Dec. 6, 1960 C. E. GROSSER ET AL 2,963,236

DISPENSING REEL BRAKE

Filed Jan. 17, 1958 3 Sheets-Sheet 1

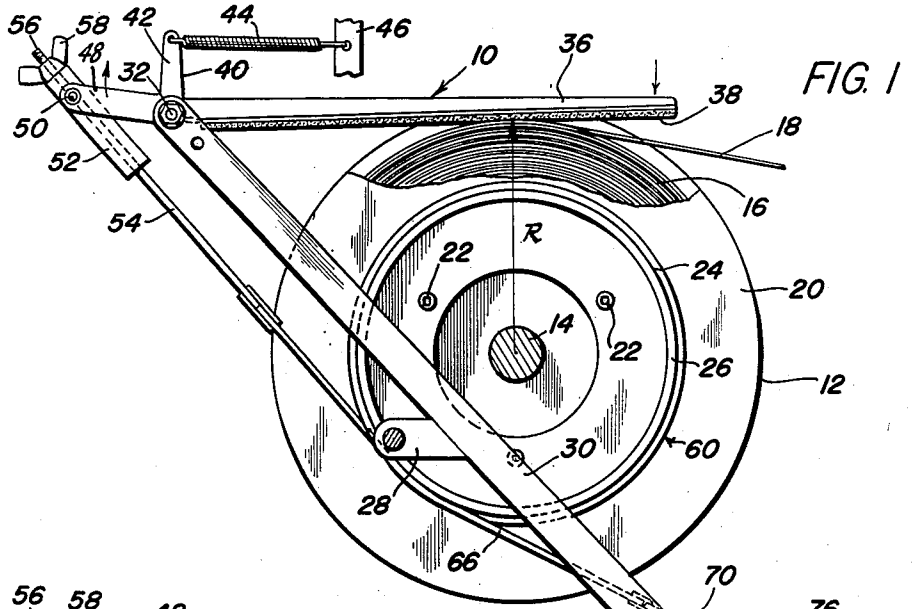


FIG. 1

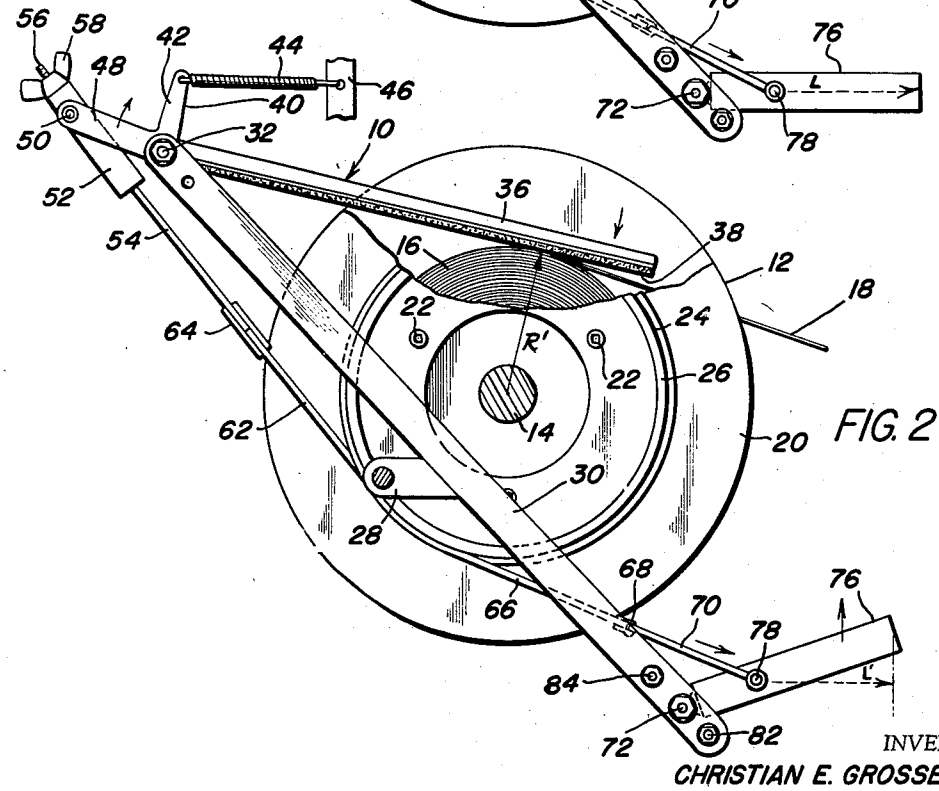


FIG. 2

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Filed Jan. 17, 1958 3 Sheets-Sheet 2

