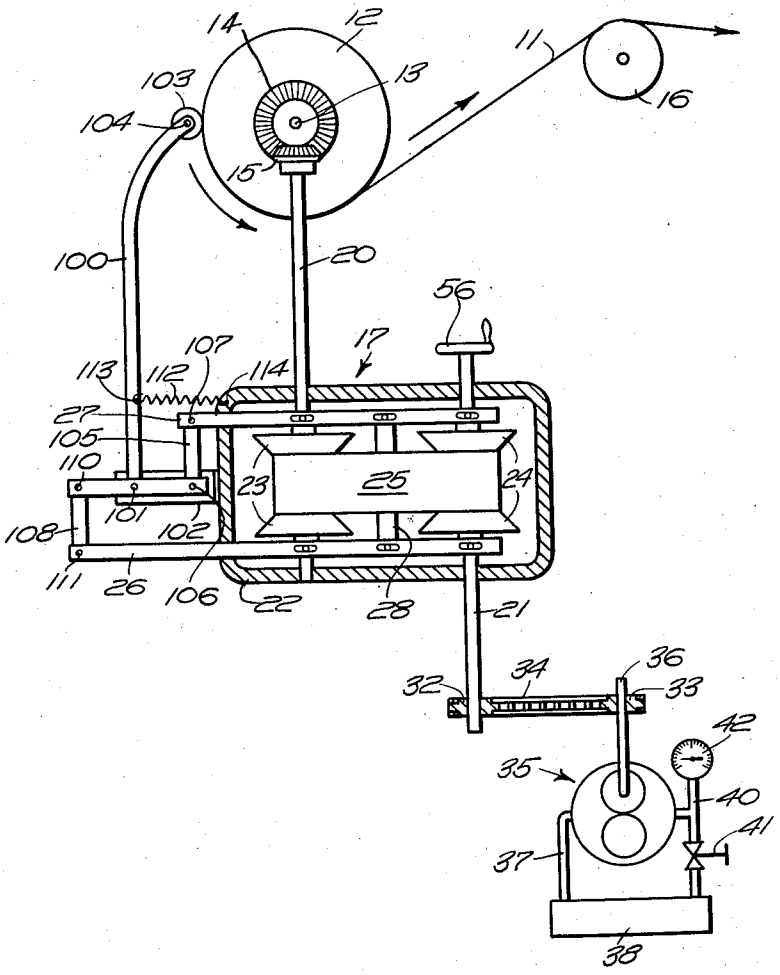
Nov. 11, 1958 R. LE B. BOWEN, JR 2,859,921

CONSTANT TENSION UNWINDING MECHANISM

Original Filed March 25, 1953



INVENTOR.

RICHARD LEBARON BOWEN, JR.

BY

Barlow & Barlow

ATTORNEYS

United States Patent Office 2,859,921 Patented Nov. 11, 1958

2,859,921

CONSTANT TENSION UNWINDING MECHANISM

Richard Le Baron Bowen, Jr., Barrington, R. I.

Original application March 25, 1953, Serial No. 344,520, now Patent No. 2,781,178, dated February 12, 1957. Divided and this application November 16, 1956, Serial No. 622,653

2 Claims. (Cl. 242—75.45)

This invention relates to a constant web tension unwinding mechanism and more particularly to a mechanism for maintaining a constant speed on the web tensioning mechanism through a variable speed transmission responsive to the change in roll diameter which reacts to control the speed of the braking mechanism.

One of the objects of the present invention is to provide a constant braking force in a web unwinding mechanism.

Another object of the present invention is to provide a constant tension unwinding mechanism which will operate automatically without any attention from an operator.

Still another object is the provision of a constant tension unwinding mechanism which will inherently permit the accurate duplication of the braking force.

Other objects of the present invention will be pointed out in part and become apparent in part in the following specification and claims.

The present application is a divisional application of my co-pending application Serial No. 344,520 now Patent No. 2,781,178 dated February 12, 1957.

Uniform or constant tension is a prerequisite to uniformity of product in many web processing machines such as textiles, paper, imitation leather, printing and the like. Especially is this true in a web coating machine where the tension in the web effects the nature and thickness of the coating material being applied to the web. Thus, when a supply roll of cloth is placed in a machine, the cloth should be drawn off at a constant speed and at a given tension.

