6) FIG. **6** is a perspective view schematically showing the plasticizing device of the injection molding apparatus according to the embodiment.
(7) FIG. **7** is a plan view schematically showing the plasticizing device of the injection molding apparatus according to the embodiment.
(8) FIG. **8** is a plan view schematically showing the plasticizing device of the injection molding apparatus according to the embodiment.
(9) FIG. **9** is a sectional view schematically showing a three-dimensional shaping apparatus according to the embodiment.
DESCRIPTION OF EXEMPLARY EMBODIMENTS
(10) Preferred embodiments of the present disclosure are explained in detail below with reference to the drawings. The embodiments explained below do not unduly limit the content of the present disclosure described in the appended claims. Not all of components explained below are essential constituent elements of the present Disclosure.
(11) 1. Injection Molding Apparatus
(12) 1.1 Overall Configuration
(13) First, an injection molding apparatus according to an embodiment is explained with reference to the drawings. FIG. **1** is a side view schematically showing an injection molding apparatus **100** according to this embodiment. In FIG. **1**, an X axis, a Y axis, and a Z axis are shown as three axes orthogonal to one another. An X-axis direction and a Y-axis direction are, for example, the horizontal directions. A Z-axis direction is, for example, the vertical direction.
(14) The injection molding apparatus **100** includes, as shown in FIG. **1**, an ejecting section **20**, a die section **30**, a die clamping section **40**, and a control section **50**.
(15) The ejecting section **20** plasticizes a material fed from a material feeding mechanism **10** into a melted material. The ejecting section **20** ejects the melted material toward the die section **30**. A detailed configuration of the material feeding mechanism **10** is explained below.
(16) Plasticizing is a concept including melting and means changing a solid to a state having fluidity. Specifically, in the case of a material in which glass transition occurs, plasticizing means raising the temperature of the material to a glass transition point or higher. In the case of a material in which glass transition does not occur, plasticizing means raising the temperature of the material to a melting point or higher.
(17) A cavity equivalent to the shape of a molded article is formed in the die section **30**. The melted material ejected from the ejecting section **20** flows into the cavity. The melted material is cooled and solidified to generate the molded article.

(18) The die clamping section **40** opens and closes the die section **30**. The die clamping section **40** opens the die section after the melted material is cooled and solidified. Consequently, the molded article is discharged to the outside.
(19) The control section **50** is configured by, for example, a computer including a processor, a main storage device, and an input and output interface that receives signals from and outputs signals to the outside. For example, the processor executes a program read to the main storage device, whereby the control section **50** exerts various functions. Specifically, the control section **50** controls the ejecting section **20** and the die clamping section **40**. The control section **50** may not be configured by the computer and may be configured by a combination of a plurality of circuits. Specific control of the control section **50** is explained below.
(20) 1.2. Specific Configuration
(21) FIG. **2** is a II-II line sectional view of FIG. **1** schematically showing the injection molding apparatus **100**. The ejecting section **20** includes, as shown in FIG. **2**, for example, a plasticizing device **60** including a plasticizing mechanism **61**, an ejecting mechanism **70**, and a nozzle **80**.
(22) The plasticizing mechanism **61** is configured to plasticize the material fed from the material feeding mechanism **10** to generate a paste-like melted material having fluidity and guide the melted material to the ejecting mechanism **70**. The plasticizing mechanism **61** includes, for example, a screw case **62**, a first driving motor **64**, a flat screw **110**, a barrel **120**, a heating section **130**, and a check valve **140**.
(23) The screw case **62** is a housing that houses the flat screw **110**. The flat screw **110** is housed in a space surrounded by the screw case **62** and the barrel **120**.
(24) The first driving motor **64** is provided in the screw case **62**. The first driving motor **64** rotates the flat screw **110**. The first driving motor **64** is controlled by the control section **50**.
(25) The flat screw **110** has a substantially columnar shape, the size of which in a rotation axis RA direction is smaller than the size thereof in a direction orthogonal to the rotation axis RA direction. In the illustrated example, the rotation axis RA is parallel to the Y axis. The flat screw **110** rotates around the rotation axis RA with torque generated by the first driving motor **64**. The flat screw **110** includes a main surface **111**, a groove forming surface **112** on the opposite side of the main surface **111**, and a connecting surface **113** connecting the main surface **111** and the groove forming surface **112**. FIG. **3** is a perspective view schematically showing the flat screw **110**. For convenience, in FIG. **3**, a state in which a vertical positional relation is reversed from a state shown in FIG. **2** is shown. In FIG. **2**, the flat screw **110** is simplified and illustrated.
(26) As shown in FIG. **3**, a first groove **114** is provided on the groove forming surface **112** of the flat screw **110**. The first groove **114** includes, for example, a center section **115**, a groove connecting section **116**, and a material introducing section **117**. The center section **115** is opposed to a communication hole **126** provided in the barrel **120**. The center section **115** communicates with the communication hole **126**. The groove connecting section **116** connects the center section **115** and the material introducing section **117**. In an example shown in FIG. **3**, the groove connecting section **116** is provided in a swirl shape from the center section **115** toward the outer circumference of the groove forming surface **112**. The material introducing section **117** is provided on the outer circumference of the groove forming surface **112**. That is, the material introducing section **117** is provided on the connecting surface **113** of the flat screw **110**. The material fed from the material feeding mechanism **10** is introduced into the first groove **114** from the material introducing section **117** and conveyed to the communication hole **126** provided in the barrel **120** through the groove connecting section **116** and the center section **115**. The number of first grooves **114** is not particularly limited. Two or more first grooves **114** may be provided.
(27) As shown in FIG. **2**, the barrel **120** is provided to be connected to the flat screw **110**. The barrel **120** has an opposed surface **122** opposed to the groove forming surface **112** of the flat screw **110**. The communication hole **126** is provided in the center of the opposed surface **122**. FIG. **4** is a plan view schematically showing the barrel **120**. For convenience, in FIG. **2**, the barrel **120** is