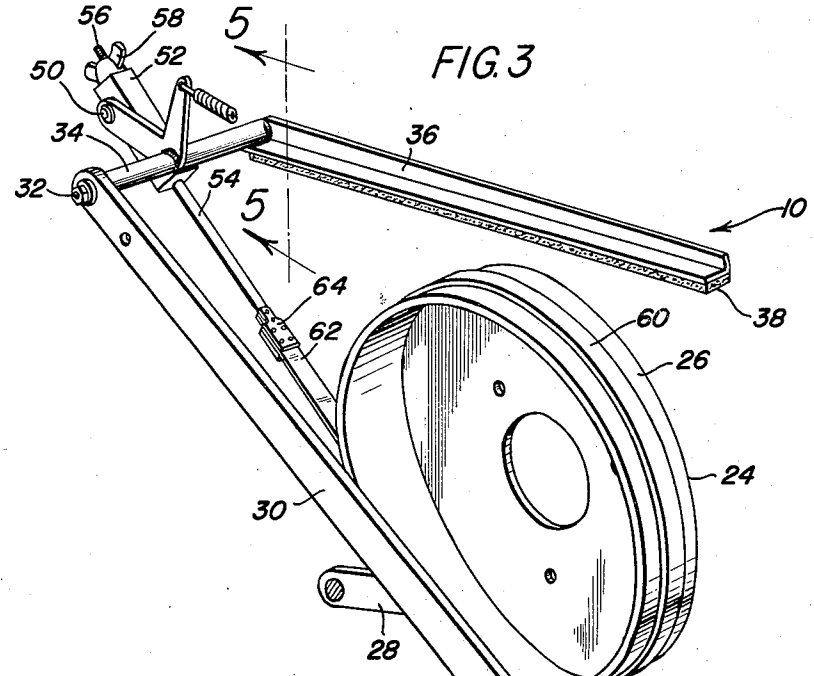


FIG. 3

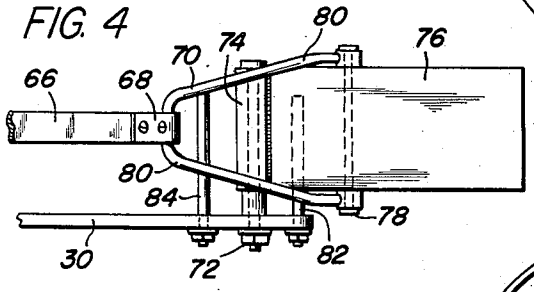


FIG. 4

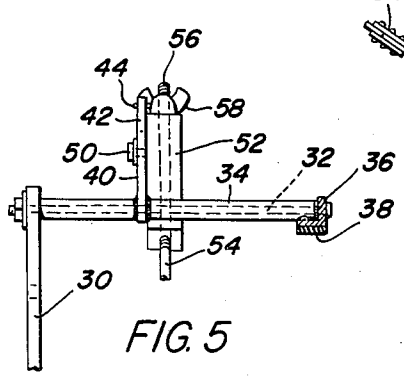


FIG. 5

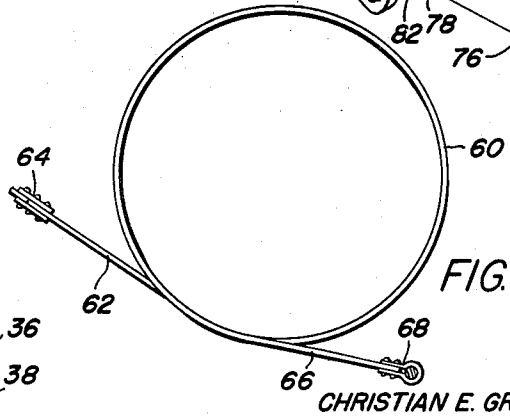


FIG. 6

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DISPENSING REEL BRAKE

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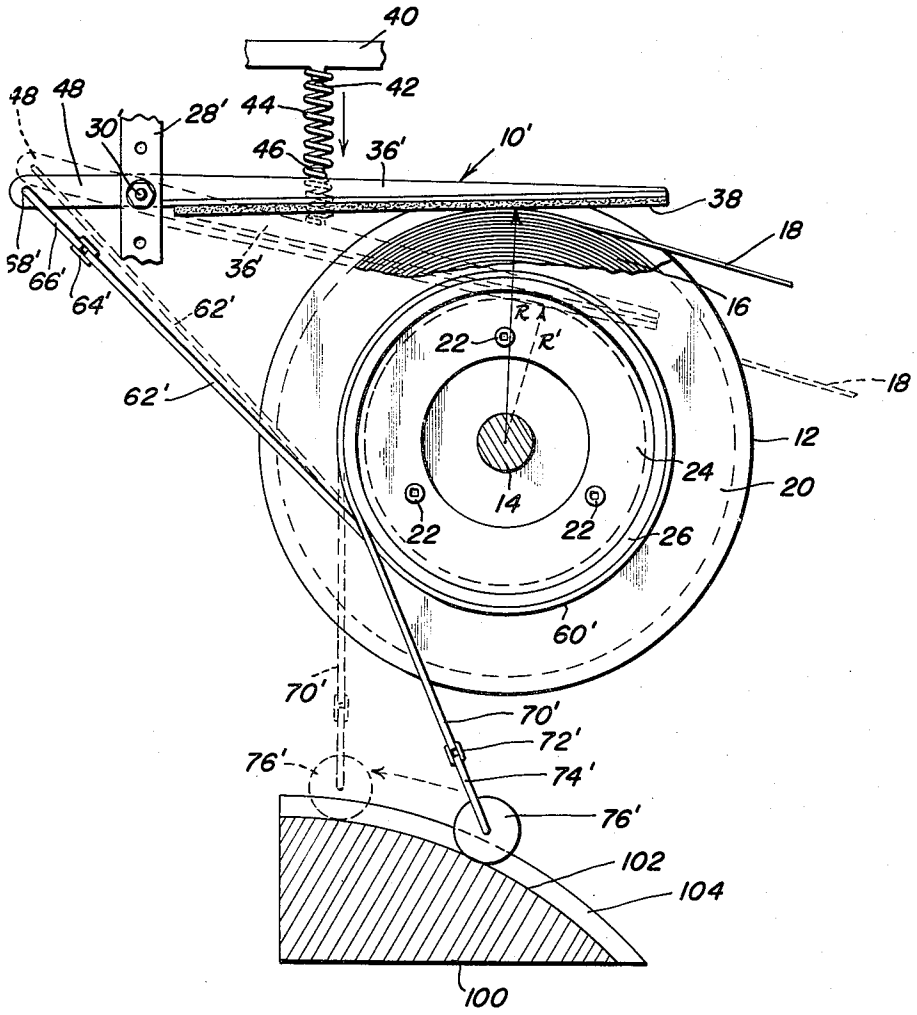


FIG. 7

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United States Patent Office

2,963,236

Patented Dec. 6, 1960



2,963,236

# DISPENSING REEL BRAKE

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Filed Jan. 17, 1958, Ser. No. 709,613

8 Claims. (Cl. 242—75.45)

This invention relates to an improved braking device used in apparatus utilizing a roll of convoluted material to be dispensed under a predetermined substantially constant tension.

