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COP WINDING MACHINE

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The present invention relates to improve-
ments in or relating to cop winding machines.

In winding machines the yarn is laid onto a
spool, bobbin or other suitable receiver by a yarn
guide that is reciprocated between end limits
over the surface upon which the yarn is to be
laid.

In certain winding operations, such as pirn
winding, it is desirable that the yarn laid in
each transverse movement of the guide should
lie at varying distances from the axis of the
winding head to enable it to be drawn off from
one end of the pirn. This is effected by moving
the traversing yarn guide slowly parallel with the
axis of the winding head, so that the portion of
the pirn body over which it traverses backwards
and forwards slowly changes. In each traverse
movement the guide moves from areas where a
greater thickness of yarn has been laid to areas
of lesser yarn thickness and vice versa, so that
the layer of yarn laid adopts the shape of a trun-
cated cone.

To effect this purpose the traversing yarn
guide is commonly mounted on a carriage which
is movable parallel to the winding head, the
movement of which may be governed by a feeler
adapted to contact the rapidly rotating yarn
built up on the winding head so that as the
yarn reaches a predetermined thickness it con-
tacts the feeler and through such contact is ef-
fected the longitudinal movement of the car-
riage with its associated traversing yarn guide.

Many practical constructions have been pro-
posed making use of such contacting diameter
feelers and it is to this type of construction that
the present invention is particularly directed.

It will be appreciated that the contact between
the yarn and the feeler must cause a certain
amount of abrasion of the yarn and this is a mat-
ter of particular importance when dealing with
fine rayon yarns.

It is an object of the present invention to pro-
duce a carriage traverse mechanism in which
the parts actually driven from the yarn are of
low inertia and to provide a construction in
which the total energy imparted from the yarn to
the feeler mechanism is low, so that a very light
contact between the yarn and the feeler will be
effective to produce movement of the carriage.

According to the present invention a yarn
guide carriage traverse mechanism for a cop
winding machine comprises a carriage, freely
slidable along a longitudinal guide or guides par-
allel with the winding head, a feeler member ro-
tatably mounted in said carriage, said feeler

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member having a head portion adapted to be
contacted by the rotating yarn and be rotated
thereby, a reciprocating threaded member par-
allel with the winding head engaging a nut mov-
able with respect to the carriage and adapted to
contact it at one end of its stroke to move the
carriage along the guide, the said nut being
caused to travel along the threaded member by
rotation of the feeler member.

The feeler member preferably carries a worm
engaging with corresponding formations on the
periphery of the nut. By providing interchange-
able right and left hand worms it is possible to
adapt the mechanism very quickly for the right-
and left-hand winding.

It will readily be appreciated that the inertia
of the feeler mechanism and the work that has
to be taken from the surface of the yarn is very
low, since the total inertia that has to be over-
come is only the inertia of the feeler member
and the nut and it is only the energy to perform
this part of the operation that has to be taken
from the yarn, the actual movement of the heavy
carriage being effected by the reciprocating
power driven rack. Since the feeler member only
has to rotate the nut it can be made of excep-
tionally light construction and therefore of very
low inertia.

The feeler member is preferably made adjust-
able to be effective at varying distances from the
winding head and for this purpose the worm may
be made longitudinally slidable on it, as by form-
ing the feeler member shaft and the worm with
corresponding square section formations. The
distance at which the feeler head contacts the
yarn may be automatically varied during each
cop winding operation to give the ends of the cop
the correct formation by providing a guide of the
desired contour which is followed by a member
associated with the feeler member to move the
same longitudinally so that the longitudinal path
described by the feeler head is the same as the
shape of the guide contour, which will thereby
be imparted to the cop.

In order that the invention may be more
clearly understood one form of yarn guide car-
riage traverse mechanism for a cop winding ma-
chine is hereinafter described with reference to
the accompanying drawings, wherein:

Figure 1 is a plan view of the mechanism,

Figure 2 is a cross section on the line A—A
of Figure 1,

Figure 3 is a cross section on the line B—B
of Figure 2.

A cop winding machine includes a winding

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head for a pirn core shown diagrammatically at 1 and a carriage 2 longitudinally slidable on guide rails 3 and 4 parallel with the winding axis. The carriage is adapted to support a suitable traversable yarn guide, which may be of any suitable construction and driven in any suitable manner. A yarn guide 30 is mounted on a pivot 31 in projecting portion 5 of the carriage and is reciprocated by means conventional in the art.

The carriage 2 is formed with a boss 6 on its edge nearer the winding head, which, with another boss 7 formed on the top of the carriage, forms a bearing for a carrier member 8 which is longitudinally movable therein. In the carrier member 8 is rotatably mounted a feeler member comprising a shaft 9 and a round disc-like head 10 adapted to contact the yarn of the cop. The other end of the feeler member shaft is provided with a squared portion adapted to receive a worm 11 having a corresponding square section aperture formed therein.

