June 5, 1945. D. BRONSON 2,377,608

PIPE WRAPPING AND METHOD AND APPARATUS FOR APPLYING SAME

Filed June 4, 1943 2 Sheets-Sheet 1

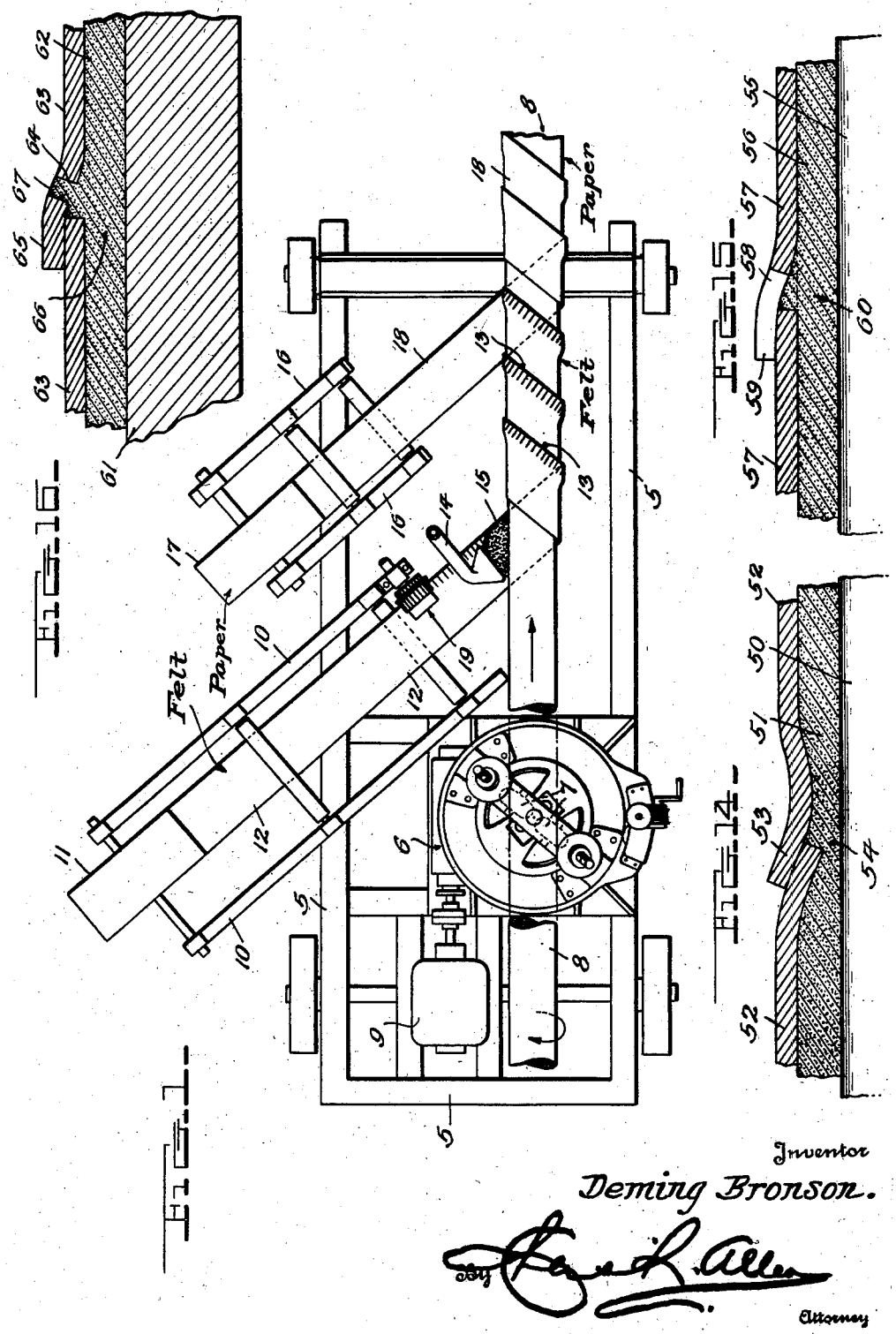


FIG. 1

FIG. 15

FIG. 14

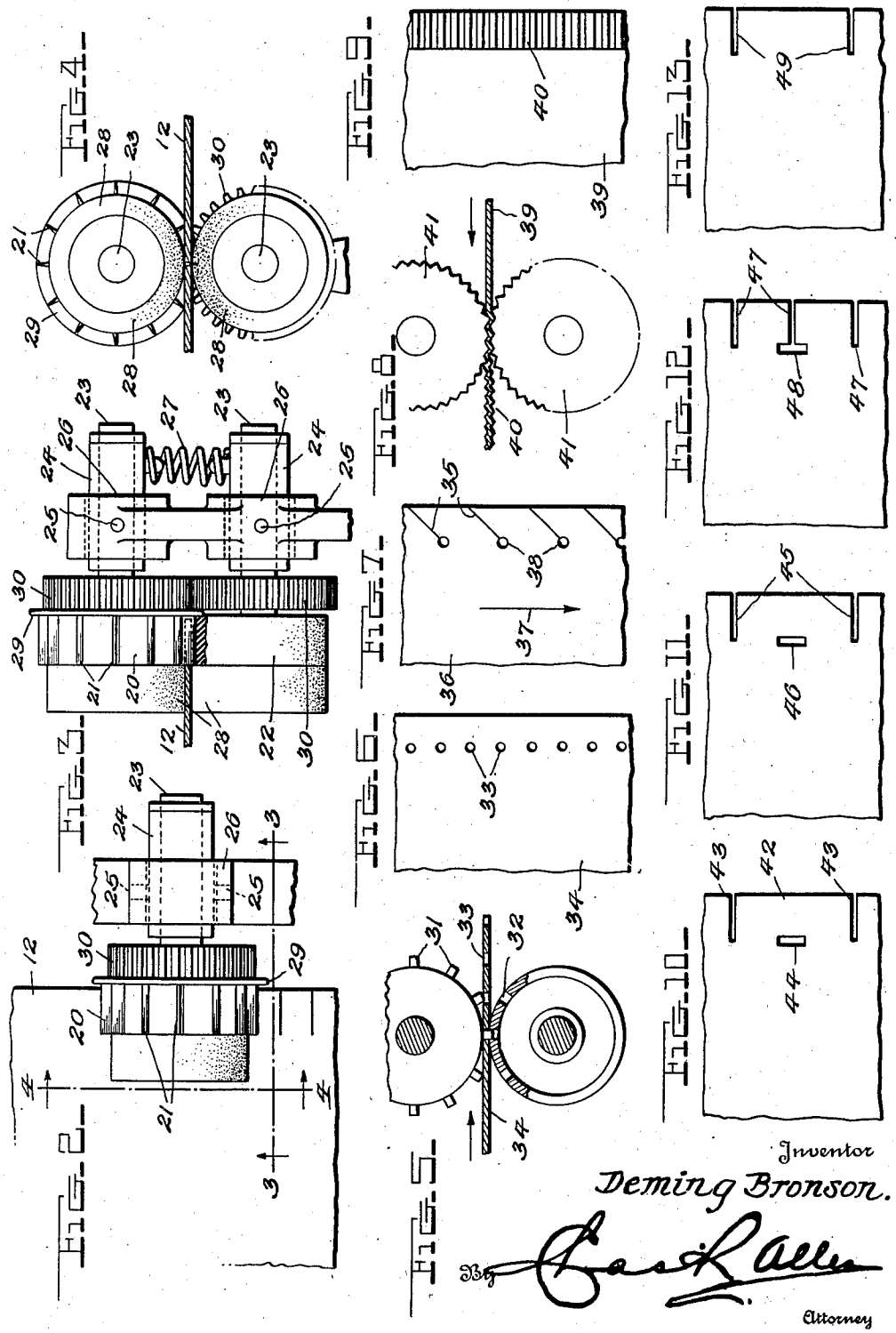
FIG. 16

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PIPE WRAPPING AND METHOD AND APPARATUS FOR APPLYING SAME

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PIPE WRAPPING AND METHOD AND APPARATUS FOR APPLYING SAME

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19 Claims. (Cl. 242—11)

The invention relates generally to the art of wrapping pipe and primarily seeks to provide certain new and useful improvements in a protective wrapping for pipe or the like and a novel method of and apparatus for applying said wrapping.