simplified and illustrated.
(28) As shown in FIG. **4**, a plurality of second grooves **124** and the communication hole **126** are provided on the opposed surface **122** of the barrel **120**. In an example shown in FIG. **4**, six second grooves **124** are provided. However, the number of second grooves **124** is not particularly limited. The plurality of second grooves **124** are provided around the communication hole **126** when viewed from the Y-axis direction. One ends of the second grooves **124** are connected to the communication hole **126**. The second grooves **124** extend in a swirl shape from the communication hole **126** toward the outer circumference of the opposed surface **122**. The second grooves **124** have a function of guiding the melted material to the communication hole **126**.
(29) The shape of the second grooves **124** is not particularly limited and may be, for example, a linear shape. The second grooves **124** may not be provided on the opposed surface **122**. However, when considering efficiently guiding the melted material to the communication hole **126**, the second grooves **124** are preferably provided on the opposed surface **122**.
(30) The heating section **130** heats a material fed to between the flat screw **110** and the barrel **120**. The heating section **130** is provided in, for example, the barrel **120**. In the example shown in FIG. **4**, the heating section **130** is configured by four heaters provided in the barrel **120**. An output of the heating section **130** is controlled by the control section **50**. The plasticizing mechanism **61** heats the material while conveying the material toward the communication hole **126** with the flat screw **110**, the barrel **120**, and the heating section **130** to generate a melted material and causes the generated melted material to flow out from the communication hole **126** to the ejecting mechanism **70**.
(31) As shown in FIG. **2**, the check valve **140** is provided in the communication hole **126**. The check valve **140** prevents a backflow of the melted material from the communication hole **126** to the first groove **114** provided in the flat screw **110**.
(32) The ejecting mechanism **70** includes, for example, a cylinder **72**, a plunger **74**, and a plunger driving section **76**. The cylinder **72** is a substantially cylindrical member connected to the communication hole **126**. The plunger **74** moves on the inside of the cylinder **72**. The plunger **74** is driven by the plunger driving section **76** configured by a motor, a gear, and the like. The plunger driving section **76** is controlled by the control section **50**.
(33) The ejecting mechanism **70** slides the plunger **74** in the cylinder **72** to thereby execute measuring operation and ejecting operation. The measuring operation indicates operation for moving the plunger **74** in a −X-axis direction away from the communication hole **126** to thereby guide the melted material located in the communication hole **126** into the cylinder **72** and measuring the melted material in the cylinder **72**. The ejecting operation indicates operation for moving the plunger **74** in a +X-axis direction approaching the communication hole **126** to thereby eject the melted material in the cylinder **72** to the die section **30** via the nozzle **80**.
(34) A nozzle hole **82** communicating with the communication hole **126** is provided in the nozzle **80**. The melted material fed from the plasticizing mechanism **61** is ejected to a molding die **32** of the die section **30** through the nozzle hole **82**. Specifically, the measuring operation and the ejecting operation explained above are executed, whereby the melted material measured in the cylinder **72** is sent from the ejecting mechanism **70** to the nozzle hole **82** via the communication hole **126**. The melted material is ejected to the die section **30** from the nozzle hole **82**.
(35) The die section **30** includes the molding die **32**. The molding die **32** is a mold. The melted material sent to the nozzle hole **82** is ejected to a cavity **34** of the molding die **32** from the nozzle hole **82**. Specifically, the molding die **32** includes a movable die **36** and a stationary die **38** opposed to each other and includes the cavity **34** between the movable die **36** and the stationary die **38**. The cavity **34** is a space equivalent to the shape of the molded article. The material of the movable die **36** and the stationary die **38** is metal. The material of the movable die **36** and the stationary die **38** may be ceramics or resin.
(36) The die clamping section **40** includes, for example, a die driving section **42** and a ball screw section **44**. The die driving section **42** is configured by, for example, a motor and a gear. The die

driving section **42** is connected to the movable die **36** via the ball screw section **44**. Driving of the die driving section **42** is controlled by the control section **50**. The ball screw section **44** transmits power generated by the driving of the die driving section **42** to the movable die **36**. The die clamping section **40** moves the movable die **36** with the die driving section **42** and the ball screw section **44** to thereby open and close the die section **30**.
(37) 1.3. Material Feeding Mechanism and the Like
(38) FIG. **5** is a sectional view schematically showing the plasticizing device **60** of the injection molding apparatus **100** and is a sectional view of the injection molding apparatus **100** shown in FIG. **1** taken along a plane parallel to a YZ plane including the Y axis and the Z axis. FIG. **6** is a sectional perspective view schematically showing the material feeding mechanism **10** of the injection molding apparatus **100**. FIG. **7** is a plan view schematically showing the material feeding mechanism **10** of the injection molding apparatus **100**.
(39) The plasticizing device **60** includes, as shown in FIGS. **5** to **7**, the material feeding mechanism **10** and the plasticizing mechanism **61** explained above, a material supply mechanism **150**, a coupling section **160**, a first material sensor **170**, and a second material sensor **172**. For convenience, in FIG. **1**, illustration of the material supply mechanism **150** is omitted.
(40) The material supply mechanism **150** is configured to supply a material P to a housing **11** of the material feeding mechanism **10**. In an example shown in FIG. **6**, the material P is a pellet-like material. The material P is, for example, an MIM (Metal Injection Molding) material containing metal particles and thermoplastic resin.
(41) Examples of the material of the metal particles contained in the material P include single metal such as magnesium (Mg), iron (Fe), cobalt (Co), chrome (Cr), aluminum (Al), titanium (Ti), copper (Cu), and nickel (Ni), an alloy containing one or more of these kinds of metal, maraging steel, stainless steel, cobalt chrome molybdenum, a titanium alloy, a nickel alloy, an aluminum alloy, a cobalt alloy, and a cobalt chrome alloy.
(42) Examples of the thermoplastic resin contained in the material P include general-purpose engineering plastic such as polypropylene (PP), polyethylene (PE), polyacetal (POM), poly vinyl chloride (PVC), polyamide (PA), acrylonitrile butadiene styrene (ABS), polylactic acid (PLA), polyphenylene sulfide (PPS), polycarbonate (PC), modified polyphenylene ether, polybutylene terephthalate, and polyethylene terephthalate and engineering plastic such as polysulfone, polyether sulfone, polyphenylene sulfide, polyarylate, polyimide, polyamide imide, polyether imide, and polyether ether ketone (PEEK).
(43) The material P is supplied to the material feeding mechanism **10** from the material supply mechanism **150**. The material feeding mechanism **10** is configured to feed the supplied material P to the plasticizing mechanism **61**. The material feeding mechanism **10** includes, as shown in FIG. **5**, for example, the housing **11**, a rotating shaft section **13**, a second driving motor **14***a*, a belt **14***b*, a rotating member **15**, a cover **17**, elastic members **18**, and a cooling mechanism **19**.
(44) The housing **11** stores the material P. Although not illustrated, the material P may be filled in the housing **11**. For convenience, in FIGS. **5** and **7**, illustration of the material P is omitted. The shape of the housing **11** is not particularly limited if the housing **11** can store the material P.
(45) A communication hole **12** is provided in the housing **11**. In an example shown in FIG. **5**, the communication hole **12** is provided in a bottom **11***a* of the housing **11**. The communication hole **12** pierces through the bottom **11***a*. The communication hole **12** includes an introducing port **12***a* and a depositing port **12***b*. The introducing port **12***a* is the end portion on the opposite side of the depositing port **12***b* of the communication hole **12**. In the example shown in FIG. **5**, the introducing port **12***a* is the end portion in a +Z-axis direction of the communication hole **12**. The depositing port **12***b* is an end portion in a −Z-axis direction of the communication hole **12**.
(46) The rotating shaft section **13** is provided in, for example, the bottom **11***a* of the housing **11**. In the example shown in FIG. **5**, the rotating shaft section **13** is provided to pierce through the bottom **11***a*. The rotating shaft section **13** rotates around a rotation axis RB with torque generated by the