The braking device of the invention will have many applications in the art, however, it is especially adaptable for use in a cigarette package wrapping machine utilizing a convoluted roll of "cellophane," for example. The maintenance of tension on the web of the material being dispensed will assure a firmly wrapped package. Additionally, in the event individual printed indicia is provided in spaced intervals on the roll of wrapping material, and it is desired that separate printed portions appear on each package being wrapped, excessive slack in the roll being dispensed results in mis-wrapping with the accompanying waste and expense resulting from the necessity for re-wrapping.

As a convoluted roll of material is dispensed from a reel and its diameter gets smaller, assuming that the material is drawn from the roll at a uniform rate, the effective lever arm of the roll of material changes, i.e. the distance from the axis of rotation of the reel to its outer periphery becomes smaller. When regulating the tension on the web of a roll of material being dispensed by applying a drag or braking action to the reel, it is desirable that the braking action be decreased in proportion to the decrease in effective lever arm of the roll.

A primary object of this invention is to provide a dispensing reel brake which includes means for applying a braking action in relation to the size of the roll of material being dispensed.

Another object of this invention is to provide a reel brake for a dispensing reel from which a convoluted roll of material is withdrawn in which a braking action is applied to the reel to maintain a predetermined tension on the web of material, the brake including means for imposing an initial predetermined braking action on the reel diminishing in relation to the decrease in size of the roll of material as it is dispensed.

Another object of this invention is to provide on a dispensing reel from which a roll of convoluted material is to be drawn, a brake device for applying braking action on a hub on the reel, the braking device including a tensioned belt on the hub subject to a variable tension force applied to the belt in relation to the size of the roll of material being dispensed.

Other objects and advantages of this invention will become apparent from a consideration of the following description, taken in connection with the accompanying drawings, wherein exemplary embodiments of this invention are disclosed. In the drawings:

Figure 1 is a side elevation of the reel braking device, portions being broken away for clarity;

Figure 2 is a view similar to Figure 1, showing the position assumed by the parts after some material has been dispensed from the reel;



Figure 3 is a perspective view of the reel brake removed from the reel with which it is used;

Figure 4 is a fragmentary plan view taken on line 4—4 of Figure 3;

Figure 5 is a fragmentary section taken on line 5—5 of Figure 3;

Figure 6 is a side elevation of a belt used in the reel brake; and

Figure 7 is a side elevation similar to Figure 1, showing another embodiment of the reel braking device, showing by dotted lines the position assumed by the parts after some material has been dispensed from the reel.

Referring to the drawings in detail, one preferred embodiment of the dispensing reel brake is indicated generally at **10**, see Figure 3, the brake being mounted in operative relationship relative to a flanged reel or spool **12** journalled on a transverse shaft **14** comprising a portion of a cigarette package wrapping apparatus, for example. The reel **12** has circumposed thereabout a convoluted roll of material to be dispensed at a predetermined tension as indicated at **16**, being drawn off tangentially, the web of which being indicated at **18**. A substantially uniform tension is to be maintained on the web of the convoluted roll of material as it is drawn off the reel by applying a braking force or drag to the reel **12** as will subsequently become apparent.

Secured to side **20** of the reel by means of suitable screws **22** is an annular hub or brake drum **24** including an annular flange **26** which is concentric to the axis of rotation of the reel **12** and projects laterally from the side **20** of the reel.

