In a spooling device for unwinding thin wire a bobbin is arranged on a hub mounted in free rotation and capable of sliding over a support shaft, the longitudinal axis of which is inclined by an adjustable angle $\alpha$ with respect to the horizontal, the said support shaft being driven in rotation and being integral with a friction disc against which one face of the hub bears by means of a friction packing, under the action of a force $F$. The invention is of particular value in wire-drawing for unwinding thin wire from a large bobbin.

5 Claims, 2 Drawing Figures
SPOOLING DEVICE FOR UNWINDING WIRE

The present invention relates to a spooling device, for use in unwinding wire from a bobbin, which employs a compensated inertia arrangement.

The winding of fine metal wire on large bobbins after manufacture is an operation which is becoming more and more widespread. However, this operation is itself limited by the difficulties which occur in recovering the wire from the large bobbins.

At the present time two methods are used which enable these wires to be unwound.

In a first arrangement, the start of the wire for unwinding is effected in the “pick-up manner” in a free or individually driven manner. This spooling method by unwinding nevertheless has numerous drawbacks, such as the twisting of the wire and the need to create tension.

In a second case, the start of the wire is effected for unwinding, each bobbin being driven by a controlled variable speed motor.

These two methods are extremely burdensome and require a very large space.

An object of the invention is to bring about a rational and economic solution by using an unwinding terminal which may comprise a plurality of stations, provided with a common simple drive and suitable braking means.

According to the invention there is provided a spooling device for use in unwinding wire from a bobbin employing an inertia arrangement, including a bobbin, a hub on which the bobbin is mounted in free rotation, a support shaft over which the hub is capable of sliding, the axis of the support shaft being inclined by an adjustable angle \( \alpha \) with respect to the horizontal, means for rotatably driving the support shaft, a friction disc integral with the support shaft, a friction packing between one face of the hub and the friction disc, the face of the hub bearing by means of the packing against the friction disc under the action of a force \( F \) which is a function, on the one hand, of the inherent weight of the hub and bobbin and, on the other hand, of the value of the angle of inclination \( \alpha \), a cylindrical bearing at one of the ends of the hub, a brake band, an oscillating lever, and a resilient return member for counteracting the oscillating lever, the oscillating lever being linked to the brake band, the brake band being arranged over the cylindrical bearing and the oscillating lever being subjected to the pull of the wire upon its exit from the bobbin thereby counteracting the resilient return member.

In one embodiment of the invention a terminal is provided having a frame which does not occupy any more space than a normal frame and which enables the advantages of spooling by unwinding to be preserved, in particular the characteristic of an absence of twisting of the wire.

Moreover, the control of the speed does not necessitate any fine adjustment and does not require any follow up.

An embodiment of the invention will now be described by way of example with reference to the accompanying drawings in which:

FIG. 1 is a view in longitudinal section of a spool device for wire employing a compensated inertia arrangement, and

FIG. 2 is a view in elevation of a wire spooling assembly comprising a plurality of bobbins.

The wire spool device for unwinding wire employing compensated inertia, shown in FIGS. 1 and 2, comprises a frame 1 on which a bearing 3 provided with ball bearings 4, 4a is fixed by means of screws 2, the said bearings being separated by a cross member 5 and held by resilient rings 6, 6a arranged in grooves.

A shaft 7 is mounted to rotate within the bearing 3, the axis \( y_1 \) of the shaft being capable of being inclined by an angle with respect to the horizontal axis \( y_3 \), by means of the frame 1 which is adjustable in position.

A hub 9 is mounted for free rotation on the shaft 7 by means of needle or roller bearings 8, 8a, a bobbin 10 being engaged on the shaft and held fixed against a shoulder 11 of the hub by a cap 12 screwed on to a threaded end of the hub. The hub 9 has, at its other end, a flange 13 which bears, by means of a friction packing 14, against a friction disc 15 keyed at 16 to the shaft 7.

The hub 9 and the external housing 17 of the roller bearings 8, 8a are capable of sliding axially and freely with respect to the interior housing 18 and to the shaft 7 to compensate the wear of the friction packing 14, thereby to obtain effective contact between the flange 13 and the friction packing.

The flange 13 of the hub 9 is extended to provide a cylindrical bearing surface 19 on which a brake band 20 is arranged. The brake band 20 is wound over a pulley 21 mounted on an oscillating lever 22 (FIG. 2) provided on one of its ends with a wheel 23 for guiding the wire 24 upon its exit from the bobbin.

At the other end, the oscillating lever 22 is attached to a spring 25 fixed at 26 to a frame member 27, the spring 25 exerting a force on the oscillating lever opposite to the traction strain of the wire 24, in such a manner that the oscillating lever exerts a torque \( C_1 \) over the braking band 20. When the spring 25 acts on the oscillating lever 22, this latter rotates about axis 0 in the direction of arrow \( F_2 \) and since the lever arm enters point 0 and point 33, a traction is exerted on the band 20 and a braking torque \( C_1 \) is applied to the pulley 19. On the contrary, if a traction is exerted by the wire on the pulley 23, the oscillating lever 22 pivots in the opposite direction, in the direction of arrow \( F_5 \), so that the traction of the spring 25 is reduced and the band 20 exerts only a reduced or even zero braking torque \( C_1 \).

At one end of the shaft 7 there is a grooved pulley 28 which enables the shaft 7 to be rotationally driven and which is linked by a belt 29 to a driving pulley 30 which is driven by means of a belt transmission 31 by a brake motor 32.

As may be seen from FIG. 2, the number of bobbin stations or supports on the frame 1 is a function of the size and weight of the bobbins, it being understood that it is advantageous to arrange the largest possible number of stations per frame, so as to only use a single drive motor.

