Nov. 20, 1928. 1,692,236

W. M. WHEILDON

MEANS AND METHOD FOR REENFORCING THE EDGES OF STRIP MATERIAL

Filed Aug. 20, 1926 3 Sheets-Sheet 1

Fig. 1.

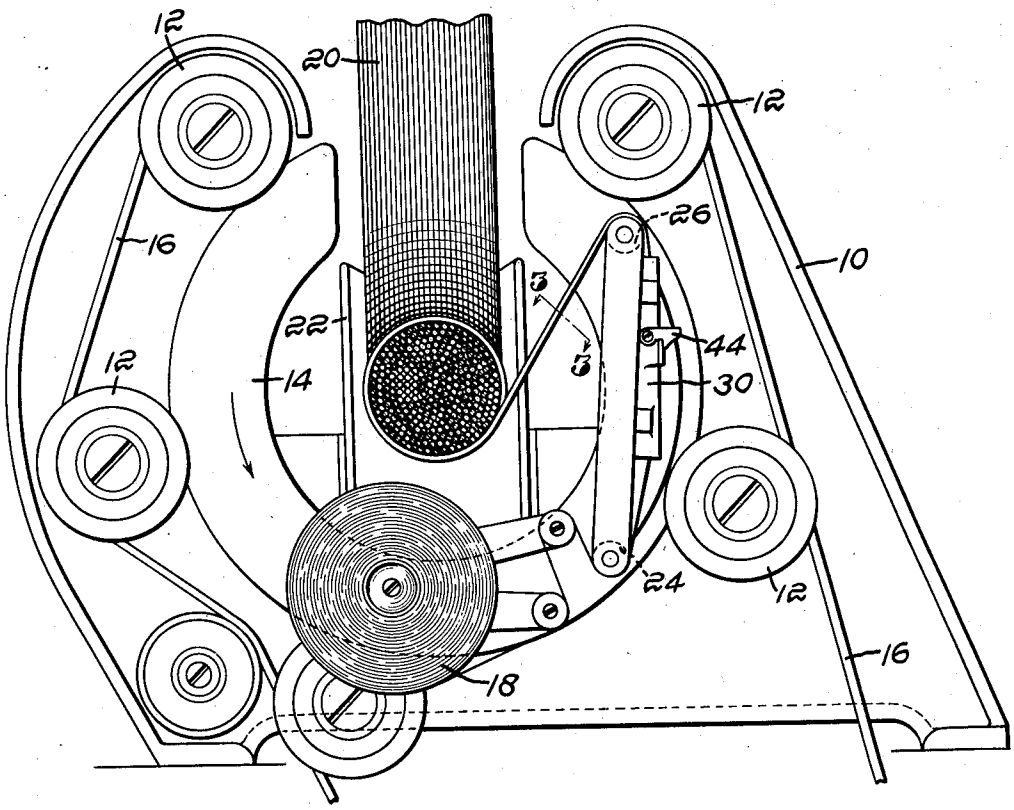


Fig. 2.



Fig. 3.



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Fig. 4.