second driving motor **14***a*. In the example shown in FIG. **5**, the rotation axis RB is parallel to the Z axis. The torque of the second driving motor **14***a* is transmitted to the rotating shaft section **13** via the belt **14***b*. The second driving motor **14***a* and the belt **14***b* are provided on the outside of the housing **11**.

(47) The rotating member **15**, such as a rotator, is housed in the housing **11**. The rotating member **15** is connected to the rotating shaft section **13**. The rotating member **15** rotates in an R direction shown in FIG. **7** according to the rotation of the rotating shaft section **13**. The rotating member **15** is capable of rotating along an inner edge **11***b* of the housing **11**. The inner edge **11***b* is the edge on the inner side of the housing **11**. The shape of the rotating member **15** is, for example, a substantially disk shape. The material of the rotating member **15** is not particularly limited but is, for example, metal or ceramics.

(48) A plurality of through-holes **16** are provided in the rotating member **15**. The plurality of through-holes **16** are provided at intervals along an outer circumference **15***a* of the rotating member **15**. For example, the plurality of through-holes **16** are provided at equal intervals around the rotating shaft section **13**. In an example shown in FIG. **7**, the through-holes **16** pierce through the rotating member **15** in the Z-axis direction. The through-holes **16** are, for example, cutouts, parts of inner surfaces of which are opened. In the example shown in FIG. **7**, the through-holes **16** are cutouts provided on the outer circumference **15***a* of the rotating member **15**. The inner surfaces of the through-holes **16** form the surface of the rotating member **15** defining the through-holes **16**. The communication hole **12** enables the through-holes **16** and the depositing port **12***b* to communicate. In the example shown in FIG. **7**, twelve through-holes **16** are provided. However, the number of through-holes **16** is not particularly limited. As shown in FIG. **6**, the material P is located in the through-holes **16**. Although not illustrated, the material P is located on the rotating member **15** and the cover **17** as well.

(49) When the rotating member **15** rotates and any one of the plurality of through-holes **16** and the depositing port **12***b* communicate, the material P stored in the housing **11** is fed from the material introducing section **117** to the plasticizing mechanism **61** through the through-holes **16**, the introducing port **12***a*, and the depositing port **12***b*. In the example shown in FIG. **7**, a through-hole **16***a* among the plurality of through-holes **16** and the introducing port **12***a* overlap when viewed from the rotation axis RB direction of the rotating member **15**. The through-hole **16***a* and the introducing port **12***a* overlap, whereby the through-hole **16***a* and the communication hole **12** communicate.

(50) The cover **17** is housed in the housing **11**. The cover **17** is provided above the rotating member **15**. In the illustrated example, the cover **17** is provided in the +Z-axis direction of the rotating member **15**. The cover **17** covers a part of the rotating member **15**. In the illustrated example, the cover **17** covers half of the rotating member **15**. As shown in FIG. **7**, the introducing port **12***a* is provided in a position overlapping the cover **17** when viewed from the rotation axis RB direction. In the example shown in FIG. **7**, the cover **17** has a shape obtained by cutting an annular member into half. An upper surface **17***a* of the cover **17** is inclined such that the material P located on the upper surface **17***a* can be guided to a portion of the rotating member **15** not covered by the cover **17**. Clearance C between the cover **17** and the rotating member **15** is, for example, equal to or smaller than a longest dimension of the material P. The longest dimension of the material P is a dimension of the longest line segment among line segments connecting the outer circumference of the material P in a plan view.

(51) The elastic members **18** are provided in the housing **11**. In the illustrated example, the elastic members **18** have a bar-like shape. The elastic members **18** are connected to the upper surface **17***a* of the cover **17** and the inner wall of the housing **11**. The elastic members **18** urge the cover **17** to the rotating member **15**. In the illustrated example, two elastic members **18** are provided. However, the number of elastic members **18** is not particularly limited. The elastic members **18** are capable of adjusting the clearance C between the cover **17** and the rotating member **15**. The cover **17** is