Fixedly mounted on the frame of the apparatus by means of a projecting portion **28** is an elongated support member **30** which is disposed in spaced relationship from the flange **26** and extends below the axis of rotation of the reel in chordal relationship to the reel and hub. Extending laterally from the upper end of support member **30** across the plane of rotation of the hub and reel is a support shaft **32** which has journalled thereon a tubular sleeve **34**. Fixed to the outer end of the sleeve **34** in the plane of rotation of the reel **12** is one end of a projecting feeler arm **36**, the lower surface of which incorporating thereon a suitable friction increasing material **38** which will tangentially engage the outer surface of the convoluted roll of material **16** as clearly seen in Figures 1 and 2. The sleeve **34** has fixedly secured thereto, substantially in the plane of the rotation of hub **24**, a L-shaped bell crank lever **40**, leg **42** of which being apertured at its upper end to receive one end of a tension spring **44**, the spring **44** being anchored at its other end in a suitable portion **46** of the frame of the apparatus. The spring **44**, as clearly illustrated in Figures 1 and 2, biases the feeler arm **36** toward the roll of convoluted material **16**. The other leg **48** of the bell crank lever **40** is apertured at its terminal end receiving therethrough a transverse pivot pin **50** pivotally connected to a mounting sleeve element **52**. Reciprocably supported in the sleeve **52** is an elongated rod **54** the upper end of which being threaded at **56** and receiving thereon a finger manipulable wing nut **58** providing an adjustable abutment element, the purpose of which will subsequently become apparent.

Convoluted about the flange **26** of the hub **24** is an elongated flexible braking belt **60** frictionally engageable with the hub for applying the drag or braking force to the reel for affording the means for maintaining tension on the web of material **16** as it is being dispensed. Opposite ends of the belt **60** extend in spaced opposed relationship beneath the flange **26**, end **62** of which being secured by means of a siutable clamp element **64** to the lower end of the rod **54**. The end **66** of the belt is

secured by means of a suitable fastening element 68 to a substantially U-shaped bridle element 70. Extending laterally from the lower end of the support member 30 across the plane of rotation of the hub 24 is a suitably mounted pivot shaft 72. Journalled on the shaft 72 is a tubular sleeve 74 fixedly secured transversely of one end of an elongated weight element 76. A support shaft 78 extends transversely through an intermediate portion of the weight 76 adjacent the sleeve 74, opposite ends of which have journalled thereon lower ends of the legs 80 of the bridle element 70. Extending on opposite sides of the pivot shaft laterally in the path of rotation of the weight element 76 are suitable stop pins 82 and 84.

Referring to Figures 1 and 2, the reel 12 will initially incorporate thereon a full roll of the convoluted material 16, and as seen in Figure 1, and the wing nut 58 will be adjusted to dispose the weight 76 in a substantially horizontal position. The feeler arm 36 will be biased into engagement with the roll of material 16 by the spring 44 and as the feeler arm 36 moves toward the position shown in Figure 2 after some of the material has been dispensed, the weight element 76 will be rotated about the pivot shaft 72 upwardly to the position shown in Figure 2, for example. The effective lever arm as indicated at R in Figure 1, will decrease, eventually becoming a shorter effective lever arm R'. As the effective lever arm of the material being dispensed decreases, the amount of drag or braking force applied to the reel 12 becomes less to maintain a constant tension on the web 18 of the material being dispensed. This diminishing effective lever arm is compensated for by a decreasing effective lever arm of the elongated weight element 76. As seen in Figure 1, the maximum effective lever arm L is shown when the weight is disposed in a horizontal position. As indicated in Figure 2 at L', the effective lever arm of the weight element 76, effective to apply tension to the belt 60 for supplying the drag or braking force, will be reduced due to the reorientation of the weight element in proportion to the decreasing diameter of the roll of material being dispensed.

Referring to Figure 7, another embodiment of the dispensing reel brake is indicated generally at 10', the brake being mounted in operative relationship relatively to a flanged reel or spool 12 journalled on a transverse shaft 14. The reel 12 has circumposed thereabout a convoluted roll of material 16 to be dispensed at a predetermined tension, being drawn off tangentially, the web of which being indicated at 18. A substantially uniform tension will be maintained on the web of the convoluted roll of material as it is drawn off of the reel by applying a drag or braking force in a manner similar to the previously described embodiment.