In the preparation of certain forms of pipe for the market, especially those intended to be buried in the ground to serve as water or like conduits, it is customary to apply to the internal surfaces of the pipe a bitumen coating having the quality of preventing tubercle formation, and a protective covering also is applied over the external surfaces of the pipe usually comprising a bitumen or other plastic protective coating, a spirally wound layer of relatively heavy felt and an outer layer of kraft paper also spirally wound. The adjacent edges of the spirally wound webs or strips of felt and paper are overlapped so as to assure complete coverage. When an edge portion of a spirally wound relatively heavy web such as the above mentioned felt is overlapped in the manner stated it surrounds a greater circumference than does the main body of the web and obviously a considerable amount of tension is established in the overlapped edge portion. This greater tension in the overlapped edge portion as compared to the other edge portion of the web is a pressure force that is exerted inwardly toward the covered pipe, and when the wrapping is applied over a plastic coating, the inward pressure at the spiral line under the overlapped web margin has a tendency to displace the plastic coating entirely or at least to reduce its thickness undesirably. This displacement or compacting and thinning of the plastic protective coating obviously is objectionable because it weakens the coating just where infiltration from without is most likely to occur, namely at the spiral line along which the web lap lies, and it is a purpose of the present invention to provide a method and means for preventing this reduction or destruction of the efficiency of the protective coating.

In its more detailed nature the invention has for an object to provide a novel protective wrapper web having a marginal edge thereof so prepared by punching, slotting, slitting or otherwise as to be free to expand or increase in diameter as it is being wound in edge overlapping relation so as to avoid establishment of edge tension effective to press inwardly on and displace or objectionably compact the underlying plastic protective coating.

Another object of the invention is to provide a novel apparatus for wrapping a web spirally about a pipe and including means for treating a marginal edge of the web to relieve or prevent edge tension as the web is being wrapped.

Another object of the invention is to provide a novel method of spirally winding a protective web about a pipe with edge portions of the web overlapping and including the step of progressively treating the edge portion of the web intended to overlap while the winding of the web is in progress and for the purpose of relieving or preventing edge tension in the overlapping edge portion of the web.

With the above and other objects in view that will hereinafter appear, the nature of the invention will be more fully understood by following the detailed description, the appended claims and the several views illustrated in the accompanying drawings.

In the drawings:

Figure 1 is a somewhat diagrammatic plan view illustrating the invention.

Figure 2 is a detail fragmentary plan view illustrating means for treating the felt web edge portion.

Figure 3 is a detail vertical cross section taken on the line 3—3 on Figure 2.

Figure 4 is a detail fragmentary vertical longitudinal section taken on the line 4—4 on Figure 2.

Figure 5 is a view similar to Figure 4 illustrating a modified form of edge treating means.

Figure 6 is a fragmentary plan view illustrating a fragment of felt web treated in the manner illustrated in Figure 5.

Figure 7 is a view similar to Figure 6 illustrating a modified manner of treating a felt web edge portion.

Figure 8 is a view similar to Figure 5 illustrating another modified means for treating a web edge portion.

Figure 9 is a fragmentary plan view illustrating an edge portion of a web treated in the manner illustrated in Figure 8.

Figures 10, 11, 12 and 13 are views similar to Figure 6 illustrating additional modified web edge treatments.

Figure 14 is an enlarged fragmentary longitudinal section of a portion of a pipe externally coated and wrapped in the conventional manner.

Figure 15 is a view similar to Figure 14 illustrating a portion of a pipe wrapped in accordance with the present invention, a web edge treated in the manner illustrated in Figures 1 and 2 being shown.

Figure 16 is a view similar to Figure 15, a web edge treated in the manner illustrated in Figure 6 being shown.

In the example of embodiment of the invention herein disclosed, the invention is illustrated as being practiced in a wrapping machine of a type well known in the art and disclosed in detail in U. S. Letters Patent 1,572,258 issued to C. F. Wieland et al. on February 9, 1926, although it is to be understood that the invention can be practiced as well in any form of spiral wrapping apparatus.

In the machine referred to there is included a framing 5 whereon is supported a turn table 6 which is adjustable about a vertical axis. On the turn table there is mounted a pair of angularly disposed, power driven rolls 7 on which the pipe 8 which is to be externally coated and wrapped rests and by which said pipe is given rotative and longitudinal movement. The rolls 7 are driven from the motor generally designated 9.

