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TAKEUP DEVICE FOR CONTINUOUS MATERIALS

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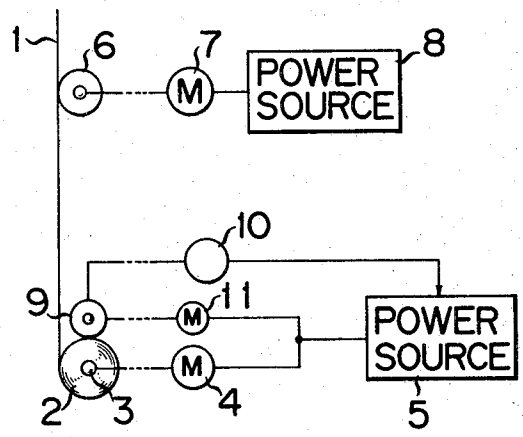

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TAKEUP DEVICE FOR CONTINUOUS MATERIALS

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ABSTRACT OF THE DISCLOSURE

In a takeup device for a continuous material wherein a speed detecting roller is urged against the periphery of a roll of the material wound about a takeup roller to supply electrical signals to a power source energising a motor which drives the takeup roller, the speed detecting roller is driven by an auxiliary motor also energised by the same power source to apply a cumulative torque to the speed detecting roller.

This invention relates to a device for taking up a continuous material under a positive tension control thus increasing the takeup speed.

In taking up a continuous material such as a thread about a takeup roller, the roller is driven by an electric motor coupled to the shaft of the roller. In order to apply a suitable tension to the material to be taken up so as to provide a smooth taking up operation, it has been the practice to provide another roller which is driven by an independent motor in contact with the continuous material prior to it being taken up by the takeup roller. Thus it is important to properly control the tension of the material for the purpose of ensuring smooth taking up operations.

According to another tension control device a dancer roller is used so as to operate a tension detecting device in accordance with the movement of the dancer roller to apply the output of the tension detecing device to the input of the driving motor coupled to the takeup roller, whereby the speed of the motor is controlled to control the tension of the material. With this tension control device, however, when the speed of the takeup roller is increased to increase the efficiency of production, the output of the tension detector begins to oscillate so that it becomes impossible to correctly detect the actual value of the tension.

Alternatively, a roller is urged against the periphery of a roll of the material formed on the takeup roller to detect the diameter of the roll to control the speed of the takeup roller driving motor in accordance with the diameter of the roll. Further a device for detecting the speed of the material being taken up may be used to control the speed of the driving motor.

However, there has been provided no effective device that can correctly control the tension of the material being taken up especially under high speed.

It is an object of this invention to provide a device for taking up a continuous material wherein the speed of the material being taken up is detected by means of a speed detecting roller and a speed detector, the output of the speed detector is supplied to a power source of an electric motor which drives a takeup roller, so as to control the speed of the motor, and an auxiliary motor is provided which is driven by the power source in synchronism with the rotation of said takeup roller to drive the speed detecting roller thus effecting a precise control of the tension of the material at high speeds without accompanying any slip between the takeup roller and the speed detecting roller.

In the accompanying drawing, a single figure illustrates a connection diagram of one embodiment of this invention.

As diagrammatically shown in the drawing a continuous material **1** such as a thread is taken up about a roller **2** to form a roll of the maetrial. Roller **3** is driven by an elecric motor **4** fed from a power source **5**. A tension roller **6** is provided to apply a suitable tension to the material being taken up, said roller **6** being driven by a motor **7** energised by an independent power source **8**.

A speed detecting roller **9** is urged against the periphery of the taken-up roll **2** to be driven thereby and the speed of the roller **9** is detected by a suitable speed detector **10** such as a tachometer generator or a pulse generator. After being converted into electrical signals, the output from the speed detector **10** is supplied to the power source **5** to control the voltage or frequency thereof.

The output from the power source **5** is applied to a main motor **4** and an auxiliary motor **11**, which drives speed detecting roller **9**. Motor **11** may be an electric motor that does not change its torque to any appreciable extent when its speed changes, as for example, a high slip type induction motor. The auxiliary motor **11** is designed to have a torque smaller than that of the main motor **4**. Accordingly, the speed of the auxiliary motor **11** is essentially determined by the peripheral speed of the roll **2** and hence the motor **11** is rotated in synchronism with the roll **2**.

Variation in the tension of the material **1** being wound results in the variation of the takeup speed, which variation is transmitted to the speed detecting roller **9**. The detected speed is converted into electrical signals which are applied to the power source **5**. As a result, the output of the power source **5** is controlled in accordance with the variation of the tension of the material to control the speed of the main motor. Concurrently therewith the speed of the auxiliary motor **11** is also controlled to vary the torque of the speed detecting roller **9**. As a result, the speed of the material is varied to adjust its tension to a correct value.

In this manner, a torque due to the rotation of the roll **2** and a torque provided by the auxiliary motor **11** are given to the speed detecting roller **9**. For this reason, increase in the peripheral speed of the roll **2** of the material does not result in the decrease in the friction between the roll **2** and the speed detecting roller **9** thus causing slippage therebetween. This insures accurate detection of the takeup speed at the time of high speed operation.

Consequently, it is possible to control precisely the speed of the main motor **4**, and hence the tension of the material **1** being wound.

What is claimed is:

1. A takeup device for a continuous material comprising a takeup roller; a motor for driving said roller to control the tension of said material when it is wound around said roller; a power source having an output energising said motor; a speed detecting roller urged against the periphery of a roll of said material wound about said takeup roller to be given a torque by the rotation of said roll to detect the speed of said material as it is taken up; a speed detector for converting the speed detected by said speed detecting roller into electrical signals to apply electrical signals corresponding to the variation of the takeup speed of said material to said power source for controlling the output of said power source; an auxiliary motor energised by said power source; and auxiliary motor energised by said power source so as to operate in synchronism with said takeup roller, said auxiliary motor giving a second torque to said speed detecting roller, said

second torque being cumulative to said first torque; and a tension roller provided before said takeup roller to apply a suitable tension to said material, whereby variation in tension of the material results in variation of the takeup speed, which variation is transmitted to the power source by the detecting roller for controlling the output of the power source to control the speed up roller and hence the tension of the material.

2. A takeup device according to claim 1 wherein said auxiliary motor comprises an induction motor having a characteristic that variation of its torque is small when its speed varies.

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U.S. Cl. X.R.

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