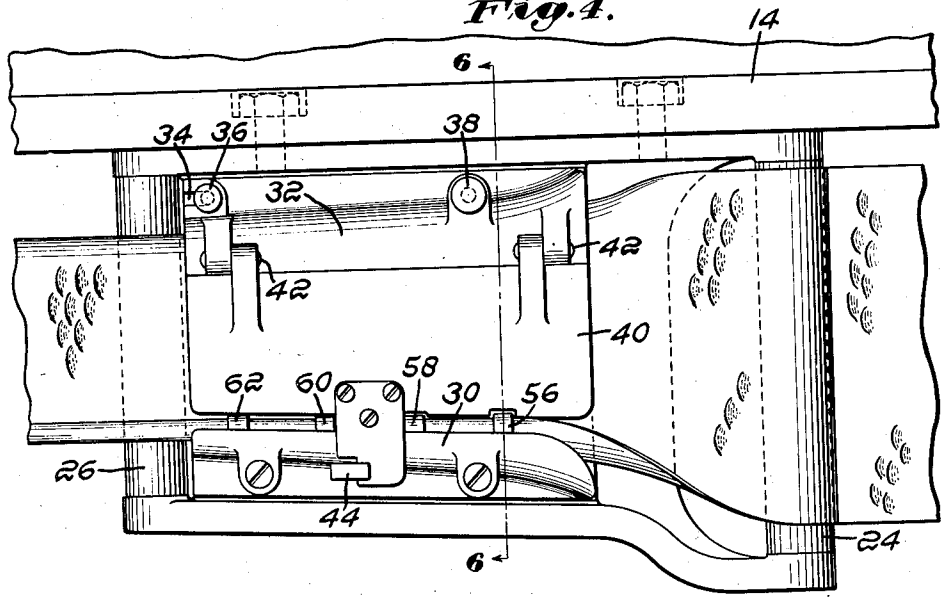


Fig. 5.

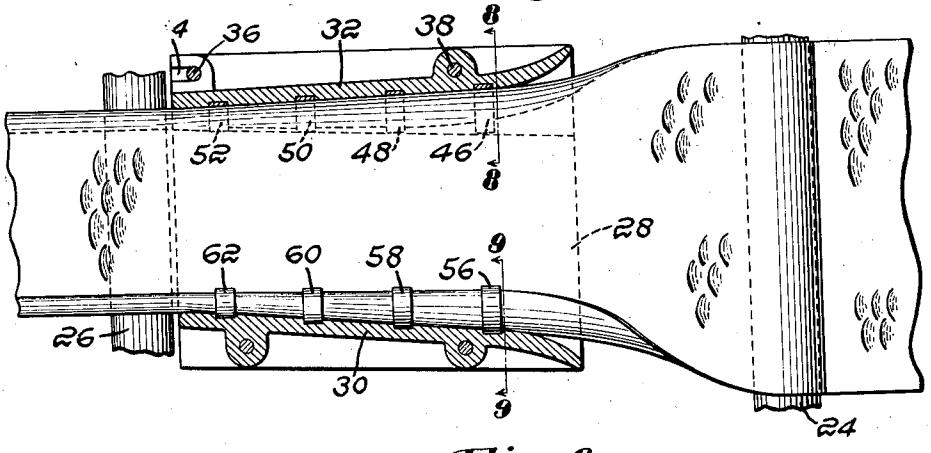
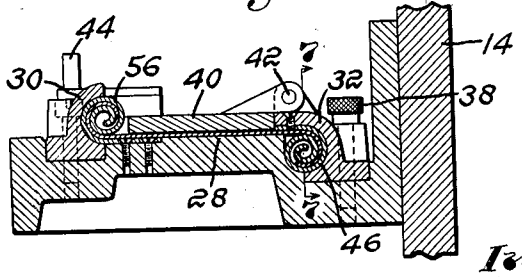


Fig. 6.



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Fig. 7.

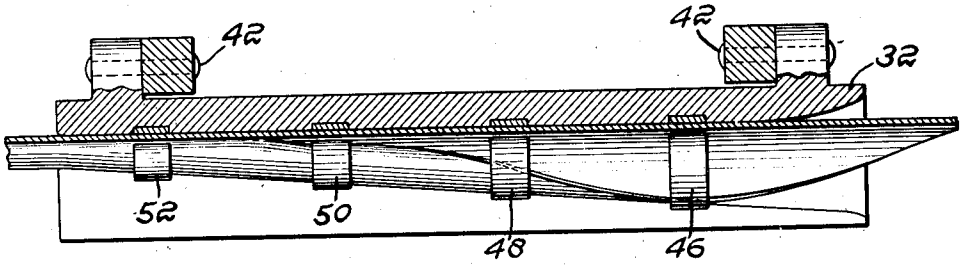


Fig. 8.

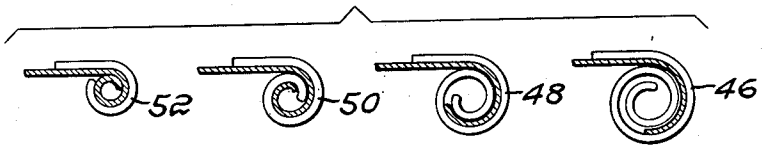
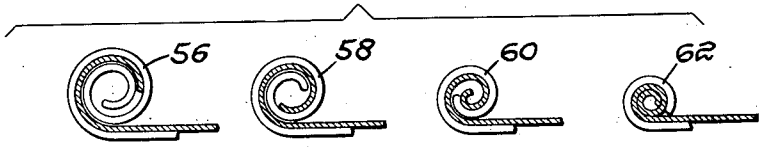


Fig. 9.



