United States Patent

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[72] Inventor Gerald J. Ottavan
Ridgefield, N.J.

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[73] Assignee Allamatic Corporation
Cliffside Park, N.J.

[54] CONSTANT TENSION PAPER SUPPLY MECHANISM

6 Claims, 3 Drawing Figs.

[52] U.S. Cl. 242/75.43
[51] Int. Cl. B65h 77/00
[50] Field of Search 242/75.43, 156.2

[56] References Cited

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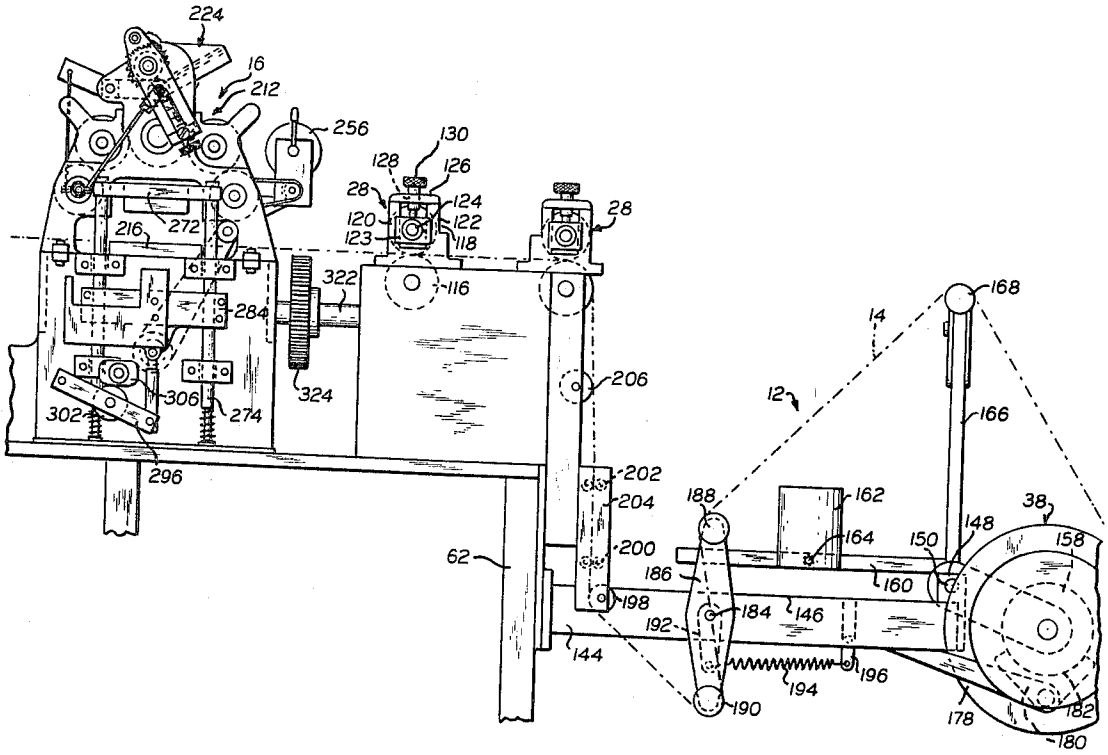
Primary Examiner—Nathan L. Mintz
Attorney—Hubbell, Cohen and Stiefel

ABSTRACT: A paper supply mechanism especially adapted for supplying pressure sensitive adhesive backed label material, which supply mechanism includes a constant tension means comprising a self-adjusting brake which compensates for loss of paper roll mass, and a tension indicating means.



