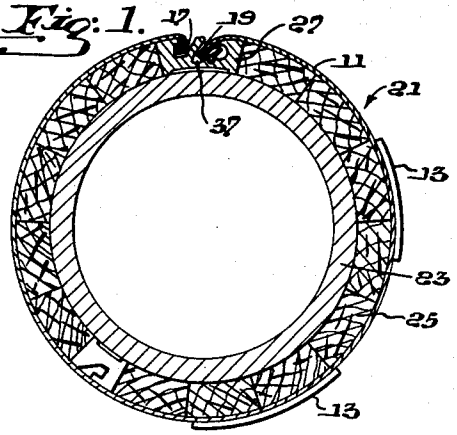
Nov. 29, 1960 C. D. NITCHIE 2,961,951

HOLDING DEVICE

Filed April 24, 1958

Fig. 1.



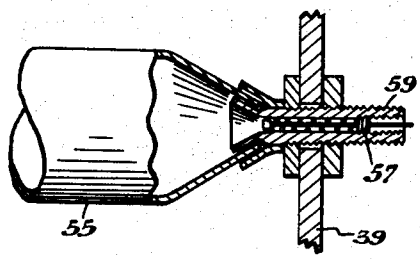


Fig. 3.

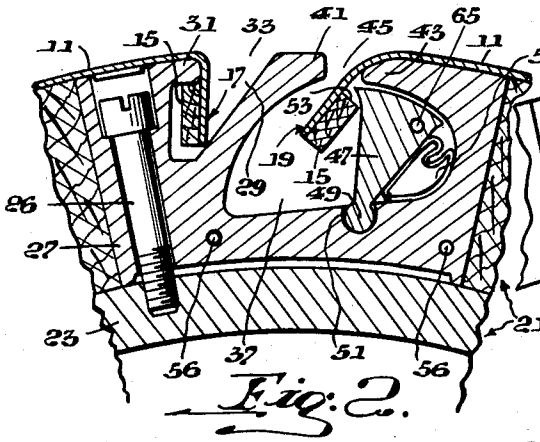


Fig. 2.

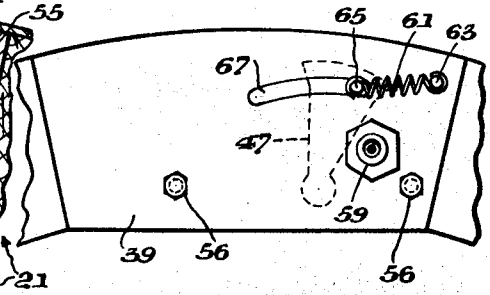


Fig. 4.

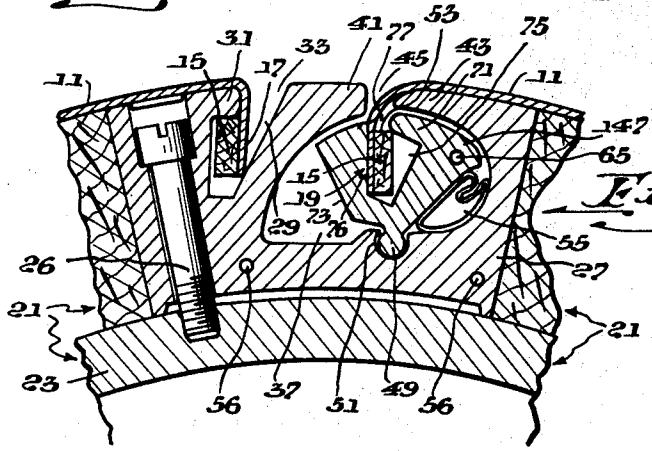


Fig. 5.

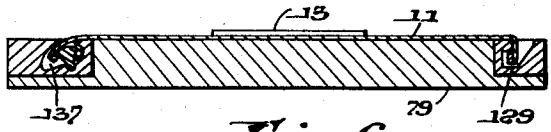


Fig. 6.

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HOLDING DEVICE

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2 Claims. (Cl. 101—415.1)

This invention relates generally to the printing of box blanks and the like and more particularly to an anchorage and tensioning device for the backing sheet of a printing member for printing box blanks.

In conventional printing presses rubber printing dies are mounted on inextensible, flexible backing sheets which are mounted on supporting printing members such as rotatable cylinders or platens so that an imprint can be placed on material pressed against the dies. Heretofore these backing sheets were held against such rotatable cylinders or platens by anchoring the ends of the backing sheets with rollers or other devices in grooves in the cylinders or the platens. Heretofore, however, difficulty was encountered in evenly and uniformly tensioning the backing sheets so as to conform the backing evenly against the supporting surface of the cylinders or platens. Provision is also desirable for increasing the tension on the backing during the printing operation as stretching of the backing often occurs.

