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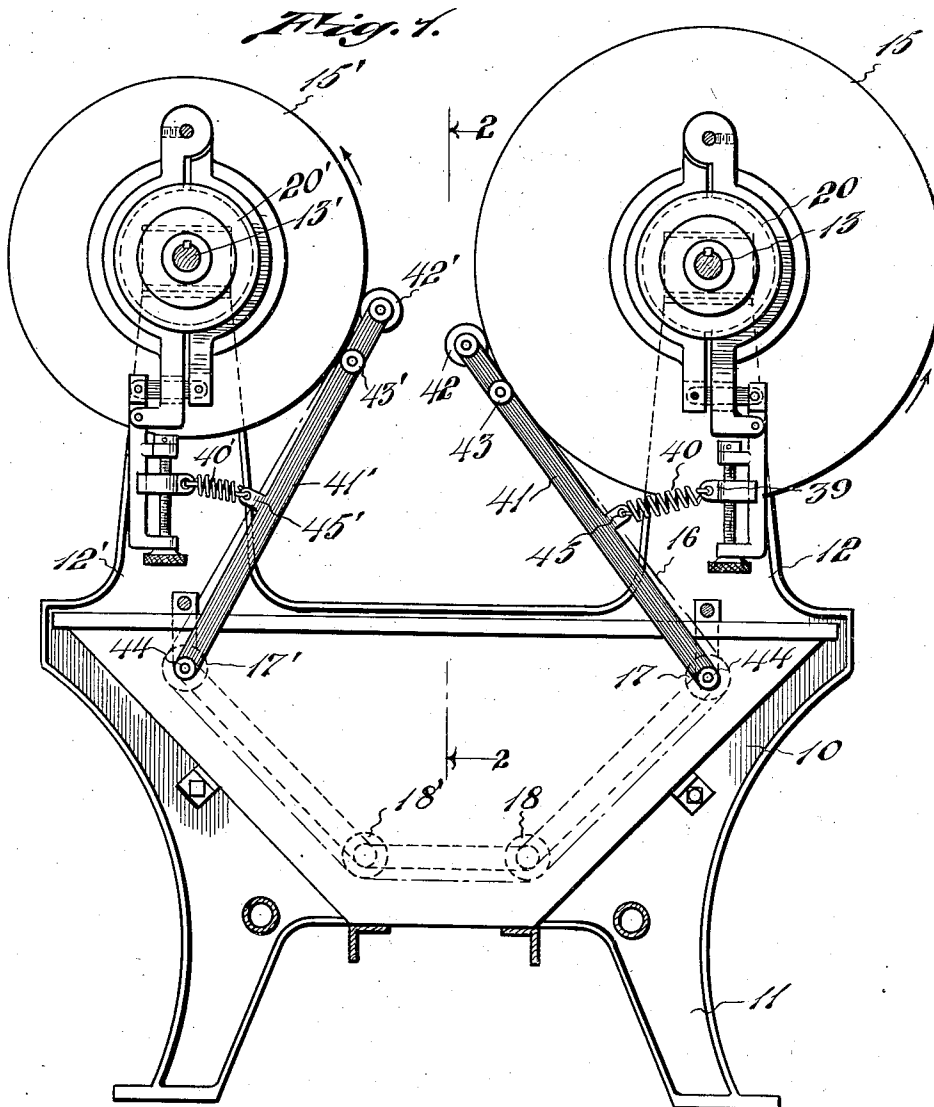
W. R. KENT