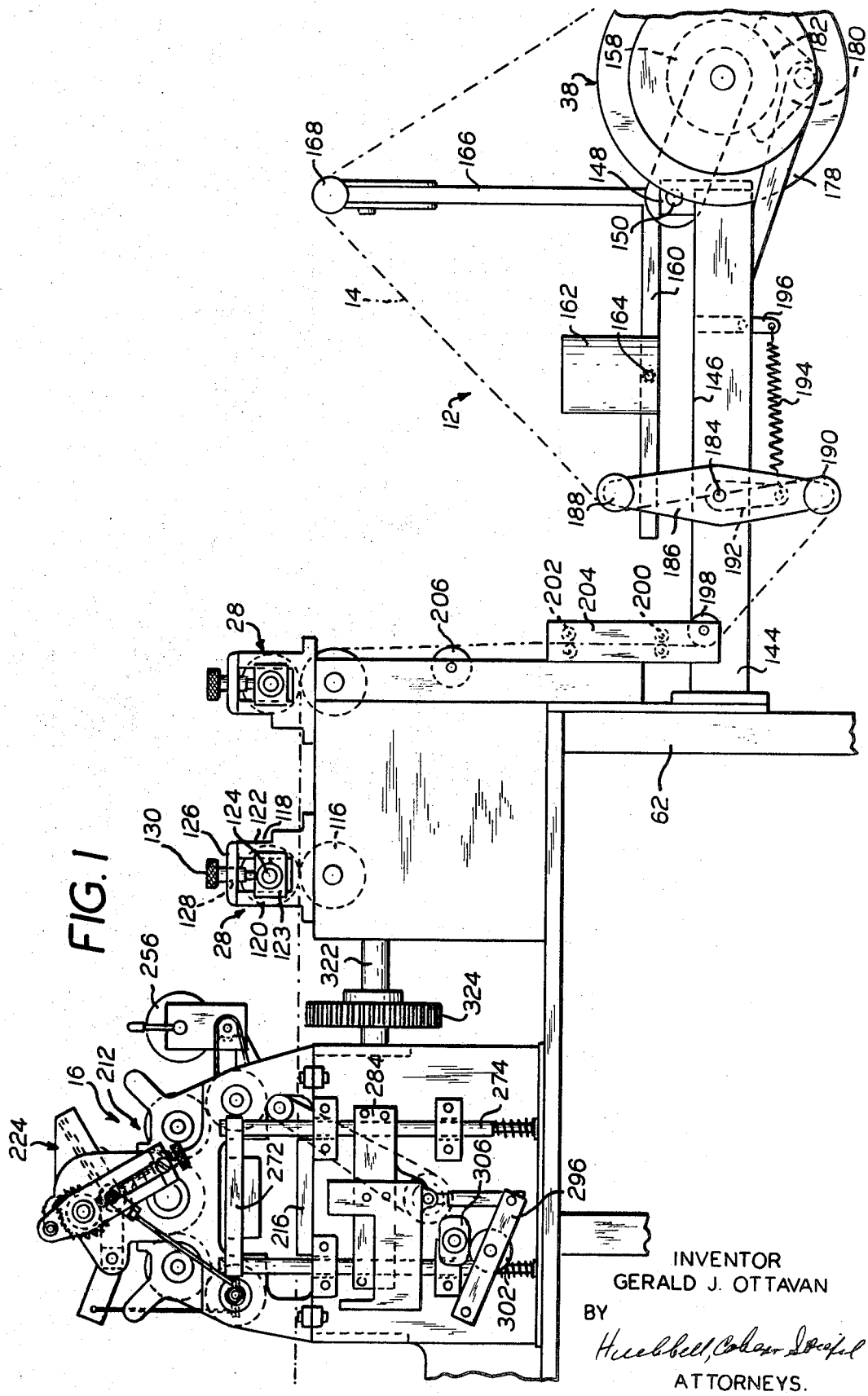


FIG. 1

INVENTOR
GERALD J. OTTAVAN

BY

Hubbell, Cohen & Stiefel

ATTORNEYS.

FIG.2.