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UNITED STATES PATENT OFFICE.

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MEANS AND METHOD FOR REENFORCING THE EDGES OF STRIP MATERIAL.

Application filed August 20, 1926. Serial No. 130,478

This invention relates to a method of providing strip paper, such as is utilized for wrapping purposes, with a multi-ply thickness along the edge thereof for reenforcing the same and to a mechanism suitable for carrying out the method, and it finds particular application in the helical wrapping of annular articles, especially articles of great weight as, for example, heavy coils of wire.

The wrapping of articles and particularly annular articles, such as tires, coils of wire, hose and the like, with a helically applied wrapping of strip paper is well known. In particular when expansible paper is used to form the package described in the patent to Edward H. Angier, No. 1,282,167, Oct. 22, 1918, a smooth and tight wrapping highly resistant to the shocks of use is provided for. It is, however, desirable to apply a protecting wrapping to large and heavy coils of wire, the bulk and weight of which cause such shocks in handling, for instance when the coil is dropped, as to be beyond the power of ordinary paper to withstand. I provide, among other things, for packaging such coils by utilizing a suitable strip of paper, the edges of which are formed, preferably while the wrapping is being applied, into a multi-ply thickness of considerable bulk so that in the finished package the coil is, as it were, lashed or woolded with a heavy paper cord which carries as an integral part thereof a protecting thickness of paper which provides a surface covering for the coil.

In the spiral wrapping of articles it has been proposed to fold over an edge of the wrapping strip to avoid an exposed raw edge and for this purpose folding devices similar to the hemmers familiar on sewing machines have been utilized. Difficulties, however, are encountered when an attempt is made to make more than a single simple fold. These difficulties I obviate by rolling up the edge of the paper spirally into the form of a bead, which roll or bead may, if desired, be caused or permitted to flatten out as the article is wrapped.

My invention will be well understood by reference to the following description of an illustrative embodiment of a suitable mechanism for providing multi-ply edges on a paper wrapping strip taken in connection with the accompanying drawings, wherein:

Fig. 1 is a front elevation of certain parts of a wrapping machine of well known type having the mechanism embodying my invention applied thereto;

Fig. 2 is a cross section of the wrapping strip showing the form to which it is brought by the mechanism operating on the edge thereof;

Fig. 3 is a similar view showing how the multi-ply edges may be flattened out under tension as they are applied to the article to be wrapped;

Fig. 4 is a plan view of the edge rolling mechanism;

Fig. 5 is a section through the same disclosing the interior construction;

Fig. 6 is a section on the line 6—6 of Fig. 4;

Fig. 7 is a section on the line 7—7 of Fig. 6; and

Figs. 8 and 9 are diagrammatic views substantially as seen from the lines 8—8 and 9—9 of Fig. 5, respectively, showing successive positions of the paper as it passes through the edge rolling mechanism.

Referring to Fig. 1 of the drawings, I have there illustrated a portion of a wrapping machine adapted to apply a helical wrapping to an annular coil of wire. This machine may be substantially of the construction shown in my Patent 1,439,387, Dec. 19, 1922, and need not be extensively described herein. I have here shown a standard 10 carrying rolls 12 which support a partly annular shuttle 14 received in a bight of the driving belt 16 and adapted to be rotated thereby, the shuttle carrying with it a roll 18 of wrapping material mounted on its face which is thus carried around the cross section of the coil of wire 20 or similar annular article supported on feed rolls 22, only one of which is shown in Fig. 1, in such a manner as to traverse the eye of the shuttle. Revolution of the coil of wire 20 by the feed rolls 22 provides for the application of the paper with a spiral pitch to form the well known spiral wrapped package. I have herein illustrated the roll of paper 18 as mounted on a tension mechanism carried by the shuttle which may be of the kind described in my Patent 1,578,874, March 30, 1926, and from this tension mechanism the paper leads to a mechanism for acting on the edges thereof to bring them to the form shown in Fig. 2 and thence is led to the coil of wire 20.

