DRIVE CLUTCH FOR ARTICLE ADDRESSING MACHINE
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3 Claims

ABSTRACT OF THE DISCLOSURE
A clutch for use with an article addressing machine to permit certain of the addressing machine components to be coupled and uncoupled from the machine power source. The clutch includes a clutch collar rotatably coupled to a driven member and having a clutch face with at least one shoulder abutment, the collar being axially moveable to bring the clutch face thereof into and out of clutching engagement with an opposing clutch face of a drive member to couple and uncouple the members together. The drive member has a drive pin projecting from the clutch face thereof for contact with the clutch shoulder abutment on the clutch collar on movement of the clutch collar forward into clutching position. The drive pin itself is carried on a clutch ring arranged for controlled displacement relative to the drive member through a resilient coupling means.

This invention relates to a clutch for addressing machines, and more particularly, to an improved impact cushioned clutch for addressing machines.

Automatic article addressing machines function to transfer either address bearing labels or the address information therefrom to articles being addressed. In these machines, the label supply is normally uncoupled, consisting of a sheet-like form with the labels arranged therein in single or multiple rows. To accommodate this type of label supply, the addressing machine labeling head includes a label form feeder with knives or other means to separate the form into individual labels for use by the label transfer mechanism. As can be understood, the timing of the labeling head form feeder and knife mechanisms, both with each other and with the other addressing machine components, is critical to accurate and high speed machine operation; and, for this purpose, the labeling head incorporates a relatively complex and expensive gear drive system for driving the label form feeder and knife mechanisms.

At the same time, however, it is usually prudent to provide some protection against a failure in the supply of articles being addressed. This is important since sustained operation of the labeling head following a failure or interruption of the article supply could result in an almost irreparable disruption of the mailing list chain. This in turn could result, in a subpoena mailing use for example, in certain subscribers falling altogether to receive the articles subscribed for.

To carry out the above purposes, there is normally provided in the labeling head drive train a drive clutch, the aforesaid drive clutch being under the control of a suitable sensor effective on a break in the article supply to disengage the clutch and stop the labeling head. However, since the timing function of the addressing machine components is so critical, a positive clutch is used with the result that relatively high impact forces are generated, particularly on clutch engagement. These impact forces may cause undue strain or breaking of the clutch parts themselves or of the labeling head gear train associated therewith.

The clutch assembly is adapted to be rotatably coupled to the drive member to operate the label supply means; a clutch collar having a clutch face with at least one clutch abutment, means rotatably coupling the clutch collar with one of the drive and driving members while permitting the collar to move axially relative to the members; a clutch ring opposite the clutch collar, the clutch ring having a clutch face with at least one clutch abutment thereon adapted to contact the clutch collar abutment on predetermined axial movement of the clutch collar toward the clutch ring whereby to rotatably couple the clutch collar with the clutch ring; means coupling the clutch ring and the other of the drive and driving members axially together, the coupling means enabling the clutch ring to rotate relative to the other member, the clutch ring including a contact surface opposite the other member; the other member including a stop surface opposite the clutch ring and angularly separated from the clutch collar abutment such that on contact of the clutch collar abutment with the clutch ring abutment, the clutch ring turns relative to the other member to bring the clutch ring contact surface into abutment with the other member stop surface whereby to drive the drive member; and resilient means between the clutch ring contact surface and the other member stop surface to cushion impact resulting from contact of the clutch collar abutment with the clutch ring abutment.

Other objects and advantages will be apparent from the ensuing description and drawings in which:

FIG. 1 is a schematic view of an addressing machine of the type incorporating the improved clutch of the present invention;
FIG. 2 is an enlarged schematic view of the labeling head portion of the machine shown in FIG. 1;
FIG. 3 is an isometric view of the drive clutch of the present invention;
FIG. 4 is a side view in section showing the drive clutch of the present invention; and
FIG. 5 is a cross section view taken along lines 5—5 of FIG. 4.

Referring to the drawings, there is shown an addressing machine, designated generally by the numeral 5, incorporating the labeling head drive clutch, designated by the numeral 10, of the present invention. In the exemplary showing, addressing machine 5 includes a table-like base 6 on which an article transport 7 is operatively supported, transport 7 serving to bring articles that are either blank or labeled, such as envelopes 12, into operative relationship with a rotatable transfer wheel 14 on labeling head 15. A supply of envelopes 12 to be addressed are stored in a supply hopper 8 with a suitable feeder means (not shown) provided to advance one envelope at a time from the bottom of hopper 8 onto transport 7.