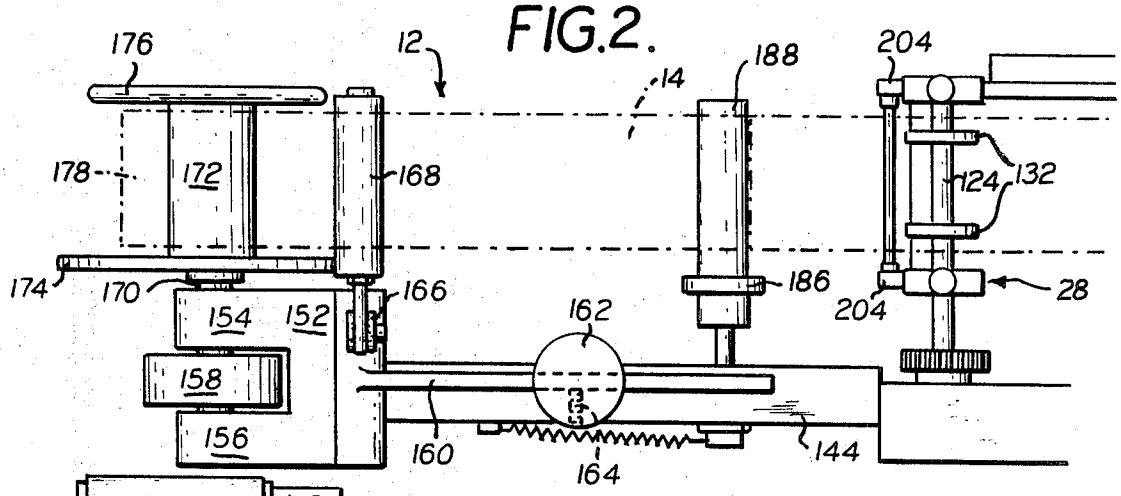
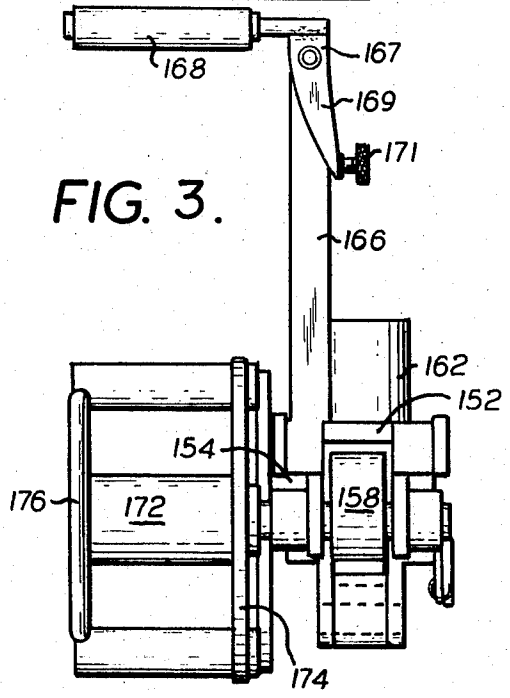


FIG. 3.



INVENTOR
GERALD J. OTTAVAN
BY
Hubbell, Cohen & Stiefel
ATTORNEYS.

CONSTANT TENSION PAPER SUPPLY MECHANISM

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a paper supply mechanism, and especially to a paper supply mechanism for feeding pressure sensitive adhesive backed material to a label printing machine.

2. Description of the Prior Art

Paper supply mechanisms for printing presses are well known. However, there has been difficulty encountered in the past in regulating the paper supply mechanisms to maintain constant tension on the paper, and such mechanisms rarely provide for means for indicating the value of tension.

SUMMARY OF THE INVENTION

The improved paper supply mechanism of the present invention includes a self-adjusting brake which maintains substantially constant tension on the paper being fed by the mechanism by reducing the braking force on the paper concomitantly with the reduction in the inertia of the paper reel from which the paper is supplied. The paper supply mechanism further includes a simplified convenient means for indicating the degree of tension on the paper.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings:

FIG. 1 is a side elevational view of the tension supply mechanism of the present invention in combination with a printing head for printing labels on the paper stock;

FIG. 2 is a top plan view of the constant tension paper feed; and

FIG. 3 is an end elevational view thereof.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to the drawings in detail, the constant tension supply mechanism of the present invention is generally designated by the reference numeral **12**. As shown herein, the supply mechanism **12** is for paper, here shown as label paper **14** of the pressure sensitive adhesive backed type. The constant tension mechanism **12** finds its preferred utility in a label printing machine or press **10** which includes a printing head **16** of any desired construction. Also included are means **28** for advancing the paper stock **14** in a step-by-step motion. As here shown there are two means **28** interposed between the feed mechanism **12** and the printing head **16**.

