

CLAIMS

1. A process cartridge comprising:

a photosensitive drum;

a developing roller for developing a latent image on the photosensitive drum, the developing roller being movable relative to the photosensitive drum between (i) a first position in which the developing roller is positioned proximate to the photosensitive drum such that the developing roller can develop a latent image on the photosensitive drum and (ii) a second position in which the developing roller is spaced apart from the photosensitive drum; and

a clutch comprising:

a first drive transmission member capable of receiving a rotational force to thereby rotate about a rotational axis, the first drive transmission member including an engagement portion comprising at least one projection; and

a second drive transmission member capable of receiving the rotational force from the first drive transmission member to thereby rotate about a rotational axis and transmit the rotational force to the developing roller, the second drive transmission member including an engagement portion comprising at least one projection, the engagement portion of the second drive transmission member being engageable with the engagement portion of the first drive transmission member,

wherein the engagement portion of the first drive transmission member and the engagement portion of the second drive transmission member contact each other when the developing roller is in the first position to enable the second drive transmission member to receive the rotational force from the first drive transmission member, and

wherein the engagement portion of the first drive transmission member and the engagement portion of the second drive transmission member are separated from each other when the developing roller is in the second position in order to prevent the second drive transmission member from receiving the rotational force from the first drive transmission member.

2. The process cartridge of claim 1, wherein the engagement portion of the first drive transmission member includes a plurality of projections, and the engagement portion of the second drive transmission member includes a plurality of projections that are contactable to the plurality of projections of the first drive transmission member.
3. The process cartridge of claim 1, wherein the at least one projection of the first drive transmission member is a claw and the at least one projection of the second drive transmission member is a claw that is contactable to the claw of the first drive transmission member.
4. The process cartridge of claim 3, wherein the engagement portion of the first drive transmission member includes a plurality of projections in the form of claws and the engagement portion of the second drive transmission member includes a plurality of projections in the form of claws that are contactable to the plurality of claws of the first drive transmission member.
5. The process cartridge of claim 1, wherein the at least one projection of one of the first drive transmission member and the second drive transmission member is a claw, and the at least one projection of the other one of the first drive transmission member and the second drive transmission member is a rib.
6. The process cartridge of claim 1, wherein the first drive transmission member includes a shaft, and the second drive transmission member includes an opening that receives the shaft.
7. The process cartridge of claim 1, wherein the second drive transmission member includes a shaft, and the first drive transmission member includes an opening that receives the shaft.
8. The process cartridge of claim 1, further comprising a shaft, wherein the first transmission member includes an opening that receives the shaft, and the second drive transmission member includes an opening that receives the shaft.

9. The process cartridge of claim 1, further comprising a spring that urges the first drive transmission member.
10. The process cartridge of claim 9, wherein the spring urges the first drive transmission member toward the second drive transmission member.
11. The process cartridge of claim 1, further comprising a spring that urges the second drive transmission member.
12. The process cartridge of claim 11, wherein the spring urges the second drive transmission member toward the first drive transmission member.
13. The process cartridge of claim 1, further comprising:
 - a transmission gear connected to the second drive transmission member; and
 - a developing roller gear connected to the transmission gear and to the developing roller.
14. The process cartridge of claim 13, wherein at least a part of the second drive transmission member is provided inside of the transmission gear.
15. The process cartridge of claim 1, further comprising a drive connecting and disconnecting member configured to connect the first and second drive transmission members when the developing roller is in the first position and configured to disconnect the first and second drive transmission members when the developing roller is in the second position.
16. The process cartridge of claim 1, further comprising:
 - a first frame rotatably supporting the photosensitive drum; and
 - a second frame rotatably supporting the developing roller, the second frame being connected to the first frame, and the second frame being rotatable relative to the first frame about a frame rotation axis to move the developing roller between the first position and the second position.
17. The process cartridge of claim 16, wherein the first drive transmission member is provided along the frame rotation axis.