Labeling head 15 is suitably supported on the base 6 with transfer wheel 14, which is journaled in the lower
frame portion of head 15, operatively disposed above the article transport 7. The labels themselves are supplied as an uncut sheet or form 17, the head 15 being provided with suitable form feeding and cutting means for the purpose of supplying individual labels from form 17 to transfer wheel 14 in proper operational sequence. The form feeding and cutting means (not shown) cooperates with margins 18 of form 17 to feed form 17 one label width at a time to a first cutter, guillotine 16. Guillotine 16 cuts from 17 transversely into strip-like pieces normally four or five labels long. The label strips are advanced by means of an intermittently operated pinch roll pair 20 and rotary knife pair 21 in a crosswise direction toward the transfer wheel 14, second cutter 31. The label roll 21 of rotary knife pair 21, the knife working against the periphery of the other roll to cut the label strip drawn therebetween into individual labels. The cut labels leaving knife pair 21 are picked up by transfer wheel 14, the transfer wheel being provided with suitable vacuum holddown means effective to temporarily hold the labels on the periphery of transfer wheel 14 while the labels are carried by wheel 14 into transfer contact with the envelopes 12 passing thereunder on transport 7.

As will be understood by those skilled in the art, the labels may be physically transferred to the envelopes 12 through the use of a suitable adhesive. For example, the label paper itself may carry a heat-activated adhesive, there being suitable heating means (not shown) in or adjacent to the transfer wheel 14 to actuate the adhesive as the label is carried from rotary knife pair 21 into transfer contact with the envelope 12 passing therebelow on article transport 7. According to another transfer arrangement, the label or address information is printed on a release-type paper so that pressure contact of the labels with the envelopes, preferably in the presence of heat, transfers the label image onto the envelopes. Following transfer, the used labels may be discarded.

Base 6 includes suitable means 9 for driving addressing machine 5. Labeling head 15 includes an input drive shaft 25, there being suitable means 11 to driveingly connect the shaft 25 with the motor means 9 on base 6. Transfer wheel 14 is supported by rotatable shaft 28, and is driven from drive gear 26 on shaft 25 through suitable gearing (not shown).

Referring particularly to Figs. 3–5, the transfer wheel drive gear 26 is mounted on and rotatable with input shaft 25. A drive gear or sprocket 31 for the label form feeding and cutting means is rotatably mounted on drive shaft 25 by means of bearing 27. Gear 31 serves to drive through suitable gear and shaft means (not shown), the label form feeding and cutting means, including the pinch roll pair 29, and rotary knife pair 21. As will appear hereinafter, drive gear 26 is selectively coupled to gear 31 and shaft 25 through clutch 10, disengagement of clutch 10 serving to stop the label form feeding and cutting means and terminate the supply of labels to transfer wheel 14 to effectively stop the labeling head 15.

Clutch 10 includes an axially displaceable clutch collar 32, and cooperating clutch ring 34, the latter being secured to the inside face of drive gear 26 in a manner to be more fully explained hereinafter. The opposing faces 33, 35 of collar 32 and ring 34 respectively form the clutching surfaces. Gear 31 has a barrel-like extension 37 integral therewith and projecting axially toward gear 31. Clutch collar 32 is slidably mounted on extension 37 for limited back and forth movement therealong (as shown by the arrows in Fig. 2) to enable the collar 32 to be moved into and out of clutching engagement with clutch ring 34. Collar 32 is rotatably coupled to gear 31 by means of key 36, suitable mating keyways being provided in extension 37 and bore 40 of gear 31. The periphery of clutch collar 32 has a slot-like recess 27 extending therearound to accommodate shifting fork 41 as will appear.

A portion of the collar clutch face 33 is recessed at 39 to provide clutch shoulders 43. As will appear, one of the clutch shoulders 43 cooperates with the head 49 of drive pin 44 on clutch ring 34 to clutch collar 32 and ring 34 together.

Clutch ring 34 consists of a ring-like part, a sector portion of which is removed at 46. Drive pin hole 47 is provided diametrically opposite to the removed sector 46, head 47 serving to receive the shank portion 48 of drive pin 44. Drive pin 44 is retained in hole 47 by suitable means with the driving head portion 49 thereof projecting axially out from the clutch surface 35 for contact with the shoulder 43 of clutch collar 32.

A pair of diametrically opposed slot-like openings 50 are provided in clutch ring 34, the plane common to the axis of slots 50 being substantially perpendicular to the plane common to the axis of sector 46 and hole 47. As will appear, slots 50 accommodate holddown screws 51 which thread into face 56 of gear 26 to attach clutch ring 34 to gear 26 as will appear.

The driving side 55 of sector 46 is undercut at 52 to receive resilient insert 54. Insert 54, which is preferably formed from urethane, is suitably retained in section 52. The thickness of insert 54 is somewhat less than the depth of undercut 52. As will appear, insert 54 forms the drive or contact surface between gear 26 and clutch ring 34.

On the face 56 of gear 26 is provided with a pair of threaded holes 57 to accommodate holddown screws 51. Gear 26 includes an axially projecting drive lug 60 receivable within sector 46 of clutch ring 34, the drive lug 60 being located substantially diametrically opposite to the plane common to the axis of holes 57. The arcuate extent of drive lug 60 is less than the effective arcuate extent of the removed sector portion 46 of clutch ring 34 as measured between the surface of insert 54 and the opposite face 55 of clutch ring 34 to provide limited free or lost motion between the contacting surfaces of drive lug 60 and insert 54 on clutch engagement as will appear.