2,199,594

MACHINE FOR UNWINDING A WEB OF MATERIAL

Filed April 26, 1938

2 Sheets-Sheet 1



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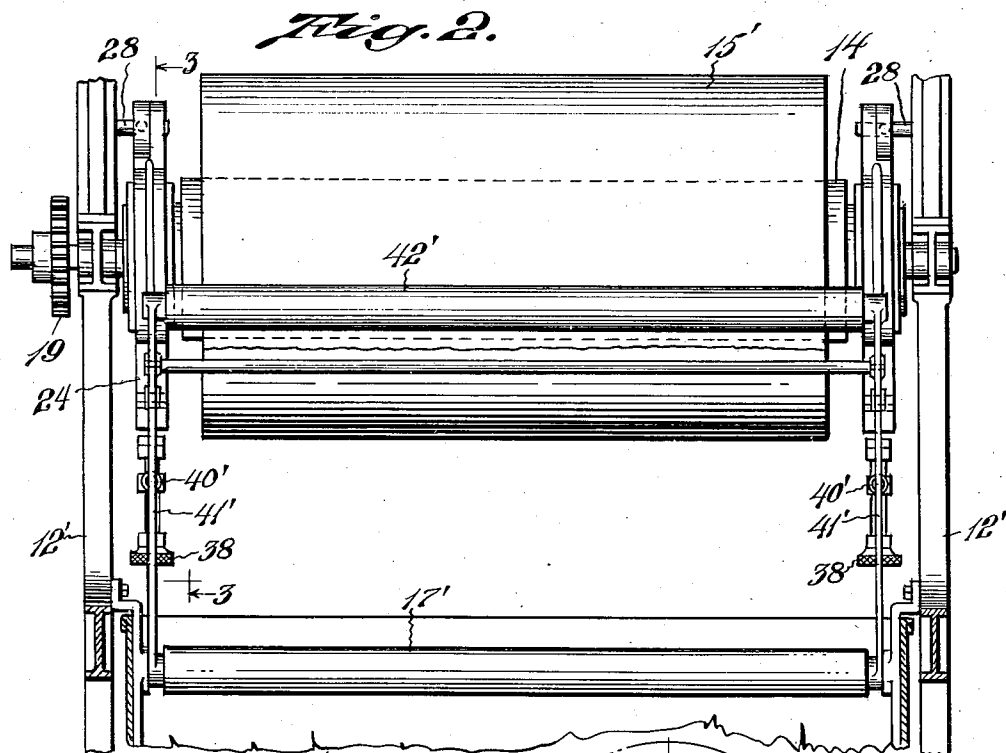
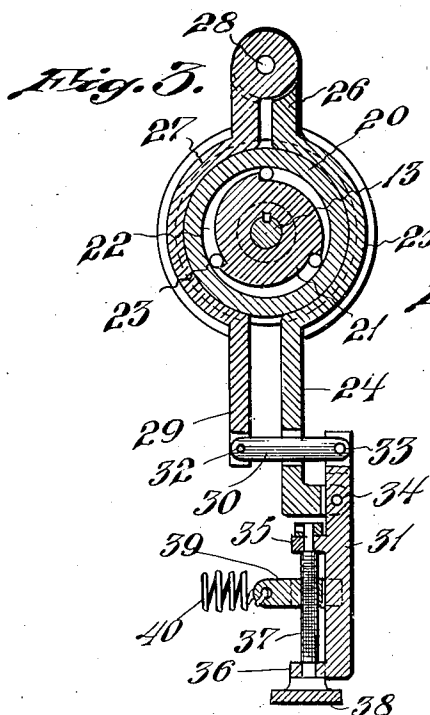
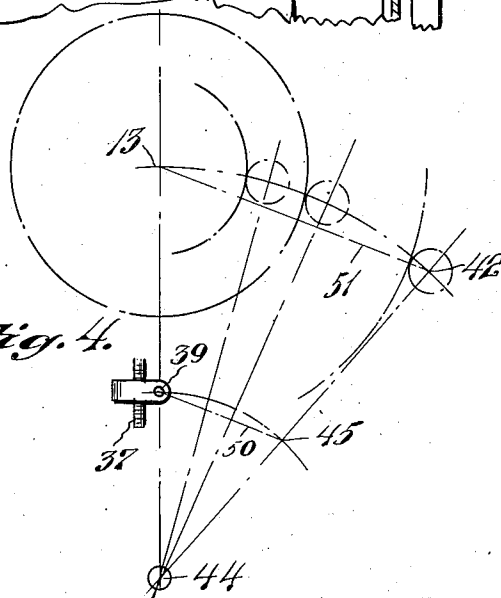
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MACHINE FOR UNWINDING A WEB OF MATERIAL

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UNITED STATES PATENT OFFICE

2,199,594

MACHINE FOR UNWINDING A WEB OF MATERIAL

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9 Claims. (Cl. 242—55)

This invention relates to a machine for unwinding a web of material such as textile goods, and is useful for a dye jig. The invention has for one of its objects to provide a constant tension on the goods as unwound from a beam or shell notwithstanding the constantly decreasing diameter of the goods.