18. The process cartridge of claim 17, wherein the first drive transmission member and the second drive transmission member are provided along the frame rotation axis.
19. The process cartridge of claim 1, further comprising:
 - a drive inputting portion configured to receive the rotational force from a source external to the process cartridge; and
 - a universal joint configured to permit movement of a rotational axis of the drive inputting portion.
20. The process cartridge of claim 19, wherein the universal joint is an Oldham coupling.
21. The process cartridge of claim 1, wherein the second drive transmission member is movable along the rotational axis of the second drive transmission member in order to separate from the first drive transmission member.
22. The process cartridge of claim 1, wherein the first drive transmission member is movable along the rotational axis of the first drive transmission member in order to separate from the second drive transmission member.
23. The process cartridge of claim 1, wherein the at least one projection of the first drive transmission member extends toward the second drive transmission member in a rotational axis direction of the first drive transmission member.
24. The process cartridge of claim 1, wherein the at least one projection of the second drive transmission member extends toward the first drive transmission member in a rotational axis direction of the first drive transmission member.
25. The process cartridge of claim 1, wherein the at least one projection of the first drive transmission member extends toward the second drive transmission member in a rotational axis direction of the first drive transmission member, and
 - wherein the at least one projection of the second drive transmission member extends toward the first drive transmission member in a rotational axis direction of the first drive transmission member.

26. The process cartridge of claim 1, wherein the first drive transmission member includes a gear for receiving the rotational force.
27. The process cartridge of claim 1, wherein the second drive transmission member includes a gear for outputting the rotational force.
28. A process cartridge comprising:
- a photosensitive drum;
 - a developing roller for developing a latent image on the photosensitive drum, the developing roller being movable relative to the photosensitive drum between (i) a first position in which the developing roller is positioned proximate to the photosensitive drum such that the developing roller can develop a latent image on the photosensitive drum and (ii) a second position in which the developing roller is spaced apart from the photosensitive drum; and
 - a clutch comprising:
 - a first drive transmission member capable of receiving a rotational force to thereby rotate about a rotational axis, the first drive transmission member including an engagement portion; and
 - a second drive transmission member capable of receiving the rotational force from the first drive transmission member to thereby rotate about a rotational axis and transmit the rotational force to the developing roller, the second drive transmission member including an engagement portion,
- wherein the engagement portion of the first drive transmission member and the engagement portion of the second drive transmission member couple by interference when the developing roller is in the first position, to enable the second drive transmission member to receive the rotational force from the first drive transmission member, and

wherein the engagement portion of the first drive transmission member and the engagement portion of the second drive transmission member are separated from each other when the developing roller is in the second position in order to prevent the second drive transmission member from receiving the rotational force from the first drive transmission member.

29. The process cartridge of claim 28, wherein the first drive transmission member includes a shaft, and the second drive transmission member includes an opening that receives the shaft.

30. The process cartridge of claim 28, wherein the second drive transmission member includes a shaft, and the first drive transmission member includes an opening that receives the shaft.

31. The process cartridge of claim 28, further comprising a shaft,

wherein the first transmission member includes an opening that receives the shaft, and the second drive transmission member includes an opening that receives the shaft.

32. The process cartridge of claim 28, further comprising a spring that urges the first drive transmission member.

33. The process cartridge of claim 32, wherein the spring urges the first drive transmission member toward the second drive transmission member.

34. The process cartridge of claim 28, further comprising a spring that urges the second drive transmission member.

35. The process cartridge of claim 34, wherein the spring urges the second drive transmission member toward the first drive transmission member.

36. The process cartridge of claim 28, further comprising:

a transmission gear connected to the second drive transmission member; and

a developing roller gear connected to the transmission gear and to the developing roller.