A felt stand or frame 10 is provided and on this stand the supply roll 11 of felt is mounted. The felt wrapping web is wrapped about the pipe 8 in the manner clearly illustrated in Figure 1 and the rotating pipe serves to draw the web 12 off of the supply roll 11, the positioning of the pipe supporting and driving rolls 7 and the angular relation of the felt stand 10 being so related as to cause the web 12 to wrap spirally about the pipe at the proper angle and with one edge portion of the web overlapping as indicated at 13. See also Figures 14 to 16.

According to standard practice in the protective wrapping of pipe, a hot bitumen coating is applied externally to the pipe, a felt web is wrapped spirally about the pipe over the bitumen coating, and then the outer covering of kraft paper is wrapped spirally about the pipe over the felt wrapping, with or without an additional protective coating of hot bitumen intervening the felt and paper wrappings. The hot bitumen protective coating may be applied to the pipe so as to underlie the felt wrapping in any approved manner, as by direct deposition onto the external surface of the rotating and longitudinally moving pipe by dragging a granny rag having hot bitumen deposited thereon against the moving pipe, or by direct deposition of the hot bitumen through a distributor pipe 14 or other applicator onto the upper surface of the felt web 12 opposing the external surface of the pipe in the manner indicated at 15 in Figure 1.

A kraft paper stand or frame 16 is provided and supports a supply roll 17 from which the kraft paper web 18 or outer wrapping is drawn off and wrapped about the pipe in the manner clearly illustrated in Figure 1. The kraft paper wrapping 18 is overlapped at its edge portion in the same manner as the felt wrapping web 12, but because of the fact that the paper web is relatively thin, no problem is presented by the overlapping of its edge portion, and the web edge treatment which forms the outstanding feature of the present invention need not be practiced in the case of said paper web.

All of the parts hereinabove described are well known in the art and form no part of the present invention except in combination with the structures and practices which are to be described in detail hereinafter. The hereinabove described conventional structures and practices are disclosed in detail in U. S. Letters Patent 1,572,258 issued to C. F. Wieland et al. on February 9, 1926, and in U. S. Letters Patent 2,133,014 issued to David W. Boylan on October 28, 1936.

According to the present invention the felt web 12 while passing to the pipe and being spirally wrapped thereon goes through an edge treating means generally designated 19 in Figure 1. The edge treating means may take various forms, and when the edge treatment is in the form illustrated in Figures 1 and 2, the web edge portion passes between a slitter roll 20 provided with circumferentially spaced, transverse slitter blades 21 and an underlying pressure roll 22 of rubber, cork or other suitable material into which the slitting blades 21 can bite. See Figures 1 and 4. The rolls 20 and 22 are fixed on shafts 23 which are rotatable in upper and lower bearing blocks 24 tiltably mounted at 25 in bearings 26. A compression spring 27 preferably is interposed between the outer portions of the tiltably mounted blocks 24 so as to urge the opposing rolls 20 and 22 together against the interposed web edge portion, said rolls including friction ring portions 28 which engage the web 12 so as to cause the linear movement of the web to be transmitted in the form of rotation to the rolls 20 and 22. One of the rolls is equipped with an edge guide flange 29, and the rolls also are equipped with intermeshing gears 30 which cause them to rotate together in a manner assuring against tearing of edge portions of the web by reason of any differential movement of the rolls.

As previously stated, the edge portion of the felt web 12 may be treated in various manners to provide for the desired relieving or avoidance of tension in the web, and in Figures 5 and 6 there is illustrated a modified form of edge treatment consisting of the provision of a multiplicity of equidistantly placed apertures arranged in a line spaced inwardly from an edge of the web a distance approximating the degree to which the edge portion of the web is to overlap the web wrapping. One way of performing this type of web edge treatment is by provision of opposing rolls having complementary punches 31 and receiving recesses 32 in the manner clearly illustrated in Figure 5 and which serve to provide the line of apertures 33 in the web 34 illustrated in Figures 5 and 6.

In Figure 7 there is illustrated another modification of edge treatment of the felt web, this treatment consisting of a combination of angularly disposed edge slits 35, the slits being directed rearwardly and laterally with respect to the direction of feed of the web 36, as indicated by the arrow 37, and each slit terminating at its inner extremity in an aperture 38. The provision of the apertures 38 will overcome any tendency of the slits to tear at their inner extremities, and by angling the slits in the manner stated, upfolding of the triangular web edge portions formed by the provision of the slits is avoided during the wrapping of the web onto the pipe, and instead, the web edge portions intervening the slits 35 are caused to tightly hug the overlapped web edge portions and lie flatly against the underlying wrapping so that in the finished product, namely the completely wrapped pipe, the very presence of the slits can be observed only with difficulty.