Referring now to Figs. 4, 5 and 6, the mechanism for acting on the edges of the

paper may be mounted on the face of the shuttle 14 and is here shown as organized on a framework which carries at one end a roll 24 over which the paper is led from its support on the shuttle and at the other end a roll 26 across which the paper leads to the article to be wrapped. Mounted between these two rolls is the mechanism which acts on the edge portions of the paper. Referring more particularly to Fig. 6, the paper in passing from the shuttle to the tire may lead over a supporting surface 28 of less width than the same to permit one or both edges to project on either side thereof to be formed into multi-ply reenforcements. I have herein illustrated both edges of the paper as rolled up into bead-like form and these beads as formed on opposite faces of the strip. It will be obvious that either one of the edges might be rolled alone or that the beadings might extend in the same direction. Along the outer side of the supporting surface 28 may be mounted a flange 30, herein formed from a separate piece screwed in position, the general direction of which flange is oblique to the travel of the paper, as best shown in Fig. 5, so that as the paper passes therethrough the flange gradually crowds the paper inwardly and, as seen in the figures, this flange has a concaved inner face tending to turn the edge of the paper as it is pressed thereagainst and to start it curling over on itself. In the present embodiment of the invention a similar flange 32 is provided at the inner edge of the surface 28 but since in the example shown the inner edge reenforcement is made of the under side of the paper strip, the flange 32 is offset downwardly with respect to the surface 28, its concaved face presenting a groove in which the edge of the paper is received, the face of this groove likewise extending obliquely inwardly as shown in Fig. 5 and being of a generally curved contour to start the paper rolling on itself. I have herein shown the member 32 as removably secured in position (see Figs. 4 and 5) by means of the open-ended slot 34 at one end thereof adapted to be placed over the shank of a headed pin 36 and of a thumb screw 38. In the embodiment of the invention shown, both flanges 30 and 32 are readily removable among other things to provide for change of such parts when desired, and the fastening means herein shown in connection with 32 only is an example of one which may be adopted permitting removal or assembly without the use of tools.

To prevent the central portion of the paper which overlies the surface 28 from buckling laterally as the flanges tend to crowd the edges together and thus insure that the desired rolling up action shall be made effective on the edges of the paper suitable means may be provided for holding the central portion thereof extended and for this purpose I may utilize a plate 40 adapted to confine the paper against the surface 28. This plate 40 is preferably movable to expose the upper face of the plate so that in starting the machine a portion of the paper strip between the ends thereof may be laid in position over the surface 28 by a movement of superposition from above as contrasted with an attempt to thread it through a narrow opening such as is presented by the space between surface 28 and plate 40 as seen in Fig. 6. I have herein shown the plate 40 as hinged at 42 to the upper edge of the flange element 32 and as secured in its lowered position by a latch 44 (see Fig. 4) on the opposite flange 30.

I have herein shown the mechanism as so disposed with reference to the face of the shuttle 14 that the center line of the paper strip as it is led to it is not mid-way between the flanges 30 and 32 but lies outwardly thereof. Consequently a somewhat greater width of paper is adapted to be rolled up by the outer flange 30 than by the inner flange 32. The beading formed by the flange 30 lies outermost on the completed package and may be desirably formed of more plies than the other and such an arrangement is shown in the example of my invention illustrated. Obviously, however, the folding mechanism may be so mounted on the shuttle as to vary as desired the number of plies which will be made at either or both edges or the mechanism might be utilized having means solely for operating on one edge and in this case the positioning of the mechanism would control the number of turns in that edge.

As the paper starts to enter between the flanges it is given a curling motion over in the arc of a circle and back on itself. If in this motion the paper should strike against itself after having completed substantially one turn it could not continue the rolling up motion. In accordance with my present invention I provide means cooperating with both sides of the paper which cause it to roll up into the form of a spiral with spaced turns which, when the desired amount has been rolled up, may be permitted to collapse into contact one with another. Referring more particularly to Figs. 6, 7 and 8, I will describe the mechanism which in the embodiment of the invention shown rolls up the inner edge of the paper, that nearer the shuttle, into a downwardly facing bead. For this purpose the edge of the paper is guided by suitable surfaces which may be and preferably are, as herein shown, formed by separate scroll-like elements 46, 48, 50 and 52 spaced apart along flange 32 but which, although so spaced apart, are essentially sections or elements of an oblique conical spiral having spaced turns between which the edge of the paper moves, adjacent turns of the spiral contacting with opposite sides of the strip of paper. This will be clear from Figs.