37. The process cartridge of claim 36, wherein at least a part of the second drive transmission member is provided inside of the transmission gear.
38. The process cartridge of claim 28, further comprising a drive connecting and disconnecting member configured to connect the first and second drive transmission members when the developing roller is in the first position and configured to disconnect the first and second drive transmission members when the developing roller is in the second position.
39. The process cartridge of claim 28, further comprising:
- a first frame rotatably supporting the photosensitive drum; and
 - a second frame rotatably supporting the developing roller, the second frame being connected to the first frame, and the second frame being rotatable relative to the first frame about a frame rotation axis to move the developing roller between the first position and the second position.
40. The process cartridge of claim 39, wherein the first drive transmission member is provided along the frame rotation axis.
41. The process cartridge of claim 40, wherein the first drive transmission member and the second drive transmission member are provided along the frame rotation axis.
42. The process cartridge of claim 28, further comprising:
- a drive inputting portion configured to receive the rotational force from a source external to the process cartridge; and
 - a universal joint configured to permit movement of a rotational axis of the drive inputting portion.
43. The process cartridge of claim 42, wherein the universal joint is an Oldham coupling.
44. The process cartridge of claim 28, wherein the second drive transmission member is movable along the rotational axis of the second drive transmission member in order to separate from the first drive transmission member.

45. The process cartridge of claim 28, wherein the first drive transmission member is movable along the rotational axis of the first drive transmission member in order to separate from the second drive transmission member.
46. The process cartridge of claim 28, wherein the engagement portion of the first drive transmission member includes at least one projection that is engageable with the engagement portion of the second drive transmission member.
47. The process cartridge of claim 46, wherein the at least one projection extends toward the second drive transmission member in a rotational axis direction of the first drive transmission member.
48. The process cartridge of claim 28, the engagement portion of the first drive transmission member includes a plurality of projections that are engageable with the engagement portion of the second drive transmission member.
49. The process cartridge of claim 28, wherein the engagement portion of the second transmission member includes at least one projection that is engageable with the engagement portion of the first drive transmission member.
50. The process cartridge of claim 49, wherein the at least one projection extends toward the first transmission member in a rotational axis direction of the second drive transmission member.
51. The process cartridge of claim 28, the engagement portion of the second drive transmission member includes a plurality of projections that are engageable with the engagement portion of the first drive transmission member.
52. The process cartridge of claim 28, wherein the engagement portion of the first drive transmission member includes a plurality of projections, and the engagement portion of the second drive transmission member includes a plurality of projections that are contactable to the plurality of projections of the first drive transmission member.
53. The process cartridge of claim 28, wherein the first drive transmission member includes a gear for receiving the rotational force.

54. The process cartridge of claim 28, wherein the second drive transmission member includes a gear for outputting the rotational force.

55. A process cartridge comprising:

a photosensitive drum;

a developing roller for developing a latent image on the photosensitive drum, the developing roller being movable relative to the photosensitive drum between (i) a first position in which the developing roller is positioned proximate to the photosensitive drum such that the developing roller can develop a latent image on the photosensitive drum and (ii) a second position in which the developing roller is spaced apart from the photosensitive drum; and

a dog clutch comprising:

a first drive transmission member capable of receiving a rotational force; and

a second drive transmission member capable of receiving the rotational force from the first drive transmission member and transmitting the rotational force to the developing roller when the second drive transmission member is engaged with the first drive transmission member,

wherein the first drive transmission member is engaged with the second drive transmission member when the developing roller is in the first position and is disengaged from the second drive transmission member when the developing roller is in the second position.

56. The process cartridge of claim 55, wherein the first drive transmission member includes a shaft, and the second drive transmission member includes an opening that receives the shaft.

57. The process cartridge of claim 55, wherein the second drive transmission member includes a shaft, and the first drive transmission member includes an opening that receives the shaft.