capable of moving up and down according to extension and contraction of the elastic members **18**.
(52) As shown in FIG. **5**, the cooling mechanism **19** is provided in, for example, the bottom **11***a* of the housing **11**. The cooling mechanism **19** is configured to cool the material P. The cooling mechanism **19** is, for example, a cooling pipe in which a coolant flows. Examples of the coolant include water.
(53) The coupling section **160** couples the material feeding mechanism **10** and the plasticizing mechanism **61**. In the illustrated example, the coupling section **160** couples the bottom **11***a* of the housing **11** of the material feeding mechanism **10** and the screw case **62** of the plasticizing mechanism **61**. The shape of the coupling section **160** is, for example, a plate shape. A feeding path **162** functioning as a path for feeding the material P is provided in the coupling section **160**. The feeding path **162** communicates with the communication hole **12**. The feeding path **162** connects the depositing port **12***b* and the material introducing section **117**. In the illustrated example, the feeding path **162** is provided at fixed width from the depositing port **12***b* to the material introducing section **117**. The material introducing section **117** of the plasticizing mechanism **61** is a feeding port for receiving the material P. The depositing port **12***b* communicates with the material introducing section **117** via the feeding path **162**. In the illustrated example, the feeding path **162** is provided in the coupling section **160** and the screw case **62**.
(54) The first material sensor **170** detects the material P in the housing **11**. The first material sensor **170** is supported by, for example, the housing **11**. A distal end **171** of the first material sensor **170** is located in the housing **11**. The first material sensor **170** detects presence or absence of the material P in the housing **11**. The first material sensor **170** is a proximity sensor such as a high-frequency induction type proximity sensor or a capacitance type proximity sensor.
(55) The second material sensor **172** detects the material P in the feeding path **162**. The second material sensor **172** is supported by, for example, the plasticizing mechanism **61**. A distal end **173** of the second material sensor **172** is located in the feeding path **162** provided in the plasticizing mechanism **61**. The second material sensor **172** detects presence or absence of the material P in the feeding path **162**. The second material sensor **172** is a proximity sensor such as a high-frequency induction type proximity sensor or a capacitance type proximity sensor.
(56) The first material sensor **170** and the second material sensor **172** may be a weight sensor or a pressure sensor and may detect a residual amount of the material P by converting the residual amount into a numerical value. One or both of the first material sensor **170** and the second material sensor **172** may not be provided. However, in order to surely detect material shortage, both of the first material sensor **170** and the second material sensor **172** are preferably provided.
(57) 1.4. Control Section
(58) The control section **50** controls rotating speed of the rotating member **15** based on, for example, rotating speed of the flat screw **110**. The rotating member **15** is controlled based on the rotating speed of the flat screw **110**. Specifically, when the rotating speed of the flat screw **110** increases, the control section **50** controls the second driving motor **14***a* to increase the rotating speed of the rotating member **15**. When the rotating speed of the flat screw **110** increases, since plasticization of the material P in the plasticizing mechanism **61** is accelerated, the rotating speed of the rotating member **15** is increased. Consequently, it is possible to prevent the flat screw **110** from idling. The control section **50** may acquire the rotating speed of the flat screw **110** from an output of the first driving motor **64** or may acquire the rotating speed of the flat screw **110** from a not-shown sensor.
(59) The control section **50** controls the rotating speed of the rotating member **15** based on, for example, a torque value of the first driving motor **64**. Specifically, the control section **50** acquires the torque value of the first driving motor **64** and, when the acquired torque value is smaller than a predetermined value, controls the second driving motor **14***a* to increase the rotating speed of the rotating member **15**. When the torque value of the first driving motor **64** is smaller than the predetermined value, the rotating member **15** is controlled such that the rotating speed is higher

compared with when the torque value of the first driving motor **64** is larger than the predetermined value. When the torque value of the first driving motor **64** is smaller than the predetermined value, since the material P is not fed to the material introducing section **117**, the flat screw **110** is likely to be idling. Accordingly, it is possible to eliminate the idling of the flat screw **110** by increasing the rotating speed of the rotating member **15**.

(60) The control section **50** controls the rotating speed of the rotating member **15** based on, for example, a torque value of the second driving motor **14***a*. Specifically, the control section **50** acquires the torque value of the second driving motor **14***a* and, when the acquired torque value is larger than a predetermined value, controls the second driving motor **14***a* to reversely rotate the rotating member **15**. When the torque value of the second driving motor **14***a* is larger than the predetermined value, the rotating member **15** rotates in the opposite direction of a rotating direction in which the rotating member **15** rotates when the torque value of the second driving motor **14***a* is smaller than the predetermined value. When the torque value is larger than the predetermined value, in some case, the material P is bit and caught and the rotating member **15** cannot rotate in the R direction. Accordingly, it is possible to eliminate the catching of the material P by rotating the rotating member **15** in the opposite direction of the R direction.

(61) The control section **50** controls, for example, the material supply mechanism **150**. The control section **50** controls the material supply mechanism **150** based on, for example, a detection result of the first material sensor **170** to supply the material P to the housing **11**. The material supply mechanism **150** supplies the material P to the housing **11** based on the detection result of the first material sensor **170**. Specifically, when the first material sensor **170** detects material shortage, the control section **50** drives the material supply mechanism **150** and supplies the material P to the housing **11**. Consequently, it is possible to eliminate the material shortage in the housing **11**.

(62) The control section **50** controls, for example, the flat screw **110**. Specifically, when the second material sensor **172** detects material shortage, the control section **50** controls the first driving motor **64** to stop the rotation of the flat screw **110**. When the second material sensor **172** detects material shortage, the flat screw **110** stops rotating. Consequently, it is possible to prevent the flat screw **110** from idling.

(63) In the above explanation, an example is explained in which one control section **50** performs the control of the rotating member **15** based on the rotating speed of the flat screw **110**, the control of the rotating member **15** based on the torque value of the first driving motor **64**, the control of the rotating member **15** based on the torque value of the second driving motor **14***a*, the control of the material supply mechanism **150** based on the detection result of the first material sensor **170**, and the control of the flat screw **110** based on the detection result of the second material sensor **172**. However, separate control sections may be provided for each of the controls. When considering a reduction in the size of the apparatus, it is preferable to perform the controls with one control section. The control section **50** may perform all of the controls or may perform any one of the controls. The number of controls is not particularly limited.

(64) 1.5. Action Effects

(65) The plasticizing device **60** includes the plasticizing mechanism **61** that includes the material introducing section **117** that receives the material P and plasticizes the material P to generate a melted material and the material feeding mechanism **10** configured to feed the material P to the plasticizing mechanism **61**. The material feeding mechanism **10** includes the housing **11** including the depositing port **12***b* communicating with the material introducing section **117**, the housing **11** storing the material p, and the rotating member **15** housed in the housing **11** and capable of rotating along the inner edge **11***b* of the housing **11**. In the rotating member **15**, the plurality of through-holes **16** are provided at intervals along the outer circumference **15***a* of the rotating member **15**. When the rotating member **15** rotates and any one of the plurality of through-holes **16** and the depositing port **12***b* communicate, the material P stored in the housing **11** is fed from the material introducing section **117** to the plasticizing mechanism **61** through the depositing port **12***b*.