Another object of the invention is to provide a brake to control the unwinding or rotation of the package and to control the application of the brake in a ratio which is directly proportional to the radius or diameter of the roll or package of goods being operated upon in an arrangement whereby constant tension is had upon the work.

Another object of the invention is the provision of a means so that no retarding influence is had upon the rotation of the package at the time of winding the goods on the package, this being accomplished in the present invention by means of an over-running clutch.

Another object of the invention when applied to a dye jig is to provide pins substantially coaxial with the guide roll pins upon which to mount a swinging frame to assist in guiding the roll which engages the package of work so that its axis is in a direction parallel with the axis of the work of the package.

Another object of the invention is the provision of a spring through which the brake on the brake drum is actuated; which spring is so selected and positioned that the force exerted by the spring is proportional to the distance through which it acts and whereby its tension may vary proportionally to the radius of the package that the tension on the goods may be constant.

With these and other objects in view, the invention consists of certain novel features of construction, as will be more fully described, and particularly pointed out in the appended claims.

In the accompanying drawings:

Fig. 1 is a side elevation of a dye jig equipped with this invention;

Fig. 2 is a sectional view on substantially line 2—2 of Fig. 1;

Fig. 3 is a sectional view showing on a larger scale and in more detail the brake drum and brake;

Fig. 4 is a diagrammatic view illustrating various positions of the guide roll.

In the handling of webs of material particularly such as are used in connection with dye jigs, although the usefulness of this invention extends to other textile goods, leather, paper or any material in sheet or web formation which is

unrolled from a beam or shell, it is required that the package in unwinding be controlled by causing some retarding influence to be placed upon the travel of the goods. To effect all of this control through engagement with the goods sometimes places strains upon the goods, which is undesirable, and to apply the control to the axis of the beam or shell upon which the goods are packaged is difficult of control due to the varying amounts of material on the package and their varying rates of travel from the package; and in order that these different variable relationships may be brought into harmony, I have arranged a control of the package by means of a brake with an overrunning clutch so that the brake will not operate in winding the goods on the beam or shell but will operate under the control of a device which engages the surface of the goods and acts through a resilient means such as a spring to apply pressure upon the brake and thus maintain the goods under a control which is proportional to the size of the package. I having selected the arrangement and the spring tension such that this result may be brought about in direct proportion to the size of the package. That is, a greater braking action is applied the greater the size of the package. This pressure is larger at the commencement of unwinding than when the package is smaller at or near the end of the unwinding; and the following is a more detailed description of the present embodiment of this invention, illustrating the preferred means by which these advantageous results may be accomplished:

With reference to the drawings, 10 designates a tub with legs 11 for containing the dye bath, of a usual known type of structure. Upright supports 12, 12' are provided at either side of the jig which provide bearings for the axles 13, 13' upon which the beams or shells 14 are mounted, the work in the form of a web of fabric 15, 15' being wound upon the beams 14 and traveling from one beam or package 15 to the other 15' as at 16 over guide rolls 17, 18, 18', 17', through the dye bath, and thence to package 15'. The axles 13, 13' are suitably driven by gear such as 19, see Fig. 2, first to rotate the goods to cause them to wind upon one package as 15' and, then, through reversing mechanism operable near the end of the travel of the goods, so as to drive the axle or shaft 13 and cause the package 15 to be formed by winding the goods upon the other package, this operation being automatic and traveling the goods back and forth between one package and the other in a manner well known.