In Figures 8 and 9 of the drawings, there is illustrated still another manner of treating the edge portion of the felt web. According to this modification of the invention the edge portion of the web 39 may be crimped as at 40 between opposing crimping rolls 41.

In Figure 10 of the drawings there is illustrated

still another modified form of web edge treatment in which the edge of the web **42** is provided with equidistantly spaced transverse edge slits **43** and intervening slots or apertures **44**.

In Figure 11 of the drawings there is illustrated still another modified form of edge treatment which is quite similar to that disclosed in Figure 10 except that edge slots **45** are provided instead of mere slits, and apertures or slots **46** are provided intervening each adjacent pair of slots **45**.

In Figure 12 of the drawings there is illustrated still another modification of web edge treatment in which equidistantly spaced edge slots **47** are provided, alternate ones of the slots merging into apertures or slots **48**.

In Figure 13 of the drawings there is illustrated still another modified form of web edge treatment in which the web edge is provided with equidistantly spaced transverse slots **49** without intervening apertures or slots.

In all of the forms of web edge treatment illustrated in the various Figures 1, 2, 6, 7, 9 and 10 to 13 sufficient yield, or freedom to spread is provided at the edge portion of the web which is intended to overlap an underlying web edge portion to enable the desired overlapping without storing of objectionable tension in the overlapping edge portion which must pass around a greater circumference than the underlying, main body portion of the felt wrapping web. It will be appreciated that because of the considerable thickness of the felt wrapping web **12**, the amount of tension that can be stored up in an overlapping edge portion thereof is considerable, and the objectionable nature of the inward pressure resulting from this storing up of tension can be best appreciated by observing Figure 14 of the drawings in which the conventional practice of wrapping is somewhat diagrammatically illustrated.

In Figure 14 of the drawings the pipe being wrapped is indicated at **50** and the external protective coating of hot bitumen is indicated at **51**. The felt web wrapping is indicated at **52** and the overlapping edge portion of the wrapping is indicated at **53**. Because of the tension stored up in the overlapped edge portion **53** as it passes around the external surface of the underlying web portion, and the inward pressure resulting from this tension, the plastic coating **51** is displaced or pressed inwardly as at **54** in a manner resulting in complete destruction of, or at least great reduction in, the efficiency of the hot bitumen coating at the spiral line of the web overlap. It is the purpose of the present invention to provide means overcoming this objectionable storing up of edge tension and plastic coating displacing inward pressure.

By providing the web edge treatments hereinbefore described, the overlapping edge portion of the felt web is permitted to spread and relieve the edge tension and inward pressure as the web overlaps in the manner clearly illustrated in Figure 15, and displacement or reduction in efficiency of the hot bitumen pipe coating is avoided. In Figure 15 the pipe is indicated at **55**, the hot bitumen external coating at **56**, and the felt web wrapping at **57**. The web edge slitting or slotting is indicated at **58**, and the freeing of the web edge portion by reason of the provision of this edge slitting or slotting permits the web to overlap at **59** without any objectionable storing of edge tension therein or the setting up of inwardly directed pressures against the underlying plastic coating **56**, with the result that the plastic coating remains intact and in fully efficient full thickness as at **60** along the spiral line underlying the overlapped edge portions of the web wrapping **57**. It should be understood that all of the forms of web edge treatments illustrated in Figures 1, 6, 7, 9 and 10 to 13 will provide sufficient edge freedom to avoid the setting up of objectionable edge tension in the web in a manner for avoiding the objectionable displacement of the plastic coating indicated at **54** in Figure 14.

In Figure 16 of the drawings there is illustrated a form of web edge treatment such as is illustrated in Figures 6, 10 and 11 in which apertures are provided at equidistantly spaced points along the edge portion of the web. In said Figure 16 the pipe is indicated at **61**, the hot bitumen coating at **62**, and the felt wrapping at **63**. The edge treatment consisting of or including the apertures or slots is indicated at **64** and an overlapped edge portion of the web **63** is indicated at **65**. It will be observed that the edge treatment provides sufficient freedom to avoid storing up of edge tension and inward pressures such as would displace or thin out the plastic protective coating at **66**, and it will be observed also that the plastic coating keys into the web edge treatment openings **64** in the manner indicated at **67**, a feature which contributes toward perfect union of the wrapped assembly and a locking together of the protective wrappings.