Accordingly, in the plasticizing device **60**, even if a large amount of the material P is deposited in the material feeding mechanism **10**, the material P intermittently passes through the depositing port **12***b* little by little. Therefore, it is possible to make it less likely that the depositing port **12***b* is clogged with the material P. Consequently, it is possible to prevent a bridge phenomenon from occurring because the material P is not fed to the plasticizing mechanism **61**.
(66) In the plasticizing device **60**, the material feeding mechanism. **10** includes the cover **17** provided above the rotating member **15** and covering a part of the rotating member **15**. The communication hole **12** for enabling the through-holes **16** and the depositing port **12***b* to communicate is provided in the housing **11**. When viewed from the rotation axis RB direction of the rotating member **15**, the introducing port **12***a*, which is the end portion of the communication hole **12** on the opposite side of the depositing port **12***b*, is provided in the position overlapping the cover **17**. Accordingly, in the plasticizing device **60**, it is possible to prevent, with the cover **17**, the communication hole **12** from being pressed to the material P and clogged with the material P. Further, in a state in which the material P on the rotating member **15** is shaved off by the cover **17**, it is possible to send the material P located in the through-holes **16** from the introducing port **12***a* to the depositing port **12***b*.
(67) In the plasticizing device **60**, the clearance C between the rotating member **15** and the cover **17** is equal to or smaller than the longest dimension of the material P. Accordingly, in the plasticizing device **60**, it is possible to rub and cut the material P with the rotating member **15** and the cover **17**.
(68) In the plasticizing device **60**, the material feeding mechanism **10** includes the elastic members **18** capable of adjusting the clearance C between the rotating member **15** and the cover **17**. Accordingly, if the material P is caught between the rotating member **15** and the cover **17**, since the elastic members **18** contract, it is possible to prevent the rotation of the rotating member **15** from stopping.
(69) The plasticizing device **60** includes the first material sensor **170** that detects the material P in the housing **11** and the material supply mechanism **150** configured to supply the material P to the housing **11**. The material supply mechanism **150** supplies the material P to the housing **11** based on a detection result of the first material sensor **170**. Accordingly, in the plasticizing device **60**, when the first material sensor **170** detects material shortage, the material P is automatically supplied to the housing **11** by the material supply mechanism **150**. Consequently, it is possible to save time for feeding the material P to the housing **11**.
(70) In the plasticizing device **60**, the rotating member **15** is controlled based on the rotating speed of the flat screw **110**. Accordingly, in the plasticizing device **60**, it is possible to prevent the flat screw **110** from idling.
(71) In the plasticizing device **60**, the rotating member **15** is controlled such that the rotating speed of the rotating member **15** is higher when the torque value of the first driving motor **64** is smaller than the predetermined value compared with when the torque value of the first driving motor **64** is larger than the predetermined value. Accordingly, in the plasticizing device **60**, it is possible to eliminate idling of the flat screw **110**.
(72) The plasticizing device **60** includes the second driving motor **14***a* that rotates the rotating member **15**. When the torque value of the second driving motor **14***a* is larger than the predetermined value, the rotating member **15** rotates in the opposite direction of the rotating direction in which the rotating member **15** rotates when the torque value of the second driving motor **14***a* is smaller than the predetermined value. Accordingly, in the plasticizing device **60**, it is possible to eliminate the catching of the material P.
(73) In the plasticizing device **60**, the flat screw **110** has the groove forming surface **112** on which the first groove **114** is provided, the first groove **114** includes the material introducing section **117**, the plasticizing mechanism **61** includes the barrel **120** having the opposed surface **122** opposed to the groove forming surface **112**, and the communication hole **126** communicating with the first groove **114** is provided on the opposed surface **122**. Accordingly, in the plasticizing device **60**, it is

possible to feed the material P to the communication hole **126** via the first groove **114**. Further, it is possible to achieve space saving compared with when a bar-like inline screw long in the rotation axis RA direction is used as a screw.
(74) The plasticizing device **60** includes the second material sensor **172** that detects the material P in the feeding path **162** connecting the depositing port **12***b* and the material introducing section **117**. When the second material sensor **172** detects material shortage, the flat screw **110** stops rotation. Accordingly, in the plasticizing device **60**, it is possible to prevent the flat screw **110** from idling.
(75) In the plasticizing device **60**, the material feeding mechanism **10** includes the cooling mechanism **19** configured to cool the material P. Accordingly, in the plasticizing device **60**, it is possible to prevent the material P from melting in the material feeding mechanism **10** with heat of the plasticizing mechanism **61**. When the material P melts in the material feeding mechanism **10**, the material P condenses and clogging easily occurs.
(76) In the plasticizing device **60**, the material feeding mechanism **10** feeds the material P containing the metal particles and the thermoplastic resin. Such a material P made of the MIM material has larger mass and clogging more easily occurs compared with, for example, a material made of only resin. However, in the plasticizing device **60**, since the material P can be intermittently fed by the rotating member **15** even if such a MIM material is used, it is possible to prevent the material P from clogging. Further, the material P made of the MIM material has higher thermal conductivity compared with, for example, a material made of only resin. Accordingly, heat of the plasticizing mechanism **61** is easily transmitted to the material P and the material P easily melts and condenses. However, in the plasticizing device **60**, since the material P can be intermittently fed by the rotating member **15**, it is possible to prevent the heat of the plasticizing mechanism **61** from being transmitted via the material P.
(77) Ceramics may be mixed in the material P besides the metal particles and the thermoplastic resin. Examples of the ceramics include oxide ceramics such as silicon dioxide, titanium dioxide, aluminum oxide, and zirconium oxide and non-oxide ceramics such as aluminum nitride. Further, for example, an additive such as pigment, wax, flame retardant, antioxidant, or heat stabilizer may be mixed in the material P.
(78) Further, a binder may be added to the material P. Examples of the binder include acrylic resin, epoxy resin, silicone resin, cellulose resin, and other kinds of synthetic resin and PLA (polylactic acid), PA (polyamide), PPS (polyphenylene sulfide), and PEEK (polyether ether ketone).
(79) In the above explanation, an example is explained in which the through-holes **16** are the cutouts, parts of the inner surfaces of which are opened as shown in FIG. **7**. However, the through-holes **16** may be through-holes, the inner surfaces of which are not opened as shown in FIG. **8**.
(80) In the above explanation, an example is explained in which the material P is the pellet-like material. However, the material P may be, for example, a powder-like material crushed by a crusher.
(81) In the example explained above, the flat screw **110**, the size of which in the rotation axis RA direction is smaller than the size thereof in the direction orthogonal to the rotation axis RA direction, is used as the screw. However, a bar-like inline screw long in the rotation axis RA direction may be used instead of the flat screw **110**.
(82) In the above explanation, an example is explained in which the injection molding apparatus **100** includes the control section **50** and the plasticizing device **60** does not include a control section. However, the plasticizing device **60** may include the control section **50**.
(83) 2. Three-Dimensional Shaping Apparatus
(84) A three-dimensional shaping apparatus according to this embodiment is explained with reference to the drawings. FIG. **9** is a side view schematically showing a three-dimensional shaping apparatus **200** according to this embodiment.
(85) The three-dimensional shaping apparatus **200** includes, for example, as shown in FIG. **9**, the