To operate clutch 10, a control solenoid 66 is provided, solenoid 66 being suitably supported on the labeling head frame. The stem portion of shift fork 41 is operatively connected to the armature of solenoid 66 through linkage 68. Solenoid 66 incorporates suitable spring means (not shown) to bias clutch collar 32 into engagement with clutch ring 34. Suitable control circuitry (not shown) is provided for energizing solenoid 66 and disengaging clutch 10.

With solenoid 66 energized, clutch collar 32 is retracted along gear extension 37 in the direction of gear 31 to separate the clutch faces 33, 35 and disengage clutch 10. Drive gear 31 is therefore disengaged from the labeling head input drive shaft 25 and the feeding and cutting means for label form 17 stopped. This terminates the supply of labels to transfer wheel 14 although transfer wheel 14, which is driven from shaft 25 through gear 26 continues to turn.

On subsequent deenergization of clutch control solenoid 66, the clutch ring means (not shown) slides collar 32 along gear extension 37 toward clutch ring 34 (in the direction shown by the solid line arrow in Fig. 3) to bring the clutching faces 33, 35 into mating contact. As the clutch collar 32 nears the rotating clutch ring 34, head 49 of drive pin 44 enters the recessed portion 39 of clutch face 33, the relative rotation between the collar 32 and ring 34 bringing the drive pin head 49 into abutting contact with the clutch shoulder 43 on collar 32.

It is understood that where drive pin 44 initially contacts clutch face 33 upstream of recessed portion 39 thereof, pin 44 simply rides along the surface of clutch face 33 until the pin drops into recess 39.

With contact of drive pin 44 with the clutch shoulder 43, the clutch ring 34 turns relative to the drive gear 26 in an amount determined by any free space between the contacting surfaces of drive lug 60 and insert 54, and subsequently by the compressibility of insert 54. The initial relative turning movement, as determined by any free
space between the contacting surfaces of lug 60 and insert 54, is resisted by the friction developed between the mating surfaces of input gear 26 and clutch ring 34.

Contact of drive lug 60 with the resilient insert 54 and resultant compression thereof cushions the impact force resulting from contact of drive pin 44 with clutch shoulder 43 and completes the driving connection. With clutch 10 engaged, gear 31 is driven to operate the feeding and cutting means for label form 17 to provide labels to transfer wheel 14.

On later disengagement of clutch 10, the resilient nature of insert 54 tends to reset the drive lug 60 relative to insert 54.

While the invention has been described with reference to the structure disclosed, it is not confined to the details set forth; but is intended to cover such modifications, or changes as may come within the scope of the following claims.

What is claimed is:

1. In an article addressing machine having a labeling head portion incorporating means to supply address labels, said labeling head portion including a transfer wheel and form label cutting and feeding means, a drive member for said label supply means, and a driving member coupled to said transfer wheel and adapted to be rotatably coupled to and uncoupled from said drive member to operate said label supply means, the combination of:
   a clutch collar, said clutch collar having a clutch face with at least one clutch abutment thereon;
   means rotatably coupling said clutch collar with one of said drive and driving members while permitting said collar to move axially relative to said members;
   a clutch ring opposite said clutch collar, said clutch ring having a clutch face with at least one clutch abutment thereon adapted to strike said clutch collar abutment on predetermined axial movement of said clutch collar toward said clutch ring whereby to rotatably couple said clutch collar with said clutch ring;
   means coupling said clutch ring and the other of said drive and driving members axially together, said coupling means enabling said clutch ring to rotate relative to said other member;
   said clutch ring including a contact surface opposite said other member;
   said other member including a stop surface opposite said clutch ring and angularly separated from said clutch collar abutment such that, on contact of said clutch collar abutment with said clutch ring abutment, said clutch ring turns relative to said other member to bring said clutch ring contact surface into abutment with said other member stop surface whereby to drivingly couple said drive and driving members together, said stop surface and said abutment serving to synchronize the rotation of said transfer wheel with the operation of said form label cutting and feeding means; and
   resilient means between said clutch ring contact surface and said other member stop surface to cushion impact resulting from striking of said clutch collar abutment with said clutch ring abutment.

2. The article addressing machine according to claim 1 in which a sector portion of said clutch ring is removed, one side of said removed sector portion forming said clutch ring contact surface;
   said stop surface comprising one side of a projecting drive lug on said other member adapted to fit within said clutch ring sector portion;
   the angular extent of said removed sector portion being greater than the angular extent of said drive lug so that limited lost motion is provided between said clutch ring and said other member before said contact and stop surfaces abut,
   said resilient means comprising a rubber-like material on said one side of said clutch ring removed sector portion.

3. The addressing machine according to claim 2 in which said coupling means comprises a screw and slot means adapted to prevent axial separating movement between said clutch ring and said other member whereby to retain said drive lug within said clutch ring removed sector portion.

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