Upon each of the axles 13, 13' I have mounted a brake drum 20 and 20' connected thereto through an overrunning clutch each of which consists of a hub 21 keyed to the shaft 13 and
 5 providing a series of wedge-shaped pockets 22 between it and the brake drum with rolls 23 located within the wedge-shaped pockets between the hub 21 and the brake drum 20 so that when
 10 the web rotates the shafts 13 in a counter-clockwise direction, as viewed in Fig. 3, the brake drum 20 will be caused to rotate. But, when the gear 19 drives the shaft in a clockwise direction, as
 15 viewed in Fig. 3, the rolls 23 will move to a location at the large end of the pocket and thus the hub will not be connected to the brake drum and the shaft may freely rotate without any influence of the brake thereon.

The brake shoe consists of a fixed member 24 having an arcuate portion 25 to fit about the brake drum 20 and an upstanding portion 26 to which the brake shoe 27 is pivoted as at 28. The brake shoe 27 has a downwardly extending arcuate portion with an arm 29 which is connected by link 30 to a lever 31 as by means of pivots 32 and 33, the lever 31 being pivoted as at 34 and equipped with lugs 35 and 36 to rotatably mount a threaded shaft 37 which is operated by a knurled handle 38 for moving the carriage 39 to which the spring 40 is attached along the
 30 threaded shaft 37 to various positions of attachment to the lever. Frames 41, 41' are pivoted upon the axis of the rolls 17 and 17' and each carries a guide roll 42, 42' which engages the package of work. There is also a bar 43, 43' supported in the frame between the pivot 44 and the
 35 roll which also engages the work and serves to iron out wrinkles or the like, also braces the frame, but serves no other function. The springs 40, 40' are attached to the frames as at 45, 45' so that as each of the frames move in response to the increasing radius of the package of goods, greater tension is placed upon each spring 40, 40' and consequently each exerts a greater effort to swing the brake lever as 31 around its pivot 34
 40 and apply greater tension on the brake.

It will be apparent from the drawing that inasmuch as the spring 40 provides the third side 50 of a triangle, Fig. 4, from the pivot 44 to the point of connection 45 of the spring and from the pivot 44 to the point of connection 39 of the spring, and the radius 51 of the batch of goods forms the third side of a triangle formed from pivot 44 to roll 42 and from the pivot 44 to the center of the shaft 13, which line passes through
 55 point 39, see Fig. 4, that the small triangle is superimposed on the larger one with its sides aligned therewith, whereby the length of the side 50 or spring 40 and the radius 51 of the goods are in exact proportion at all times.

The spring, here shown is a helical tension spring, although this form of spring is not essential. This spring is so chosen that its tension in elongation is proportional to the radius of the batch of goods. It becomes necessary, in order
 60 to make the tension of the spring proportional to its extension, to so choose the spring that it has no tension (i. e., is in a state of no strain), when the radius of the batch is zero, that is, when the line of tangency of roll 42 coincides with the axis of the shaft 13 or beam 14. This will never occur
 70 in practice, since the beam must have a substantial diameter and hence radius, but the same effect is obtained by so choosing the spring in respect to length at rest that its tension when the
 75 guide roll is tangent to the bare beam and its

tension when the guide roll is tangent to a batch of any radius wound upon the beam are proportional to the radius of the bare beam and the radius of that batch. This choice, in length at rest, of a spring is an essential part of the invention.

The tension of the spring having been made proportional to the radius of the batch, the brake pressure, and hence the braking effect upon the drum, are proportional to the batch. The tension on the goods varies inversely with the radius of the batch and directly with the braking effect.

The frame 41 is substantially duplicated at the opposite end of the machine from that shown in Fig. 1, so as to provide for the movement of the roll 42 parallel to the axis of the work or shaft 13. In many instances this duplication is not necessary, it being merely required to provide a swinging support for the roll 42 and bar 43; and in order to avoid twisting of the frame, some
 20 spring or other may be employed at the opposite end of the machine, one end being fastened to some fixed or variable part of the machine and the other to the frame. In this case the opposite spring is not designed to be a part of the constant tension which is applied to the brake, but merely for the convenient control of the frame 41.