plasticizing device **60**, the nozzle **80**, a stage **210**, a moving mechanism. **220**, and the control section **50**. The plasticizing device **60** includes the material feeding mechanism **10**, the plasticizing mechanism **61**, the material supply mechanism **150**, the coupling section **160**, the first material sensor **170**, and the second material sensor **172**. The plasticizing mechanism **61** includes the screw case **62**, the first driving motor **64**, the flat screw **110**, the barrel **120**, the heating section **130**, and the check valve **140**. For convenience, in FIG. **9**, the material feeding mechanism **10** is simplified and shown.

(86) The nozzle **80** discharges, toward the stage **210**, a melted material supplied from the plasticizing device **60**. Specifically, the three-dimensional shaping apparatus **200** drives the moving mechanism **220** while discharging the melted material from the nozzle **80** to the stage **210** and changes relative positions of the nozzle **80** and the stage **210**. Consequently, the three-dimensional shaping apparatus **200** shapes a three-dimensional shaped object having a desired shape on the stage **210**.

(87) The stage **210** is moved by the moving mechanism **220**. The three-dimensional shaped object is formed on a shaping surface **212** of the stage **210**.

(88) The moving mechanism **220** changes the relative positions of the nozzle **80** and the stage **210**. In an example shown in FIG. **9**, the moving mechanism **220** moves the stage **210** with respect to the nozzle **80**. The moving mechanism **220** is configured by a three-axis positioner that moves the stage **210** in the X-axis direction, the Y-axis direction, and the Z-axis direction with, for example, driving forces of three motors **222**. The motors **222** are controlled by the control section **50**.

(89) The moving mechanism **220** may be configured not to move the stage **210** but to move the nozzle **80**. Alternatively, the moving mechanism **220** may be configured to move both of the nozzle **80** and the stage **210**.

(90) The control section **50** controls the moving mechanism **220** and the plasticizing device **60** based on shaping data acquired in advance to thereby discharge the melted material from the nozzle **80** to a predetermined position on the stage **210** to shape a three-dimensional shaped object.

(91) In the above explanation, an example is explained in which the three-dimensional shaping apparatus **200** includes the control section **50** and the plasticizing device **60** does not include a control section. However, the plasticizing device **60** may include the control section **50**.

(92) The present disclosure includes substantially the same configurations as the configurations explained in the embodiment, for example, configurations having the same functions, methods, and results as the functions, the methods, and the results of the configurations explained in the embodiment or configurations having the same objects and effects as the objects and the effects of the configurations explained in the embodiment. The present disclosure includes configurations obtained by replacing nonessential portions of the configurations explained in the embodiment. The present disclosure includes configurations that can achieve the same action effects as the action effects of the configurations explained in the embodiment or configurations that can achieve the same objects as the objects of the configurations explained in the embodiment. The present disclosure includes configurations obtained by adding publicly-known techniques to the configurations explained in the embodiment.

(93) Contents described below are derived from the embodiment explained above.

(94) A plasticizing device according to an aspect of the present disclosure includes: a plasticizing mechanism including a feeding port for receiving a material and configured to plasticize the material to generate a melted material; and a material feeding mechanism configured to feed the material to the plasticizing mechanism. The material feeding mechanism includes: a housing including a depositing port communicating with the feeding port, the housing storing the material; and a rotating member housed in the housing and capable of rotating along an inner edge of the housing. A plurality of through-holes are provided in the rotating member at intervals along an outer circumference of the rotating member. When the rotating member rotates and any one of the plurality of through-holes and the depositing port communicate, the material stored in the housing