Secured to side 20 of the reel by means of suitable screws 22 is an annular hub or brake drum 24 including an annular flange 26 which is concentric to the axis of rotation of the reel 12, projecting laterally from the side 20 of the reel.

Mounted on a vertically extending portion 28' of the frame of the apparatus by means of a laterally extending support shaft 30' is an intermediately pivoted elongated feeler arm 36' disposed in coplanar relationship with the roll of convoluted material 16, the arm including on the lower surface a suitable friction increasing material 38. Overlying the arm 36' on a portion 40 of the frame of the apparatus is a depending lug 42 receiving thereabout one end of a suitable compression spring 44, the other end of the spring 44 being received about a lug portion 46 extending vertically from the upper surface of the arm 36'. The spring 44 will provide sufficient pressure to keep the portion 38 of the feeler arm in tangential engagement with the outer surface of the roll of convoluted material as its size is reduced.

It will be noted that the feeler arm which is intermediately pivoted on the support shaft 30', includes a rear lever portion 48 which progressively rises as the diameter of the roll of convoluted material decreases as the same is being dispensed.

Convoluted about the flange 26 of the hub 24 is an elongated flexible braking belt 60', similar to that previously described, for applying the drag or braking force to the wheel and affording the means for maintaining uniform tension on the web 18 as the material is being dispensed. Opposite ends of the belt 60' extend in spaced opposed relationship beneath the flange 26, end 62' of which being secured by a suitable clamp 64' to a bridle element 66' pivotly connected at 68' adjacent the terminal end of portion 48 of the feeler arm. The other end 70' of the braking belt is connected by means of a suitable clamp 72' to a bridle element 74' which may be similar in construction to the bridle element 70 of the previously described embodiment. Rotatably supported on the bridle element 74' is a calibrated weight 76' which functions to supply a progressively decreasing tension on the roll of convoluted material in substantially the same manner as the weight element 76 of the previously described embodiment.

Fixedly secured in coplanar relationship beneath the hub 24 is a variable slope ramp 100, the upper surface 102 of which being calibrated and incorporating an upwardly opening groove or channel 104 rotatably receiving therein weight element 76'.

Considering the solid line position of the parts, when the convoluted roll, prior to being dispensed, has its maximum diameter, the effective lever arm of the roll of material 16 as indicated at R will be greater than the effective lever arm R' indicated by the dotted lines. When the parts are disposed in their solid line position, the weight element 76' will have a portion of its weight supported by the variable slope ramp and the unsupported weight will provide a resultant force acting on the belt to impose a braking action on the hub 24 will be provided. However, as the roll of convoluted material decreases in diameter, and the fee'er arm 36' tilts about the shaft 30', the portion 48 will rise, causing belt portion 62' to become longer and accordingly decreasing the length of belt portion 70'. When this occurs, the weight element 76' will move toward or be disposed in the dotted line position, wherein a greater amount of the weight will be supported by the variable slope ramp and thus the resultant force for applying force to the belt and braking action on the hub flange 26 will be decreased. Thus the amount of tension progressively decreases in relationship to the diminishing size of the roll of convoluted material as in the previously described embodiment.

The forms of the invention shown and described are intended to be taken as preferred examples of the same, and various changes in shape, size and arrangement of parts may be made as do not depart from the spirit of the invention and the scope of the appended claims.

What is claimed as new is as follows:

1. In apparatus for dispensing a convoluted roll of material upon which a predetermined tension is to be maintained, a reel journalled on a transverse axis of rotation for having a convoluted roll of material disposed thereon to be withdrawn at a predetermined tension, and brake means operatively connected to said reel and applying a braking force thereto for preventing free rotation of said reel as material is dispensed, said brake means including portions operative for applying a variable braking force to said reel in proportion to the decrease in size in the roll of material being dispensed to permit the material to be withdrawn at a constant tension, said portions comprising an annular hub projecting laterally from said reel concentric to the axis of rotation of the reel, a feeler arm pivotally biased toward the axis of rotation of said reel for tangentially engaging the roll of material to be dispensed, a flexible belt convoluted about

said hub, a lever part connected to said feeler arm vertically pivoted to respond to movement of said feeler arm toward the axis of rotation of said reel, said flexible belt having one end connected to said lever part, and gravity-responsive means connected to the other end of said flexible belt for applying a progressively decreasing tension to said belt in response to the decrease in size of the roll of material being dispensed.