5, 7 and 8 in which the conical or tapering form of the spiral and its oblique disposition are clearly shown and wherein is also illustrated the diminution in the number of turns of the spiral as the smaller end is approached. The envelope of the surfaces shown might be imagined as formed from a trapezoidal strip rolled up into a conical oblique spiral from the larger of its parallel bases.

Herein the discontinuous surfaces 46, 48, 50 and 52, which in effect form sections of the spiral just described, are formed from sections of flat strip rolled into spiral or scroll form and countersunk in the overhanging portion of the flange 32, the outermost turn of the spiral merging into that flange and presented toward the edge of the paper strip. As seen in Figs. 5 and 8, all these scrolls except the terminal scroll 52 make more than one complete turn, that is, the spiral extends through more than 360°. The extent of the turn, the number of scrolls utilized and the space occupied thereby may be varied in accordance with the amount of paper it is desired to roll up. Referring to Fig. 8, the edge of the paper enters the scroll 46 and curls over between the outermost and the next inner turn thereof. As seen in Fig. 5, the second scroll 48 is disposed inwardly of the scroll 46 because of its position on the oblique flange 32. A somewhat greater width of paper is thus thrust into the scroll 48 and it continues to turn over still guided on both sides by the turns of the scroll 48. This action is still further continued by the scroll 50 and with the parts positioned as indicated therein the rolling of the paper will continue until it has made about one and one-half turns always guided by the scrolls and with the turns held apart, at which time the edge of the paper will come into contact with itself. As the paper then passes to the final scroll 52, which makes less than a complete turn, the turns of the rolled-up edge are no longer held apart but are permitted to collapse on themselves and be brought as therein shown to the form also illustrated in Fig. 2.

Along the flange 30 there may be provided scrolls 56, 58, 60 and 62 in all respects similar to the corresponding scrolls 46, 48, 50 and 52. These scrolls, however, may have their outer turns countersunk and secured at the edge of the supporting surface 28, the convexity thereof being fitted against the inner surface of the flange 30 and may thus tend to roll the paper upwardly over its upper face. While I have shown, as seen from a comparison of Figs. 8 and 9, the corresponding scrolls at either side as being identical, it will be seen from those figures that the upwardly extending scrolls are adapted to make a bead of more plies than the downwardly extending scrolls. This is merely the result of the placing of the folding mechanism as a whole at one side of the center line of the paper so that more paper is crowded inwardly at the outer edge and consequently sufficient is supplied to make an additional half turn at the outer edge as contrasted with the inner edge. The arrangement of the scrolls here shown permits this larger beading to be rolled up with the turns held apart during the rolling up process and obviously the form and arrangement of the scrolls may be suitably varied to produce any desired results as to the amount of the edge rolling which is effected.

In wrapping the strip about the coil under considerable tension or preliminarily thereto in drawing it with a sharp bend over roll 26 the edge reenforcements may be flattened out to the form shown in Fig. 3.

Referring to Fig. 8 it will be seen that in the form of the invention shown, the innermost portion of the scroll 46 is not utilized in guiding the paper. I prefer, however, to so make the set of scrolls as to provide in each a substantially central guiding portion or eye. Thus, the inner portion of scrolls 46 and 48 align with the axis of the completed bead in 52. The guideway thus formed may be utilized if desired to lead in a string or wire to provide a core for the bead.

The movement of the paper throughout is an easy rolling movement which does not place any strain upon the fibers of the paper and as distinguished from a repeated folding or an attempt to re-fold an already folded surface which for obvious geometrical reasons causes a mechanical strain on the fibers of the paper, seriously weakening the same and causing difficulties in the operation.