In the foregoing description I have disclosed several novel forms of protective wrappings for pipe, also a novel method of and means for edge treating the wrapping and applying the same to the pipe in a manner for assuring against the storing up of edge tension in the wrapping and the setting up of pressure forces effective to displace and render inefficient the plastic protective coating underlying the web wrappings.

It is, of course, to be understood that the details of structure and the arrangement of parts may be variously changed and modified without departing from the spirit and scope of the invention.

I claim:

1. In apparatus of the character described, pipe supporting means, means for supporting a single thickness wrapper web, means for effecting a wrapping of the web spirally about the pipe with edge portions of the web overlapping, means for performing a mechanical non-additive treatment upon only that edge portion of the web intended to overlap thereby to enable the overlapping edge to spread and permanently remain spread so as to relieve edge tension and inward pressure where it overlaps an edge portion of the spirally wound web.

2. In a pipe wrapping machine, means for rotating and feeding longitudinally a pipe to be wrapped, means for directing a single thickness wrapper web in angular relation to the pipe to be wrapped thereon spirally and with an edge portion thereof being wound overlapping a previously wound edge portion, and means for performing a mechanical non-additive treatment upon only that edge portion of the web intended to overlap thereby to enable it to spread and permanently remain spread so as to relieve inward pressure where it overlaps the underlying web edge portion.

3. In a pipe wrapping machine, means for rotating and feeding longitudinally a pipe to be wrapped, means for applying a plastic protective coating on the pipe, means for directing single thickness wrapper web in angular relation to the pipe to be wrapped thereon spirally over said

coating and with an edge portion thereof being wound overlapping a previously wound edge portion, and means for performing a mechanical non-additive treatment upon only that edge portion of the web intended to overlap thereby to enable it to spread and assume and retain the increased diameter resulting from its overlapping of the underlying web edge portion without exerting pressure inwardly sufficient to displace and appreciably diminish the efficiency of said plastic protective coating.

4. In apparatus of the character described, pipe supporting means, wrapper web supporting means, means for effecting a wrapping of the web spirally about the pipe with edge portions of the web overlapping, and means for slitting an edge portion of the web to enable it to spread and relieve edge tension and inward pressure as it overlaps an edge portion of the spirally wound web.

5. In apparatus of the character described, pipe supporting means, wrapper web supporting means, means for effecting a wrapping of the web spirally about the pipe with edge portions of the web overlapping, and means for crimping an edge portion of the web to enable it to spread and relieve edge tension and inward pressure as it overlaps an edge portion of the spirally wound web.

6. In a pipe wrapping machine, means for rotating and feeding longitudinally a pipe to be wrapped, means for applying a plastic protective coating on the pipe, means for directing a wrapper web in angular relation to the pipe to be wrapped thereon spirally over said coating and with an edge portion thereof being wound overlapping a previously wound edge portion, and means for treating said overlapping edge portion to enable it to spread and assume the increased diameter resulting from its overlapping of the underlying web edge portion without exerting pressure inwardly sufficient to displace and appreciably diminish the efficiency of said plastic protective coating, said last named means including a pair of friction rolls between which the edge portion being treated passes, means for yieldably pressing the rolls against the intervening web edge, and edge indenting means on at least one said roll.

7. In a pipe wrapping machine, means for rotating and feeding longitudinally a pipe to be wrapped, means for applying a plastic protective coating on the pipe, means for directing a wrapper web in angular relation to the pipe to be wrapped thereon spirally over said coating and with an edge portion thereof being wound overlapping a previously wound edge portion, and means for treating said overlapping edge portion to enable it to spread and assume the increased diameter resulting from its overlapping of the underlying web edge portion without exerting pressure inwardly sufficient to displace and appreciably diminish the efficiency of said plastic protective coating, said last named means including a pair of friction rolls between which the edge portion being treated passes, means for yieldably pressing the rolls against the intervening web edge, and means on at least one said roll for passing through said intervening web edge at regularly spaced intervals.

8. The herein described method of wrapping pipe which comprises, wrapping a single thickness wrapper web spirally about the pipe with edge portions thereof overlapping, and mechanically and non-additively treating the overlapping edge portion only of said web while the wrapping of the web is progressing so as to enable said treated edge portion as it overlaps the underlying web edge portion to spread and permanently remain spread, thereby to relieve edge tension and inward pressure.