A pair of bosses 12 on the outer side of the carriage serve as a mounting for a nut 13, formed with an internal thread which is both rotatably and longitudinally movable in said mounting. The nut 13 is formed with worm-wheel formations 14 on its periphery to enable it to be rotated by engagement with the worm 11 carried by the feeler member. It also has a peripheral collar 15 formed on its outer surface positioned between the two bosses which acts as an abutment to contact the forward boss. Through the nut passes a rack rod 16 formed with a corresponding thread which is provided with a suitable drive to give it a reciprocating movement which it can impart to the nut. The rack rod is flattened along one side, so that it may be moved laterally with respect to the nut to disengage the same and allow the carriage to be returned rapidly in known manner to its start point.

In operation, as the yarn forming the cop builds up during winding to a predetermined diameter, it will contact the rear edge of the feeler head 10 and cause it to rotate. This rotation is transmitted to the worm 11 and through it to the nut 13 which is thus progressed a very small amount along the rack rod 16. The reciprocating movement of the rack carries the abutment collar 15 into contact with the forward boss 12 at the end of its forward stroke so that the carriage 2 is thereby pushed along its guide rails by an amount substantially equal to the amount of movement of the nut 13 along the rack rod 16 in the preceding cycle.

In this way the energy taken from the yarn by its contact with the feeler member is used only to control the movement of the carriage and is not required to effect such movement directly. Since the energy to be transmitted by the feeler mechanism is very small and the inertia of the nut 13 is small, requiring only very small torque to be applied to the feeler shaft 9 both this part and the feeler head 10 can be made very light.

It will be understood that the rack 16 is reciprocated by conventional means, that the yarn guide 30 is reciprocated in the usual manner by cam means not shown and that the relationship between the two reciprocating motions is such that the rack and the yarn guide do not reach their effective extremities at the same instant. Thus, at the instant a thread is laid where it will contact feeler 10, the nut 13 is intermediate bosses 12 in a free floating condition. The yarn buildup rotates feeler 10, which in turn ad-

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justs the position of nut 13 on rack 16 without engaging either of the bosses 12. The carriage then is nudged along by the next reciprocation of the rack, which will force nut 13 against the lower of the bosses 12 of Figure 1. The amplitude of reciprocation of the rack 16 is of course such that it is less than the free distance of movement of the nut 13 between the bosses 12 so that in normal operation the nut nudges the carriage forward only and only after each change of position of the nut 13 on the rack 16.

The control of the distance of the feeler head 10 from the winding spindle for control of the cop diameter is effected by means of a guide member 17, against which bears a follower 18 mounted in an upward projection of the boss 7. The follower member 18 is connected by a clamp 19 to the feeler member carrier 8, so that as the follower 18 is moved along the guide contour it can impart a longitudinal movement to the carrier 8 and through it to the feeler head 10 when it contacts an angled guide portion 20 out of parallel with the carriage guide. The follower 18 is loaded towards its guide by means of a compression spring 21 arranged about the feeler carrier between the clamp 19 and the boss 6.

What we claim is:

1. A yarn guide carriage traverse mechanism for a winding machine comprising carriage guide means parallel with the winding axis, a carriage longitudinally slidable on said guide means, a feeler member rotatably mounted in said carriage, a feeler head on said feeler member adapted to contact the yarn of a package being wound about the winding axis and to be rotated through such contact, a threaded member arranged to reciprocate longitudinally, a nut engaging said threaded member, having a limited free longitudinal movement with respect to said carriage and adapted to contact a surface on said carriage at one end of its stroke and means associated with the feeler member for rotating said nut, whereby it is progressed along the threaded member to effect longitudinal movement of the carriage.

2. A yarn guide carriage traverse mechanism for a winding machine comprising carriage guide means parallel with the winding axis, a carriage longitudinally slidable on said guide means, a feeler member rotatably mounted in said carriage, a feeler head on said feeler member adapted to contact the yarn of a package being wound about the winding axis and to be rotated through such contact, a threaded member arranged to reciprocate longitudinally, a nut engaging said threaded member, having a limited free longitudinal movement with respect to said carriage and adapted to contact a surface on said carriage at one end of its stroke, a worm rotatable with said feeler member and worm wheel formations on said nut engageable with said worm to effect progression of the nut along the threaded member and consequent longitudinal movement of the carriage.

3. A yarn guide carriage traverse mechanism for a winding machine comprising carriage guide means parallel to the winding axis, a carriage longitudinally slidable on said guide means, a feeler member rotatably mounted transversely of said carriage, a pair of bosses on said carriage, a nut rotatable and longitudinally movable in said bosses, an abutment collar on said nut worm wheel formations on said nut, a worm carried on the feeler member engaging said worm wheel formations, a feeler head on said feeler member

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adapted to be rotated through contact with the yarn of a package being wound at the winding axis, a thread member arranged to engage said nut and to reciprocate longitudinally so that rotation of the feeler head is effective to cause longitudinal movement of the carriage through the impact of the nut abutment collar on its forward end supporting boss.

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