While not limited thereto, I prefer to utilize for wrapping articles in the manner described expansible craped paper as described in the patent to Edward H. Angier above referred to. The cord or bead into which the edge of this paper is rolled up retains the resiliency of the paper and is adapted to stretch therewith so that the flat surfaces of the paper which are not rolled up may closely adapt themselves to the surface of the article to be wrapped. A certain amount of yielding or resilient give in the rolled-up edges is further provided so that the package as a whole functions as does the package in said patent against disruptive shocks while the wrapping material as applied to the package is of ample strength both to permit it to be applied under exceedingly high tension and to restrain the shocks to which an exceedingly heavy article may submit it although the paper from which it is made might be inadequate in itself for such duties. As previously suggested, the effect is of a package lashed or bound with heavy paper cord, but one also having a surface covering in addition thereto which covering is carried by the lashing as an integral part thereof and is held in position thereby.

Having described in detail one particular

mechanism by the use of which my invention is realized, I should point out that I am by no means limited to this particular structure which I have described very fully in order that it might be clearly understood and not because all the details of construction shown are essential. On the contrary they might be widely varied without departing from the principles of the invention and what I consider new and desire to secure by Letters Patent I shall define in the following claims.

Claims—

1. A device of the class described comprising a guide for the paper including a series of scrolls, each making at least a complete turn, disposed in spaced relation along a line oblique to the path of travel of the paper.

2. A device of the class described comprising a guide for the paper including a series of scrolls of progressively decreasing size, each making at least a complete turn, disposed in spaced relation along a line oblique to the path of travel of the paper.

3. In combination, a support over which a strip of paper may be drawn having provision for holding the central portion of the strip extended thereover and a set of scrolls adapted to receive the edge of the paper to roll it up during its passage, said scrolls having spires serving to hold apart the turns of the rolling paper.

4. In combination, a support over which a strip of paper may be drawn having provision for holding the central portion of the strip extended thereover and a set of scrolls adapted to receive the edge of the paper to roll it up during its passage, said scrolls having spires serving to hold apart the turns of the rolling paper and including a scroll making more than a complete turn whereby to roll the paper through more than 360° and a terminal scroll making less than a complete turn whereby to consolidate the turns of the rolled edge.

5. In combination, a support over which a strip of paper may be drawn having provision for holding the central portion of the strip extended thereover and a set of scrolls adapted to receive the edge of the paper to roll it up during its passage, said scrolls having spires serving to hold apart the turns of the rolling paper and including a scroll making more than a complete turn whereby to roll the paper through more than 360° and a smaller terminal scroll positioned further inward and making less than a complete turn whereby to consolidate the turns of the rolled edge.

6. In combination with a support over which a strip of paper may be led, means for rolling up the edge of the strip in at least a complete turn, comprising surfaces disposed substantially along an oblique conical spiral and adapted to contact with both sides of the paper as it is rolled up.

7. In combination with a support over which a strip of paper may be led, means for rolling up the edge of the strip comprising surfaces disposed substantially along an oblique conical spiral which has a gradually diminishing number of spires as the smaller base is approached and adapted to contact with both sides of the paper as it is rolled up.

8. In combination, a support over which a strip of paper may be drawn, means gradually to crowd inwardly the edge of the paper during its passage constructed to impart a curling motion thereto throughout at least a complete turn and cooperating means for temporarily holding apart the turns of the curling paper.

9. In a device of the class described, in combination, a support over which the paper may be drawn, means disposed at the sides thereof for confining the edges of the paper and including means for operating on an edge portion of the paper to turn the same over, and a displaceable cover plate to confine the central part of the paper to said support to prevent lateral collapse thereof.

10. In a device of the class described, in combination, a support over which the paper may be drawn, means disposed at the side thereof for operating on the edge portion of the paper to turn the same over, a hinged cover plate which may be swung upwardly to permit a portion of the paper between its ends to be laid over the support or lowered to confine the central part of the paper to said support to prevent lateral collapse thereof.

11. In a device of the class described, in combination, a support over which the paper may be drawn and a separable removable and replaceable member along a side thereof having associated therewith means for turning over the edge of the paper as it passes over the support.

12. In a device of the class described, in combination, a support over which the paper may be drawn and separable removable and replaceable members along the opposite sides thereof having associated therewith means for turning over the edges of the paper as it passes over the support.

In testimony whereof, I have signed my name to this specification.

WILLIAM M. WHEILDON.