9. The herein described method of wrapping pipe which comprises wrapping a single thickness wrapper web spirally about the pipe with edge portions thereof overlapping, applying a protective plastic coating to the pipe in a manner for lying between the pipe and said wrapping, and mechanically and non-additively treating the overlapping edge portion only of said web while the wrapping of the web is progressing so as to enable said treated edge portion as it overlaps the underlying web edge portion to spread and assume and retain the increased diameter resulting from its overlapping of the underlying edge portion without exerting pressure inwardly sufficient to displace and appreciably diminish the efficiency of said plastic protective coating.

10. The herein described method of wrapping pipe which comprises, wrapping a wrapper web spirally about the pipe with edge portions thereof overlapping and edge treating the overlapping edge portion of said web by cutting through the same at regular intervals while the wrapping of the web is progressing so as to enable said treated edge portion as it overlaps the underlying web edge portion to spread and relieve edge tension and inward pressure.

11. The herein described method of wrapping pipe which comprises, wrapping a wrapper web spirally about the pipe with edge portions thereof overlapping, applying a protective plastic coating to the pipe in a manner for lying between the pipe and said wrapping, and edge treating the overlapping edge portion of said web by cutting through the same at regular intervals while the wrapping of the web is progressing so as to enable said treated edge portion as it overlaps the underlying web edge portion to spread and assume the increased diameter resulting from its overlapping of the underlying edge portion without exerting pressure inwardly sufficient to displace and appreciably diminish the efficiency of said plastic protective coating.

12. A pipe wrapper intended to be spirally wound about a pipe in edge overlapping relation and comprising a long wrapper web having one edge thereof cut through at regular intervals in a manner for enabling it to spread and assume the necessary increase in diameter of the spiral wrap resulting from its overlapping of the underlying edge portion without exerting appreciable inward pressure.

13. A pipe wrapper intended to be spirally wound about a pipe in edge overlapping relation and comprising a long wrapper web having one edge thereof slit through at regular intervals in a manner for enabling it to spread and assume the necessary increase in diameter of the spiral wrap resulting from its overlapping of the underlying edge portion without exerting appreciable inward pressure.

14. A pipe wrapper intended to be spirally wound about a pipe in edge overlapping relation and comprising a long wrapper web having one edge thereof slit through at regular intervals in a manner for enabling it to spread and assume the necessary increase in diameter of the spiral wrap resulting from its overlapping of the underlying edge portion without exerting appreciable inward pressure, each said slit being angled later-

ally and rearwardly of the direction in which the web is to be wrapped.

15. A pipe wrapper intended to be spirally wound about a pipe in edge overlapping relation and comprising a long wrapper web having one edge thereof slit through at regular intervals in a manner for enabling it to spread and assume the necessary increase in diameter of the spiral wrap resulting from its overlapping of the underlying edge portion without exerting appreciable inward pressure, each said slit terminating inwardly in an aperture.

16. A pipe wrapper intended to be spirally wound about a pipe in edge overlapping relation and comprising a long wrapper web having one edge thereof cut through at regular intervals in a manner for enabling it to spread and assume the necessary increase in diameter of the spiral wrap resulting from its overlapping of the underlying edge portion without exerting appreciable inward pressure, and there being an aperture disposed between each adjacent pair of cuts and aligned with the inner terminals of the cuts.

17. A pipe wrapper intended to be spirally wound about a pipe in edge overlapping relation and comprising a long wrapper web having one edge thereof crimped in a manner for enabling it to spread and assume the necessary increase in diameter of the spiral wrap resulting from its overlapping of the underlying edge portion without exerting appreciable inward pressure.

18. The herein described method of wrapping pipe which comprises cutting through one side edge portion of a wrapper web at regular intervals throughout its length to render said edge portion less resistant to expansion, and thereafter wrapping the web spirally about a pipe with the cut edge portion overlapping a previously wound web edge portion.

19. The herein described method of wrapping pipe which comprises slitting one side edge portion of a wrapping web at regular intervals throughout its length to render said edge portion less resistant to expansion, each said slit bearing angular relation to said one side edge portion, and thereafter wrapping the web spirally about a pipe with the cut edge portion overlapping a previously wound web edge portion.

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