is fed from the feeding port to the plasticizing mechanism through the depositing port.
(95) With the plasticizing device, even if a large amount of the material is deposited to the material feeding mechanism, since the material intermittently passes through the depositing port little by little, it is possible to make it less likely that the depositing port is clogged with the material. Consequently, it is possible to prevent a bridge phenomenon from occurring because the material is not fed to the plasticizing mechanism.
(96) In the plasticizing device according to the aspect, the material feeding mechanism may include a cover provided above the rotating member and covering a part of the rotating member, a communication hole for enabling the through-hole and the depositing port to communicate may be provided in the housing, and, when viewed from a rotation axis direction of the rotating member, an end portion of the communication hole on an opposite side of the depositing port may be provided in a position overlapping the cover.
(97) With the plasticizing device, it is possible to prevent, with the cover, the communication hole from being pressed to the material and clogged with the material.
(98) In the plasticizing device according to the aspect, clearance between the rotating member and the cover may be equal to or smaller than a longest dimension of the material.
(99) With the plasticizing device, it is possible to rub and cut the material with the rotating member and the cover.
(100) In the plasticizing device according to the aspect, the material feeding mechanism may include an elastic member capable of adjusting clearance between the rotating member and the cover.
(101) With the plasticizing device, if the material is caught between the rotating member and the cover, it is possible to prevent the rotation of the rotating member from stopping because the elastic member contracts.
(102) In the plasticizing device according to the aspect, the plasticizing device may further include: a first material sensor that detects the material in the housing; and a material supply mechanism configured to supply the material to the housing, and the material supply mechanism may supply the material to the housing based on a detection result of the first material sensor.
(103) With the plasticizing device, when the first material sensor detects material shortage, the material is automatically supplied to the housing by the material supply mechanism. Therefore, it is possible to save time for supplying the material to the housing.
(104) In the plasticizing device according to the aspect, the plasticizing mechanism may include: a first driving motor; and a screw rotated by the first driving motor.
(105) In the plasticizing device according to the aspect, the rotating member may be controlled based on rotating speed of the screw.
(106) With the plasticizing device, it is possible to prevent the screw from idling.
(107) In the plasticizing device according to the aspect, when a torque value of the first driving motor is smaller than a predetermined value, the rotating member may be controlled such that rotating speed is higher compared with when the torque value of the first driving motor is larger than the predetermined value.
(108) With the plasticizing device, it is possible to eliminate idling of the screw.
(109) In the plasticizing device according to the aspect, the plasticizing device may further include a second driving motor that rotates the rotating member, and, when a torque value of the second driving motor is larger than a predetermined value, the rotating member may rotate in an opposite direction of a rotating direction in which the rotating member rotates when the torque value of the second driving motor is smaller than the predetermined value.
(110) With the plasticizing device, it is possible to eliminate catching of the material.
(111) In the plasticizing device according to the aspect, the screw may have a groove forming surface on which a groove is provided, the groove may include the feeding port, the plasticizing mechanism may include a barrel having an opposed surface opposed to the groove forming surface,

and a communication hole communicating with the groove may be provided on the opposed surface.
(112) With the plasticizing device, it is possible to feed the material to the communication hole via the groove.
(113) In the plasticizing device according to the aspect, the plasticizing device may further include a second material sensor that detects the material in a feeding path connecting the depositing port and the feeding port, and the screw may stop the rotation when the second material sensor detects material shortage.
(114) With the plasticizing device, it is possible to prevent the screw from idling.
(115) In the plasticizing device according to the aspect, the material feeding mechanism may include a cooling mechanism configured to cool the material.
(116) With the plasticizing device, it is possible to prevent the material from melting in the material feeding mechanism with heat of the plasticizing mechanism.
(117) In the plasticizing device according to the aspect, the material feeding mechanism may feed the material containing metal particles and thermoplastic resin.
(118) With the plasticizing device, even if an MIM material with which clogging easily occurs is used, the material can be intermittently fed by the rotating member. Therefore, it is possible to prevent the material from clogging.
(119) An injection molding apparatus according to an aspect of the present disclosure includes: a plasticizing device that plasticizes a material into a melted material; and a nozzle that ejects, to a mold, the melted material fed from the plasticizing device. The plasticizing device includes: a plasticizing mechanism including a feeding port for receiving the material and configured to plasticize the material to generate the melted material; and a material feeding mechanism configured to feed the material to the plasticizing mechanism. The material feeding mechanism includes: a housing including a depositing port communicating with the feeding port, the housing storing the material; and a rotating member housed in the housing and capable of rotating along an inner edge of the housing. A plurality of through-holes are provided in the rotating member at intervals along an outer circumference of the rotating member. When the rotating member rotates and any one of the plurality of through-holes and the depositing port communicate, the material stored in the housing is fed from the feeding port to the plasticizing mechanism through the depositing port.
(120) A three-dimensional shaping apparatus according to an aspect of the present disclosure is a three-dimensional shaping apparatus that shapes a three-dimensional shaped object, the three-dimensional shaping apparatus including: a plasticizing device that plasticizes a material into a melted material; and a nozzle that discharges, toward a stage, the melted material fed from the plasticizing device. The plasticizing device includes: a plasticizing mechanism including a feeding port for receiving the material and configured to plasticize the material to generate the melted material; and a material feeding mechanism configured to feed the material to the plasticizing mechanism. The material feeding mechanism includes: a housing including a depositing port communicating with the feeding port, the housing storing the material; and a rotating member housed in the housing and capable of rotating along an inner edge of the housing. A plurality of through-holes are provided in the rotating member at intervals along an outer circumference of the rotating member. When the rotating member rotates and any one of the plurality of through-holes and the depositing port communicate, the material stored in the housing is fed from the feeding port to the plasticizing mechanism through the depositing port.

Claims

1. A plasticizing device comprising: a plasticizing mechanism including a screw, a feeding port for receiving a material, and a first driving motor that rotates the screw, the plasticizing mechanism

being configured to plasticize the material to generate a melted material; and a material feeding mechanism configured to feed the material to the plasticizing mechanism, wherein the material feeding mechanism includes: a housing including a depositing port communicating with the feeding port, the housing storing the material; a rotator housed in the housing and configured to rotate along an inner edge of the housing; and a second driving motor that rotates the rotator, a plurality of through-holes are provided in the rotator at intervals along an outer circumference of the rotator, when the rotator rotates around a rotating shaft and any one of the plurality of through-holes and the depositing port communicate, the material stored in the housing is fed from the feeding port to the plasticizing mechanism through the depositing port, the material feeding mechanism includes a cover provided above the rotator and covering a part of the rotator, the rotating shaft being received by a portion of the cover, the cover is positioned along an outer circumference of the rotating shaft and overlaps the depositing port, a communication hole for enabling the plurality of through-holes and the depositing port to communicate is provided in the housing, when viewed from a rotation axis direction of the rotator, an end portion of the communication hole on an opposite side of the depositing port is provided in a position overlapping the cover, the material feeding mechanism includes an elastic member configured to elongate and contract to adjust a clearance between the rotator and the cover during feeding of the material to the feeding port, the elastic member having a first end connected to an upper surface of the cover and a second end connected to the housing, the elastic member urging the cover to the rotator, the plasticizing device further includes: a processor; and a memory including instructions that, when executed by the processor, cause the processor to control the first driving motor and the second driving motor, and when a torque value of the first driving motor is smaller than a predetermined value, the processor controls the second driving motor such that a rotating speed of the rotator is higher compared with when the torque value of the first driving motor is larger than the predetermined value.

2. The plasticizing device according to claim 1, wherein the material is in a pellet form, and the clearance between the rotator and the cover is equal to or smaller than a longest dimension of the material.