An object of this invention, therefore, is to provide an anchorage and tensioning device for the end of a backing sheet mounted on a printing press with a means for evenly varying the tension on the backing.

Another object is to provide a holding device for evenly and uniformly holding in tension on a supporting printing member a backing sheet having dies attached thereto.

A still further object is to provide an automatic compensation operable during a printing operation to compensate for any stretching of backing sheets supported on printing presses.

This invention contemplates an anchorage for tensioning a sheet on a supporting printing member by way of an inflatable member for exerting force on a gate against an enlarged end portion of the sheet to hold the sheet under a desired tension and automatically compensates for any stretching in the sheet during a printing operation.

The above and further objects and novel features of this invention will appear more fully from the following detailed description when the same is read in connection with the accompanying drawings. It is to be expressly understood, however, that the drawings are not intended as a definition of the invention but are for the purpose of illustration only.

In the drawings whose like parts are marked alike:

Fig. 1 is a partial cross-sectional view of an embodiment of the invention.

Fig. 2 is an enlarged cross-sectional view of the sheet anchorage and tensioning device shown in Fig. 1.

Fig. 3 is a partial elevational view of the inflatable member shown in Fig. 2.

Fig. 4 is a partial end view of the elements shown in Fig. 3.

Fig. 5 is a partial cross-section of another embodiment of this invention.

Fig. 6 is a partial cross-section of still another embodiment of this invention.

Referring to Fig. 1, a conformable backing sheet **11** having dies **13** attached thereto and mounted on cylinder **21** is conventional in the printing of corrugated board for boxes. Usually dies **13** are held by a suitable adhesive to the backing sheet **11** which is generally made of a kraft paper that is substantially inextensible and very flexible.

Each end **17** and **19** of the sheet **11** is enlarged as shown in Fig. 2. A convenient way to enlarge an end is to glue the kraft paper to an anchor strip **15** of rectangular wood or other materials such as solid fiber stock. It is to be understood that the ends are so formed that they are truly parallel insofar as it is possible to make them parallel.

The supporting cylinder **21** for backing **11** may be a metallic cylindrical base **23**, mounted on a conventional shaft (not shown), having a peripheral surface of a wood veneer **25** which is relatively rigid. Held on base **23** in the wood veneer **25** by friction and bolts **26** threaded into base **23** along its length is a metal member **27** having a recess **29** of sufficient depth and so contoured as to provide a tongue portion **31** overhanging a portion of the recess **29** below the tongue at least equal to the width of the enlarged end **17** of sheet **11**. The width of throat **33** of recess **29** adjacent the tongue **31** is at least equal to the thickness of the end **17** of sheet **11** so that end **17** may be radially seated in the recess **29** and anchored therein under tongue **31**. This anchoring of end **17** in recess **29** is conventional and to this end after seating end **17** in the recess **29** the flexible sheet **11** is wrapped around the cylinder **21** so that the enlarged end **17** by recess wall cooperation is anchored under tongue **31**. Then the enlarged free end **19** is positioned adjacent the anchored end.

Conventional practice has been to provide, adjacent the anchoring recess **29**, a second tangential recess having therein a roller with a slot for receiving the enlarged end **19** of sheet **11**, so that the end **19** could be anchored therein. Relative rotation of the roller as with a bar attached to the roller tightened the anchored sheet **11** against the cylinder and a pawl and ratchet arrangement held the roller in its relatively rotated position to maintain tension on the backing. The torsional deflection in this conventional tensioning roller often caused the backing sheet **11** to pull tighter on the edges than in the center so that the backing and dies attached thereto were warped to a very undesirable extent. Also since the tensioning of the backing was limited to the pitch or step of the ratchet, the backing would be taken up either too tightly, in which case warping in the dies took place, or not tightly enough, in which case the backing sagged away from the supporting printing cylinder. No provision existed for automatically tightening the backing to take up stretching which occurred in the backing during the printing operation.

In accordance with this invention, Figure 2, adjacent the anchoring recess **29** in metal member **27**, is formed a recess **37** having its sides bounded by the member **27**. At one end of recess **37** member **27** provides overhanging tongue portions **41** and **43** which form a throat **45** adjacent the outside surface of the member **27** of a width appreciably greater than the width of the enlarged end **19** of sheet **11** so that end **19** may be radially seated in the recess **37**. The depth of recess **37** below the tongues is at least equal to the width of the end **19**.

In recess **37** is mounted an elongated gate **47**, substantially triangular in cross-section arcuate at the top. A cylindrical bottom portion **49** of the gate rests in a groove **51** formed in member **27** so that the gate **47** is

pivotable back and forth in the recess and the arcuate top of the gate is narrow enough to permit recess 37 to be open when the gate is pivoted to one side of the recess. Thus when the gate 47 is pivoted to one side of the recess the recess is open for seating of the end 19 in the recess and when pivoted in the opposite direction the gate 47 simultaneously contacts the edge 53 of seated end 19 and closes the recess 37 against the removal of the end 19 by recess wall cooperation of the seated end 19 with the gate 47 and the wall of the recess.