2. An apparatus as set forth in claim 1 in which said gravity-responsive means comprises an elongated weight element intermediately pivoted to said other end of the flexible belt to provide a progressively decreasing effective lever arm in response to movement of the feeler arm toward the axis of rotation of said reel.

3. An apparatus as set forth in claim 1 in which said gravity-responsive means comprises a weight element rotatably mounted on said other end of the flexible belt, and a variable slope ramp including a calibrated surface upon which said weight element is supported, said variable slope ramp progressively absorbing an increased amount of the force of the weight element in relation to the decrease in size of the roll of material being dispensed.

4. In an apparatus for dispensing strip material from a convoluted roll thereof, a reel mounted for rotation in a frame and adapted to support the roll of material, and means for maintaining a substantially constant tension in the strip as it is withdrawn comprising a brake drum connected to said reel to rotate therewith, a flexible brake band encircling said drum, a feeler means including a pivoted feeler member having a free end biased toward the roll for engagement therewith, one end of said band being connected to said feeler means and being variable as to position in accordance with the position of said member, a weight connected to the opposite end of said band and adapted to exert tension force thereon said weight being variable as to position in accordance with the position of said feeler member, and mounting means for said weight arranged to vary the effective tension force of said weight on said band in accordance with the position of the weight.

5. In an apparatus for dispensing strip material from a convoluted roll thereof, a reel mounted for rotation in a frame and adapted to support the roll of material, and means for maintaining a substantially constant tension in the strip as it is withdrawn comprising a brake drum connected to said reel to rotate therewith, a flexible brake band encircling said drum, a feeler means including a pivoted feeler having a free end biased toward the roll for engagement therewith and variable as to position as the radius of the roll varies, one end of said band being connected to said feeler means and being variable as to position in accordance with the position of said member,



a weight connected to the opposite end of said band and adapted by gravity to exert a tension force on said band, and auxiliary supporting means for said weight adapted and arranged to support and counteract a portion of the gravity force of the weight said portion being variable in proportion to the position of the weight and thereby to vary the tension exerted by the weight.

6. In an apparatus for dispensing strip material from a convoluted roll thereof, a reel mounted for rotation in a frame and adapted to support the roll of material, and means for maintaining a substantially constant tension in the strip as it is withdrawn comprising a brake drum connected to said reel to rotate therewith, a flexible brake band encircling said drum, a feeler means including a feeler member having a pivoted support and a free end biased toward the roll for engagement therewith and variable as to position as the radius of the roll varies, one end of said band being connected to a lever arm rotatable about said pivotal support with said member thereby to permit corresponding circumferential movement of said band about said drum, a weight connected to the opposite end of said band and adapted by gravity to exert a tension force on said band said weight being movable as to position in accordance with the circumferential movement of said band as determined by the position of said feeler means, and auxiliary supporting means for said weight adapted and arranged to support and counteract a portion of the gravity force of the weight said portion being variable in proportion to the position of the weight and thereby to vary the tension exerted by the weight on said band.

7. Apparatus as set forth in claim 4 in which the mounting means for the weight comprises a variable slope ramp upon which the weight is supported and movable therealong by movement of said band in the direction of its extent as determined by the position of said feeler member, said ramp being shaped to absorb an increased proportion of the force of the weight as the radius of the roll decreases.

8. Apparatus as set forth in claim 4 in which said weight comprises an elongated member pivoted at one end for rotation in a vertical plane and said band is connected to the weight intermediate of its ends to vary the angle of the weight about its pivot and provide a progressively decreasing effective lever arm thereof in response to movement of said feeler member toward the axis of the roll.

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