It is common practice to put a mechanical brake on the shaft of the unwinding roll of material. As the diameter of the roll decreases, the speed or linear travel of the cloth or web is maintained constant, but the speed of the unwinding roll shaft increases in proportion to the decreasing diameter of the roll. If the setting of the mechanical brake is left constant, the tension produced on the web continues to increase in proportion to the increasing speed of the unwinding roll shaft. In such a set up it is necessary to decrease the drag or setting of the mechanical brake on the roll shaft if the tension is to be maintained constant. Past devices have failed to automatically control the drag and thereby regulate the tension accurately in accordance with the changing tension produced as the supply roll decreases in diameter.

This failure was due in part to the nature of the braking mechanism which consisted of the conventional mechanical arrangement of a brake drum and a shoe provided with a brake lining. The coefficient of friction between the drum and shoe varied due to the heating caused by the period of operation and the unevenness

of the parts and oil and dust accumulation so that the brake slipped and grabbed. There was no way of determining a brake setting for future use since the brake lining continually wore down. The present invention contemplates an oil pump as a brake, the pressure of which is always determinable for future precise settings.

In the drawings:

The single figure is a diagrammatic view of the present invention.

Referring to the drawing, a strip of web material **11** is being withdrawn from a beam **12** by means of a drum **16**. Beam **12** is secured to an axle **13** which has fixed to it bevel gear **14** which meshes with bevel gear **15** fixed to shaft **20** of a continuously variable speed transmission, generally indicated by reference character **17**. A second shaft of variable speed transmission **17** is operatively connected to a gear pump generally indicated by reference character **35** through a shaft **36**, sprocket **33** fixed to shaft **36**, sprocket **32** fixed to shaft **21** and chain **34** connecting sprockets **32**, **33**.

A reservoir **38** is provided and is operatively connected to gear pump **35** through suction line **37** and discharge line **40**. A discharge valve **41** inserted in line **40** controls the power exerted by the gear pump **35**. A pressure gage **42** inserted in line **40** gives a relative indication of this power.

The variable speed transmission **17** comprises a pair of parallel shafts **20** and **21** rotatably mounted in a housing **22**. Each shaft **20**, **21** carries a pair of coned disks **23**, **24**, respectively, forming expansive V pulleys which are splined to said shafts. Coned disks **23**, **24** are operatively connected through edge-active belt **25** and may be simultaneously and oppositely adjusted to provide variable speed by the simultaneous adjustment of levers **26**, **27** which are operatively connected to coned disks **23**, **24** and pivotally separated by lever **28**.

Means for the movement of levers **26**, **27** is provided as follows: A bell crank arm **100** is pivotally mounted at **101** to a bracket **102** secured to housing **22** and having a follower roller **103** rotatably mounted at **104** which bears against the outside diameter of beam **12** to sense the decrease in the size of beam **12**. A link **105** is pivotally mounted to bell crank arm **100** at **106** and to lever **27** at **107**. A link **108** pivotally mounted to bell crank arm **100** at **110** connects to lever **26** at **111**. A spring **112** is connected to bell crank lever **100** at **113** and to housing **22** at **114**. The spring causes the follower roller to ride against the beam **12**.

In operation it is self-evident that as the diameter of the beam **12** decreases, bell crank lever **100** will move levers **26** and **27** thus changing the speed of the transmission **17**. This movement will maintain the speed of shaft **21** essentially constant. Since the speed of shaft **21** is maintained constant, the power applied by pump **35** will likewise remain constant, thereby applying constant tension to the web **11**.

I claim:

1. In a constant tension unwinding mechanism, a beam carrying a web, said web travelling at a constant linear speed, a variable speed transmission provided with a first shaft, a second shaft, and a speed changing mechanism, said first shaft being arranged for driving engagement with said beam, a hydraulic circuit including a gear pump and a throttling restriction, said second shaft being arranged for direct driving engagement with said gear pump,

a follower roller engaging said beam, and means connecting said speed changing mechanism with said follower roller.

2. In a constant tension unwinding mechanism, a beam carrying a web, said web travelling at a constant linear speed, a variable speed transmission provided with a first shaft, a second shaft, and a speed changing mechanism, said first shaft being arranged for driving engagement with said beam, a gear pump and a fluid reservoir therefor, a suction and discharge line for said gear pump connected to said reservoir, a throttling valve in said discharge line,

a driving connection between said gear pump and said second shaft, a bell crank arm with a follower roller adapted to engage the periphery of said beam, means for urging said roller towards said beam, and means for connecting said bell crank to said speed changing mechanism.

References Cited in the file of this patent

UNITED STATES PATENTS

1,652,299	Carpenter	Dec. 13, 1927
2,392,226	Butterworth et al.	Jan. 1, 1946