To pivot gate 47, a flexible inflatable tube 55 along its longitudinal length is interposed between the gate 47 and the side of the wall of recess 37 and endwise is interposed and confined between two plates 39 connected against metal member 27 at either end of cylinder 21 by suitable means such as bolts 56 threaded into member 27. This tube 55 forms an air tight chamber by having one end closed by the jointure of its sides and the other end closed by a valve 57 and valve stem 59 inserted through one end plate 39 (Figs. 3 and 4). Tube 55 is inflated into a substantially tubular shape by attaching a suitable source of air under pressure (not shown) to the valve stem 59 and then the tube by recess wall reaction forces the gate 47 to pivot in recess 37 on the support provided in groove 51. Thus the gate 47 grips the back edge 53 of free end 19 of sheet 11 which, as previously mentioned, encircles the cylinder 21 and has its end 17 seated in recess 29. As the tube 55 expands the slack in the sheet 11 is taken up by the pivoting of gate 47 so that the sheet 11 is evenly conformed around the cylinder 21 under resilient tensioning. Furthermore the gate 47 closes recess 37 from the removal of the seated end 19 by recess wall cooperation of the end 19 with the gate 47 and the wall of the recess 37.

Tube 55 is deflated by depressing valve 57 and then a spring 61 located at the end of gate 47 pulls gate 47 to one side of the recess 37 so that recess 37 is opened. To this end one end of spring 61 is attached to a pin 63 which is located on end plate 39 near valve stem 59 and the other end of this spring 61 is attached to a pin 65 which is attached to the end of gate 47 and fits through curved slot 67 formed in plate 39 so that the spring 61 can actuate the gate in one direction when the tube 55 is deflated. Also by arranging the pin 65 through slot 67 in this manner the slot 67 acts as a stop for the pin 65 to keep the gate 47 from pivoting too far in either direction. For example, in one direction the slot prevents the gate from pivoting so far that the tube 55 can pop out of recess 37 and in the other direction prevents the gate from injuring the tube by depressing the tube too far. Similar spring arrangements (not shown) may be located at both ends of the gate 47.

In operation, conventional rubber dies 13 for imprinting box blanks are attached with a suitable adhesive in a conventional manner to a backing sheet 11 of kraft paper. This backing sheet is formed with enlarged ends in a conventional manner as described above. One enlarged end 17 is seated in recess 29 of member 27 with tongue 31 gripping the back of the enlarged end 17. The backing is then wrapped around the cylinder with the dies disposed outwardly (Fig. 1) to anchor the end 17 under tongue 31 by recess wall cooperation. The free end 19 is seated in a recess 37 located adjacent recess 29 when the recess 37 is open, such as is the case when tube 55 is deflated. The tube 55 is then inflated by attaching a suitable air source (not shown) to the valve stem 59 and by recess wall reaction this inflation forces the gate 47 to pivot on the support provided in groove 51 and to grip and evenly pull the back edge 53 of enlarged end 19 thereby simultaneously conforming the sheet 11 under resilient tension around the cylinder 21 and locking the end 19 in recess 37 by recess wall cooperation with the gate 47. The dies 13 are inked, then the material to be printed is pressed against the dies by interposing the material between the dies 13 and a roller (not shown) mounted in a conventional manner to rotate adjacent cylinder 21 at the same surface speed as the material and cylinder 21 to form an impression on the material. After a printing run is completed, the tube 55 is deflated, and spring 61 pivots the gate 47 to open recess 37 and disengage gate 47 from the end 19. The end 19 thus may be unseated from recess 37, sheet 11 unwrapped from the cylinder 21, and end 17 removed from recess 29 so that sheet 11 may be quickly removed from cylinder 21. Since a uniform pressure is applied to gate 47 by tube 55 all the way across the cylinder 21, the backing 11 is uniformly stretched against the cylinder 21 without torsional twist on gate 47. Should backing sheet 11 stretch during a printing operation, the compressed air in the tube 55 expands, thus evenly maintaining tension on the backing. Also, pressure applied to the tube 55 can be evenly varied by suitable connections (not shown) to give any desired tension on the backing.

Figure 5 illustrates another embodiment of gate 47. In this embodiment, gate 147 is pivotable in recess 37 and has a tongue portion 71 and wedge-shaped portion 73 which form a cavity 75 generally rectangular in shape and large enough for the seating of enlarged end 19 therein. One long side 76 of cavity 75 is canted away from its opposite wall to form an open end or throat 77 which is large enough for the insertion of enlarged end 19 therethrough into cavity 75 and which registers with throat 45 when gate 147 is pivoted to one side of recess 37.