The goods may be freely wound upon a package by reason of a well-known drive uninterfered with by the brake, but that when drawn from the package the brake drum is operated and the drum is affected by reason of the spring exerted on the brake shoe for controlling the same. When the package is largest the braking effect will be greatest and as the package grows smaller the braking effect will be gradually decreased always in an amount proportional by reason of the choosing of the spring 40 to the radius of the package.

The foregoing description is directed solely towards the construction illustrated, but I desire it to be understood that I reserve the privilege of resorting to all the mechanical changes to which the device is susceptible, the invention being defined and limited only by the terms of the appended claims.

I claim:

1. In a machine for unwinding a package containing a web of material, a brake for retarding the rotation of the package, a roll engaging and tangent to the unwinding package, a pivoted frame moved by the roll, and a spring attached substantially the same distance from the pivot of said frame to said frame and to said brake to actuate the same.

2. In a machine for unwinding a package containing a web of material, a brake for retarding the rotation of the package, a guide about which the web passes next after leaving the package, a roller engaging and tangent to the unwinding package, a frame pivoted on an axis common to the guide, said frame being moved by the roller, and a spring attached to said frame and to said brake to actuate the same, said point of attachment to said brake being substantially in a line between the axis of rotation of said package and the axis of said guide.

3. In a machine for unwinding a package containing a web of material, a brake for retarding the rotation of the package, a guide about which the web passes next after leaving the package, a roller engaging and tangent to the unwinding package at substantially the point of leaving of the web, a frame pivoted on an axis common to the guide, said frame being moved by the roller,

and a spring attached to said frame and to said brake to actuate the same.

4. In a machine for unwinding a package containing a web of material, a brake for retarding the rotation of the package, having an arm acting as a lever to actuate the same, a roller engaging and tangent to the unwinding package, a pivoted frame moved by the roller acting about its pivot as a lever, a spring attached to said frame, and to said brake arm to actuate the brake in response to the swinging of the frame about its pivot, and means to adjust the effective point of attachment of one end of said spring to change the leverage action at that end.

5. In a machine for unwinding a package of web material, a brake for retarding the rotation of the package and having an arm acting as a lever to actuate the brake, a pivoted frame carrying a roller engaging the package, a spring attached to said arm and to said frame spaced from the pivot thereof, said frame acting as a lever about the point of pivot of said frame, and means to adjust one end of attachment of said spring to change the effective leverage action at the end thereof.

6. In a machine for unwinding a package of web material, a brake for retarding the rotation of the package and having an arm acting as a lever to actuate the brake, a pivoted frame carrying a roller engaging the package, a spring attached to said arm and to said frame spaced from the pivot thereof, and means to adjust the point of connection of said spring to said brake arm to change the length of the lever action of said arm and the consequent effect of said spring on said brake.

7. In a machine for unwinding a package containing a web of material, a brake for retarding the rotation of the package, a roller engaging the unwinding package, a pivoted frame moved by the roller, a spring attached to said frame and to said brake at approximately equal distances from the pivot of said frame, said spring changing in length in direct proportion to the changing of the radius of the package.

8. In a machine for unwinding a package containing a web of material, a brake, an overrunning clutch through which the brake operates for retarding the rotation of the package in one direction, means for driving the package in the opposite direction free from the brake, a roller engaging the unwinding package, a pivoted frame moved by the roller, a spring attached to said frame and to said brake at approximately equal distances from the pivot of said frame, said spring changing in length in direct proportion to the changing of the radius of the package.

9. In a dye jig, a tub, a pair of beams on said tub, for alternately supporting a web package of goods, guides in said tub for engaging said web of goods, one located to engage the web next after leaving the package on one beam and another located to engage the web next after leaving the package on the other beam, frames pivoted on the axes of said guides and each extending parallel to the web of the goods and carrying a guide roll contacting the package of goods at the adjacent surfaces of said packages, a brake acting on each beam, and a spring through which each frame applies tension to the brake with which it is associated.

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