58. The process cartridge of claim 55, further comprising a shaft,
wherein the first transmission member includes an opening that receives the shaft, and the
second drive transmission member includes an opening that receives the shaft.
59. The process cartridge of claim 55, further comprising a spring that urges the first drive
transmission member.
60. The process cartridge of claim 59, wherein the spring urges the first drive transmission
member toward the second drive transmission member.
61. The process cartridge of claim 55, further comprising a spring that urges the second drive
transmission member.
62. The process cartridge of claim 61, wherein the spring urges the second drive transmission
member toward the first drive transmission member.
63. The process cartridge of claim 55, further comprising:
a transmission gear connected to the second drive transmission member; and
a developing roller gear connected to the transmission gear and to the developing roller.
64. The process cartridge of claim 63, wherein at least a part of the second drive transmission
member is provided inside of the transmission gear.
65. The process cartridge of claim 55, further comprising a drive connecting and
disconnecting member configured to connect the first and second drive transmission members
when the developing roller is in the first position and configured to disconnect the first and
second drive transmission members when the developing roller is in the second position.
66. The process cartridge of claim 55, further comprising:
a first frame rotatably supporting the photosensitive drum; and
a second frame rotatably supporting the developing roller, the second frame being
connected to the first frame, and the second frame being rotatable relative to the first

frame about a frame rotation axis to move the developing roller between the first position and the second position.

67. The process cartridge of claim 66, wherein the first drive transmission member is provided along the frame rotation axis.

68. The process cartridge of claim 67, wherein the first drive transmission member and the second drive transmission member are provided along the frame rotation axis.

69. The process cartridge of claim 55, further comprising;

a drive inputting portion configured to receive the rotational force from a source external to the process cartridge; and

a universal joint configured to permit movement of a rotational axis of the drive inputting portion.

70. The process cartridge of claim 69, wherein the universal joint is an Oldham coupling.

71. The process cartridge of claim 55, wherein the second drive transmission member is movable along the rotational axis of the second drive transmission member in order to separate from the first drive transmission member.

72. The process cartridge of claim 55, wherein the first drive transmission member is movable along the rotational axis of the first drive transmission member in order to separate from the second drive transmission member.

73. The process cartridge of claim 55, wherein the engagement portion of the first drive transmission member includes at least one projection that is engageable with the engagement portion of the second drive transmission member.

74. The process cartridge of claim 73, wherein the at least one projection extends toward the second drive transmission member in the rotational axis direction of the first drive transmission member.

75. The process cartridge of claim 55, the engagement portion of the first drive transmission member includes a plurality of projections that are engageable with the engagement portion of the second drive transmission member.

76. The process cartridge of claim 55, wherein the engagement portion of the second transmission member includes at least one projection that is engageable with the engagement portion of the first drive transmission member.

77. The process cartridge of claim 76, wherein the at least one projection extends toward the first drive transmission member in a rotational axis direction of the second drive transmission member.

78. The process cartridge of claim 55, the engagement portion of the second drive transmission member includes a plurality of projections that are engageable with the engagement portion of the first drive transmission member.

79. The process cartridge of claim 55, wherein the engagement portion of the first drive transmission member includes a plurality of projections, and the engagement portion of the second drive transmission member includes a plurality of projections that are contactable to the plurality of projections of the first drive transmission member.

80. The process cartridge of claim 55, wherein the first drive transmission member includes a gear for receiving the rotational force.

81. The process cartridge of claim 55, wherein the second drive transmission member includes a gear for outputting the rotational force.

82. A process cartridge comprising:

a photosensitive drum;

a developing roller for developing a latent image on the photosensitive drum, the developing roller being movable relative to the photosensitive drum between (i) a first position in which the developing roller is positioned proximate to the photosensitive drum such that the developing roller can develop a latent image on the photosensitive

drum and (ii) a second position in which the developing roller is spaced apart from the photosensitive drum; and

a clutch comprising:

a first drive transmission member capable of receiving a rotational force input to the clutch; and

a second drive transmission member capable of operably connecting to the first drive transmission member and outputting the rotational force from the clutch,

wherein the first drive transmission member and the second drive transmission member contact each other when the developing roller is in the first position to enable the second drive transmission member to receive the rotational force from the first drive transmission member, and

wherein the first drive transmission member and the second drive transmission member are separated from each other when the developing roller is in the second position in order to prevent the second drive transmission member from receiving the rotational force from the first drive transmission member.