Thus when end 17 is anchored in recess 29 and sheet 11 is wrapped around cylinder 21, as described above, the free end 19 is seated in cavity 75 of gate 147 when throat 45 registers with throat 77. Gate 147 is pivoted by the inflation of tube 55, as described above with relation to gate 47, to pivot gate 147 on the support provided for portion 49 in groove 51. Thus the tongue 71 grips the back edge 53 of end 19 simultaneously to lock the end 19 against removal from cavity 75 by cavity wall cooperation of the end 19 with tongue 71 and wedge-shaped portion 73 and to resiliently tension the backing 11 on cylinder 21 so as to evenly conform the backing with the cylinder. Furthermore the pivoting of gate 147 in recess 37 caused by the inflation of tube 55 prevents the throat 77 from registering with throat 45. When dismounting of the backing 11 is desired the tube 55 is deflated and spring 61 pivots gate 147 in a similar manner, as described above with relation to gate 47, to register throat 77 with throat 45. Thereafter end 19 is unseated from cavity 75 and the backing 11 is removed from cylinder 21, as described above.

Figure 6 illustrates another embodiment of this invention adapted particularly for a flat printing platen 79. The backing 11 having dies 13 mounted thereon is resiliently tensioned on the flat surface of the platen 79 in a manner similar to the manner of mounting, as described above, except that the recesses 129 and 137 corresponding to recesses 29 and 37 of Figure 2 respectively are not adjacent each other.

It is to be understood, of course, that the location of the anchoring recesses with relation to each other need not be adjacent each other. Also the surface to which the backing 11 is conformed need not be limited to a metal cylinder covered with wood veneer as the cylinder 21 may be made of solid metal or other material. This invention is also not limited to the use of a metal insert 27 for the recesses 29 and 37 may be formed directly in the peripheral surface of the cylinder 21. The backing sheet 11 may be of any inextensible but flexible material such as canvas, plastic or sheet metal and the dies may be made of material such as metal so long as the dies are flexibly mounted on the backing 11.

This invention resiliently tensions an inextensible sheet having an enlarged end portion on the printing member to a desired tension, evenly conforms the sheet on the

printing member, and automatically compensates for any stretching in the sheet during the printing operation.

What is claimed is:

1. Apparatus for holding the end of a sheet wrapped around a rotatable cylindrical printing member comprising an inextensible flexible backing sheet having an enlarged end, a printing member with an elongated recess formed therein, the walls of said recess having two tongues with arcuate surfaces forming a throat for said recess adjacent the surface of said printing member, an elongated gate pivotably supported in the bottom of said recess and having an arcuate moveable top portion formed with a narrow edge adjacent the arcuate under sides of said tongues for opening and closing said recess, said enlarged end of said sheet being seatable in said recess when said gate is pivoted so that said gate opens said recess, an inflatable member interposed between said gate and a side of said recess whereby inflation of said inflatable member with air turns the top narrow edge of said gate against the enlarged end of said seated sheet and turns the top portion of said gate in said recess so that said recess is closed by said gate thereby simultaneously anchoring said backing sheet enlarged end in said recess by recess wall cooperation with said gate and resiliently tensioning said backing sheet on said printing member, and resilient means connected to said gate for pivoting said gate when said inflatable member is deflated to open said recess for unseating of the enlarged end of said backing sheet from said recess.

2. A rotatable printing cylinder having a permanent recess extending inwardly from the periphery thereof, the walls of said recess having tongues with arcuate surfaces forming a throat for said recess adjacent the periphery of said cylinder, an inextensible flexible backing sheet having dies adhesively attached thereto, said backing disposed on the surface of said cylinder and having one of its ends enlarged by an elongated substantially rigid rectangular piece attached thereto and for seating into said recess, an elongated gate pivotably supported in the bottom of said recess and having an arcuate moveable top

portion formed with a narrow edge adjacent the arcuate under sides of said tongues for opening and closing said recess, said enlarged end of said sheet seatable in said recess when said gate is pivoted so that said recess is opened by said gate, an inflatable member interposed between said gate and a side of said recess whereby inflation of said inflatable member with air turns the top narrow edge of said gate against the enlarged end of said backing and turns the top portion of said gate in said recess so that said recess is closed by said gate thereby simultaneously anchoring said backing sheet enlarged end in said recess by recess wall cooperation with said gate and resiliently tensioning said backing sheet on said printing cylinder, and resilient means connected to said gate for pivoting said gate when said inflatable member is deflated to open said recess for disengagement of said top narrow edge from said enlarged end of said backing and removal of said enlarged end of said backing from said recess.

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