Each of the paper feed devices **28** may be powered off a common shaft if desired. The supply mechanisms include a feed or power roller **116** which rotates intermittently in response to an intermittent input means not shown. The axis of the power roller extends transversely of the direction of movement of the paper **14** and of a frame **62** which forms the basic support for the entire mechanism. Also secured to the frame **62** are a pair of upstanding supports **118** which supports are U-shaped in elevational view. Slidably mounted between legs **120** and **122** of U-shaped support **118** is a bearing block **123** on which is rotatably mounted an idler or pressure roller shaft **124**. Extending across the tops of the legs **120** and **122** and secured thereto is a bar **126** having a threaded aperture **128** extending vertically therethrough. Threadedly mounted in the threaded aperture **128** is a manually adjustable screw **130** the bottom of which is in engagement with the bearing block **123**. Mounted on the idler roller shafts are a pair of idler or pressure disc **132** of substantially identical diameter to the drive roller **116**. The amount of pressure applied by the pressure discs **132** to the drive rollers **116** is adjustable by rotation of the adjustment screws **130** which move the idler shaft **124** vertically to move the idler discs **132** into tighter or less tight engagement.

With the structure of the supply mechanism **28** as described, it will be obvious that each time power roller **116** rotates, each of the drive mechanism **28** will operate to advance paper **14** sandwiched between the drive rollers **116** of the pressure discs **132** a predetermined amount which is adjustable by adjustment of the amount of rotation of drive roller **116**. As indicated each of the paper feeding devices **28** is substantially identical in construction. However, there is one minor difference, namely the proportioning the parts. Specifically, the power rollers **116** of each of the supply mechanisms **28** are increasingly larger as the feeding device is located more remotely from the paper supply mechanism **12**. This assures that the paper is always under slight tension as it moves away from the supply mechanism **12**.

The supply mechanism **12** is primarily mounted on a horizontally extending cantilevered beam **144** that is secured to the base **62** of machine **10**. Secured to the upper surface **146** or of beam **144** is a bearing block **148** in which is pivotally or rotatably mounted a shaft **150** to which is fixed a U-shaped member or lever **152** that carries between its arms **154** and **156** a brake drum or roller **158**. Fixed to U-shaped member **152** as by welding or suitable securing elements is a horizontally extending counterbalance arm **160** on which is disposed a counterbalance **162** which may be moved longitudinally of the counterbalance arm **160** and then releasably secured in a preferred position as by a setscrew **164**. Also fixed to U-shaped member **152** as by welding or by suitable securing elements is an upstanding arm **166**. Pivotally mounted at the upper end of the upstanding arm **166** is a bellcrank shaped member **167** the horizontal portion of which is a roller **168**. Threadedly secured to the vertical portion **169** of member **167** is a thumb screw **171** which is adjustably threadedly secured to the upstanding arm **166**. The horizontal positioning of roller **168** may be adjusted by operating the thumb screw **171** whereby to insure that there will be no side or lateral movement of the paper **14** as it moves off the reel and into the remainder of the machine **10**. In addition, the member **167** and its associated parts play an important role in maintaining tension on the paper as it comes off the reel as will be described hereinafter. Cantilevered outwardly of the arm **154** of U-shaped member **152** is a rotatable shaft **170** on which is mounted a spool comprising a hub **172**, a first side disc **174** and a removable second side disc **176**, the roll of paper **178** being disposed on the spool **172** between the side discs **174** and **176**. Connected by a bracket **178** to cantilever **144** is a brake member **180**, preferably made of wood although other friction material may be employed, which brake member is provided with an arcuate braking surface **182** complementary to the brake drum **158** for reception thereof.