3. The plasticizing device according to claim 1, wherein the instructions, when executed by the processor, cause the processor to control a first material sensor that detects the material in the housing, and wherein the material is supplied to the housing based on a detection result of the first material sensor.

4. The plasticizing device according to claim 1, wherein the processor controls the rotator based on a rotating speed of the screw.

5. The plasticizing device according to claim 1, wherein the instructions, when executed by the processor, further cause the processor to control the second driving motor that rotates the rotator, and when a torque value of the second driving motor is larger than a predetermined value, the rotator rotates in an opposite direction of a rotating direction in which the rotator rotates when the torque value of the second driving motor is smaller than the predetermined value.

6. The plasticizing device according to claim 1, wherein the screw has a groove forming surface on which a groove is provided, the groove includes the feeding port, the plasticizing mechanism includes a barrel having an opposed surface opposed to the groove forming surface, and a communication hole communicating with the groove is provided on the opposed surface.

7. The plasticizing device according to claim 1, wherein the instructions, when executed by the processor, further cause the processor to control a second material sensor that detects the material in a feeding path connecting the depositing port and the feeding port, and the screw stops a rotation when the second material sensor detects material shortage.

8. The plasticizing device according to claim 1, wherein the material feeding mechanism includes a cooler positioned in a bottom of the housing and configured to cool the material.

9. The plasticizing device according to claim 1, wherein the material feeding mechanism feeds the

material containing metal particles and thermoplastic resin.

10. An injection molding apparatus comprising: a plasticizing device that plasticizes a material into a melted material; and a nozzle that ejects, to a mold, the melted material fed from the plasticizing device, wherein the plasticizing device includes: a plasticizing mechanism including a screw, a feeding port for receiving the material, and a first driving motor that rotates the screw, the plasticizing mechanism being configured to plasticize the material to generate the melted material; and a material feeding mechanism configured to feed the material to the plasticizing mechanism, the material feeding mechanism includes: a housing including a depositing port communicating with the feeding port, the housing storing the material; a rotator housed in the housing and configured to rotate along an inner edge of the housing; and a second driving motor that rotates the rotator, a plurality of through-holes are provided in the rotator at intervals along an outer circumference of the rotator, when the rotator rotates around a rotating shaft and any one of the plurality of through-holes and the depositing port communicate, the material stored in the housing is fed from the feeding port to the plasticizing mechanism through the depositing port, the material feeding mechanism includes a cover provided above the rotator and covering a part of the rotator, the rotating shaft being received by a portion of the cover, the cover is positioned along an outer circumference of the rotating shaft and overlaps the depositing port, a communication hole for enabling the plurality of through-holes and the depositing port to communicate is provided in the housing, when viewed from a rotation axis direction of the rotator, an end portion of the communication hole on an opposite side of the depositing port is provided in a position overlapping the cover, the material feeding mechanism includes an elastic member configured to elongate and contract to adjust a clearance between the rotator and the cover during feeding of the material to the feeding port, the elastic member having a first end connected to an upper surface of the cover and second end connected to the housing, the elastic member urging the cover to the rotator, wherein the plasticizing device includes: a processor; a memory including instructions that, when executed by the processor, cause the processor to control the first driving motor and the second driving motor, and when a torque value of the first driving motor is smaller than a predetermined value, the processor controls the second driving motor such that a rotating speed of the rotator is higher compared with when the torque value of the first driving motor is larger than the predetermined value.

11. A three-dimensional shaping apparatus that shapes a three-dimensional shaped object, the three-dimensional shaping apparatus comprising: a plasticizing device that plasticizes a material into a melted material; and a nozzle that discharges, toward a stage, the melted material fed from the plasticizing device, wherein the plasticizing device includes: a plasticizing mechanism including a screw, a feeding port for receiving the material, and a first driving motor that rotates the screw, the plasticizing mechanism being configured to plasticize the material to generate the melted material; and a material feeding mechanism configured to feed the material to the plasticizing mechanism, the material feeding mechanism includes: a housing including a depositing port communicating with the feeding port, the housing storing the material; a rotator housed in the housing and configured to rotate along an inner edge of the housing; and a second driving motor that rotates the rotator, a plurality of through-holes are provided in the rotator at intervals along an outer circumference of the rotator, when the rotator rotates around a rotating shaft and any one of the plurality of through-holes and the depositing port communicate, the material stored in the housing is fed from the feeding port to the plasticizing mechanism through the depositing port, the material feeding mechanism includes a cover provided above the rotator and covering a part of the rotator, the rotating shaft being received by a portion of the cover, the cover is positioned along an outer circumference of the rotating shaft and overlaps the depositing port, a communication hole for enabling the plurality of through-holes and the depositing port to communicate is provided in the housing, when viewed from a rotation axis direction of the rotator, an end portion of the communication hole on an opposite side of the depositing port is provided in a position overlapping

the cover, the material feeding mechanism includes an elastic member configured to elongate and contract to adjust a clearance between the rotator and the cover during feeding of the material to the feeding port, the elastic member having a first end connected to an upper surface of the cover and second end connected to the housing, the elastic member urging the cover to the rotator, wherein the plasticizing device includes: a processor; a memory including instructions that, when executed by the processor, cause the processor to control the first driving motor and the second driving motor, and when a torque value of the first driving motor is smaller than a predetermined value, the processor controls the second driving motor such that a rotating speed of the rotator is higher compared with when the torque value of the first driving motor is larger than the predetermined value.

12. The plasticizing device according to claim 1, wherein the rotation axis direction of the rotator is parallel to a vertical direction.

13. The plasticizing device according to claim 1, wherein the upper surface of the cover is inclined such that, when the material is located on the upper surface, the material is guided to the rotator not covered by the cover.

14. The plasticizing device according to claim 4, wherein the processor controls the first driving motor and the second driving motor so as to rotate the rotator at a first speed when the screw is rotating at a second speed, and rotate the rotator at a third speed when the screw is rotating at a fourth speed, the first speed being greater than the third speed and the second speed being greater than the fourth speed.

15. The plasticizing device according to claim 8, the cooler has a cooling pipe through which a coolant flows, and the cooling pipe is provided in the housing closer to the depositing port than the rotator.