83. The process cartridge of claim 82, wherein the first drive transmission member includes a shaft, and the second drive transmission member includes an opening that receives the shaft.

84. The process cartridge of claim 82, wherein the second drive transmission member includes a shaft, and the first drive transmission member includes an opening that receives the shaft.

85. The process cartridge of claim 82, further comprising a shaft,

wherein the first transmission member includes an opening that receives the shaft, and the second drive transmission member includes an opening that receives the shaft.

86. The process cartridge of claim 82, further comprising a spring that urges the first drive transmission member.

87. The process cartridge of claim 86, wherein the spring urges the first drive transmission member toward the second drive transmission member.
88. The process cartridge of claim 82, further comprising a spring that urges the second drive transmission member.
89. The process cartridge of claim 88, wherein the spring urges the second drive transmission member toward the first drive transmission member.
90. The process cartridge of claim 82, further comprising:
- a transmission gear connected to the second drive transmission member; and
 - a developing roller gear connected to the transmission gear and to the developing roller.
91. The process cartridge of claim 90, wherein at least a part of the second drive transmission member is provided inside of the transmission gear.
92. The process cartridge of claim 82, further comprising a drive connecting and disconnecting member configured to connect the first and second drive transmission members when the developing roller is in the first position and configured to disconnect the first and second drive transmission members when the developing roller is in the second position.
93. The process cartridge of claim 82, further comprising:
- a first frame rotatably supporting the photosensitive drum; and
 - a second frame rotatably supporting the developing roller, the second frame being connected to the first frame, and the second frame being rotatable relative to the first frame about a frame rotation axis to move the developing roller between the first position and the second position.
94. The process cartridge of claim 93, wherein the first drive transmission member is provided along the frame rotation axis.
95. The process cartridge of claim 94, wherein the first drive transmission member and the second drive transmission member are provided along the frame rotation axis.

96. The process cartridge of claim 82, further comprising;
- a drive inputting portion configured to receive the rotational force from a source external to the process cartridge; and
- a universal joint configured to permit movement of a rotational axis of the drive inputting portion.
97. The process cartridge of claim 96, wherein the universal joint is an Oldham coupling.
98. The process cartridge of claim 82, wherein the second drive transmission member is movable along a rotational axis of the second drive transmission member in order to separate from the first drive transmission member.
99. The process cartridge of claim 82, wherein the first drive transmission member is movable along a rotational axis of the first drive transmission member in order to separate from the second drive transmission member.
100. The process cartridge of claim 82, wherein the first drive transmission member includes at least one projection that is engageable with the second drive transmission member.
101. The process cartridge of claim 100, wherein the at least one projection extends toward the second drive transmission member in a rotational axis direction of the first drive transmission member.
102. The process cartridge of claim 82, the first drive transmission member includes a plurality of projections that are engageable with the second drive transmission member.
103. The process cartridge of claim 82, wherein the engagement portion of the second transmission member includes at least one projection that is engageable with the first drive transmission member.
104. The process cartridge of claim 103, wherein the at least one projection extends toward the first drive transmission member in a rotational axis direction of the second drive transmission member.

105. The process cartridge of claim 82, the engagement portion of the second drive transmission member includes a plurality of projections that are engageable with the first drive transmission member.

106. The process cartridge of claim 82, wherein the first drive transmission member includes a plurality of projections, and the second drive transmission member includes a plurality of projections that are contactable to the plurality of projections of the first drive transmission member.

107. The process cartridge of claim 82, wherein the first drive transmission member includes a gear for receiving the rotational force.

108. The process cartridge of claim 82, wherein the second drive transmission member includes a gear for outputting the rotational force.