The spooling device operates in the following manner.

Before proceeding to draw the wire 24 (FIGS. 1 and 2), the motor 32 is started thereby ensuring the driving of the pulley 28 and the shaft 7 by the belt transmission 31 and the belt 29.

The hub 9 is locked by the action of the brake band 20 on the surface of the bearing 19, which is subjected to a braking torque \( C_1 \) exerted on the oscillating lever 22 by the spring 25. In this position, the friction disc 15
slides with respect to the hub 9 and to the bobbin 10
which is not driven.

Upon commencing drawing of the wire 24 in the
direction of the arrow A (FIG. 2) the oscillating lever 22
is rotated by the wire in the opposite direction to the
strain exerted by the spring 25, thus decreasing the
braking torque C 1 exerted on the band 20. In this
manner, the friction disc 15 which rotates integrally
with the shaft 7 progressively drives the hub 9 and the
bobbin 10 by means of the packing 14.

The drive torque C 0 of the bobbin can be adjusted by
modifying the angle x, F being the force of pressure
exerted by the hub 9 against the friction disc 15, as shown
on the diagram of forces of FIG. 1. The modification of
the angle x may be readily obtained through varying
the inclination of frame 1 in a manner well known in
the art, such as, by suitable screws and nuts or cams
(not shown). For example, frame 1 may include a plate
portion 33 which is hingedly connected at 34 to the
frame member 27. The latter may have threads therein
through an adjusting bolt 35, the upper end of which
contacts the lower surface of frame 1 so as to vary the
angle of inclination thereof in response to adjustment
of bolt 35 relative to frame member 27. It follows
therefrom that F is a function of the weight P and of
the value of the angle x in which P is equal to the weight
of the hub 9 and bobbin 10.

Upon starting, the braking torque C 1 exerted by
the band 20 on the hub 9 must be greater than the torque
C 1 transmitted by the friction disc 15. The value of the
torque C 1 can be regulated by means of the spring 25.

For unwinding the wire at a constant speed, the pulley
28 should be driven at a speed slightly greater than
the speed of the bobbin at the end of spooling opera-
tion. At the beginning of the spooling operation, the
speed of the bobbin is slower and the slipping greater
than at the end of the operation.

The wire spooling device according to the invention
can also be applied to a bobbin supported between
points.

Various modifications can be made by a person
skilled in the art to the devices and methods which have
been described solely by way of non-limiting example,
without departing from the scope of the invention
claimed.

I claim:

1. A spooling device for use in unwinding wire from
a bobbin employing a compensated inertia arrange-
ment, including a bobbin, a rotatable hub on which the
bobbin is mounted, a support shaft having the hub slid-
ingly and rotatably supported thereon, the axis of the
support shaft being inclined by an adjustable angle x
with respect to the horizontal, means for rotatably driv-
ing the support shaft, a friction disc integral with the
support shaft, a friction packing between an end sur-
face of the hub and the friction disc, said end surface
of the hub bearing through the intermediary of the
packing against the friction disc under the action of
a force F which is a function of the inherent weight of the
hub and bobbin and of the value of the angle of inclina-
tion x, a cylindrical bearing surface formed at one of
the ends of the hub, a brake band, an oscillating lever
and a resilient return member for counteracting the os-
cillating lever, said oscillating lever being linked to the
brake band, the brake band being arranged over the cy-
lindrical bearing surface, said oscillating lever being
subjected to the pull of the wire upon its exit from the
bobbin thereby counteracting the resilient return mem-
ber.

2. A spooling device according to claim 1, including
bearing means having internal and external casings
mounting the hub on its support and drive shaft, the
external casings being freely slideable with the hub with
respect to the internal casings and the shaft.

3. A spooling device according to claim 1, including
a frame having an adjustable portion, a roller bearing
mounting the bobbin support shaft on said adjustable
frame portion, and means for varying the inclination of
said frame portion, so as to concurrently vary the value
of the angle x which is the axis of the bobbin support
shaft makes with the horizontal.

4. A spooling device according to claim 1, including
a pulley, on which the brake band of the hub is wound,
carried on the central part of the oscillating lever and
a wheel at one of the ends of the oscillating lever over
which the wire passes upon its exit from the bobbin, the
oscillating lever being subjected at its other end to the
action of the resilient return member which counter-
acts the tension on the wire.

5. A spooling device for use in unwinding wire from
a plurality of bobbins employing a compensated inertia
arrangement, including a plurality of bobbins, a plural-
ity of rotatable hubs each having one of said bobbins
mounted thereon, a plurality of support shafts, each
said support shaft slidingly and rotatably supporting
thereon respectively one of said hubs, the axes of said
support shafts being inclined by an adjustable angle x
with respect to the horizontal, means for driving said
support shafts, a plurality of friction discs being integral
one each with respectively one each of said support
shafts, friction packing means between an end surface
of each of said hubs and friction discs, said end surfaces
of said hubs bearing through the intermediary of said
packing means against said friction discs under the ac-
tion of a force F which is a function of the inherent
weight of each said hub and bobbin and of the value of
the angle of inclination x, a cylindrical bearing surface
formed at one end of each said hub, a plurality of brake
bands, a plurality of oscillating levers and resilient re-
turn members for counteracting said oscillating levers,
each of said oscillating levers being linked respectively
to one of said brake bands, one each of said brake
bands being arranged over a respective one of said
bearing surfaces, and said oscillating levers, being sub-
jected to the pull of the wires upon their exit from the
bobbins thereby counteracting the resilient return members.

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