With the described brake, the amount of braking force applied between the brake drum **158** and the brake member **182** is a function of the weight of the reel of paper **178** and of the weight of the counterweight **162** and the position of the counterweight on the lever **160**. Accordingly, by adjusting the position of the counterweight **162** on lever **160** at the outset of a run, the amount of tension on the paper can be established, as this will be a function of the braking force on the braking drum **158**, and of the inertia of the paper reel **178**. It will be seen that as paper is consumed from the reel **178**, the amount of inertia of the reel will decrease. Concomitantly, the amount of braking force, which is dependent upon the weight of the reel, will also decrease and it has been found that these decreases tend to offset one another thereby to maintain a constant tension on the paper **14**. In addition, it will be seen that if there is undue tension on the paper as it moves off the reel **178**, this tension will tend to act in a horizontal direction on the roller **168** whereby to pivot the arm **166** clockwise as its viewed in FIG. 5. This pivotal movement of arm **166** will tend to release the brake **158—180** whereby to reduce the tension on the paper in order to maintain a substantially constant tension thereon.

Mounted on cantilever **144** by a rotatable pin **184** is a lever **186** having a pair of rollers **188** and **190** on its free ends. Also secured to the rotatable pin **184** is a crank **192** the free end of which is secured to a tension spring **194** which is anchored at

its other end to a fixed anchor **196** that is secured to the cantilever **144**. Thus the spring **194** tends to rotate the crank **192** and hence the lever **186** in a counterclockwise direction. It will be seen that the tension on the paper **14** as it passes about rollers **188** and **190** will tend to rotate the lever **186** in a clockwise direction. By adjusting the tension of spring **194** as well as from braking force between brake drum **158** and brake **182**, the lever **186** can be positioned substantially vertically. The substantially vertical positioning of lever **186** thereafter will indicate that the appropriate amount of tension is applied to paper **14**.

In use, a reel **178** of label paper **14** is positioned on the spool **182** and is held there as by the affixing of the removable side plate **176**. The paper is then lifted off the reel to cause the reel to rotate either clockwise or counterclockwise, (the supply mechanism **12** works just as well irrespective of the direction of removal of the paper **14**) and thence over roller **168** and about roller **188** and roller **190**, and then to an upward directional guide means comprising a roller **198** and two pairs of rollers **200** and **202** which are secured between a pair of brackets **204** fixed to the frame **62**, and thence in tangential contact with a guide roller **206** and finally into the first feed mechanism **28** as described above. As the feed mechanism operates to advance paper **14** the paper will be stripped off the reel **172** and advance along the described path moving in the direction of the printer head **16**.

While I have herein shown and described the preferred form of the present invention and have suggested modifications therein, other changes and modifications may be made rather than within the scope of the appended claims without departing from the spirit and scope of the invention.

I claim:

1. A constant tension feed mechanism comprising:

a. a support;

b. a lever pivotally mounted on said support at a fulcrum;

c. spindle means for rotatably mounting a reel of elongated material on one side of said lever;

d. brake means including a circular member rotatable with said spindle means and a stationary member having a surface in frictional engagement with the periphery of said circular member; and

e. counterbalance means connected to said lever and tending to rotate said lever in a direction opposite to the direction of rotation resulting from the weight of said spindle means.

2. The feed mechanism of claim **1**, wherein said circular member is a brake drum fixed to said spindle, and said stationary member is a brake shoe and said surface thereof is complementary to the periphery of said brake drum.

3. The feed mechanism of claim **2**, wherein said counterbalance means is a weight adjustably positionable on said lever on the other side of said fulcrum.

4. The feed mechanism of claim **3**, further comprising a vertically extending lever pivotally mounted on said support, a pair of roller means, one of said pair of roller means mounted on said vertically extending lever on each side of the pivot thereof, and spring means for biasing said vertically extending lever to pivot in a direction that moves said upper roller means away from said spindle means.

5. The feed mechanism of claim **3**, further comprising an arm secured to said lever and extending away therefrom, and a horizontal roller mounted on said arm.

6. The feed mechanism of claim **5**, further comprising a vertically extending lever pivotally mounted on said support, a pair of roller means, one of said pair of roller means mounted on said vertically extending lever on each side of the pivot thereof, and spring means for biasing said vertically extending lever to pivot in a direction that moves said upper roller means away from said spindle means.