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PIPE WRAPPING MACHINE

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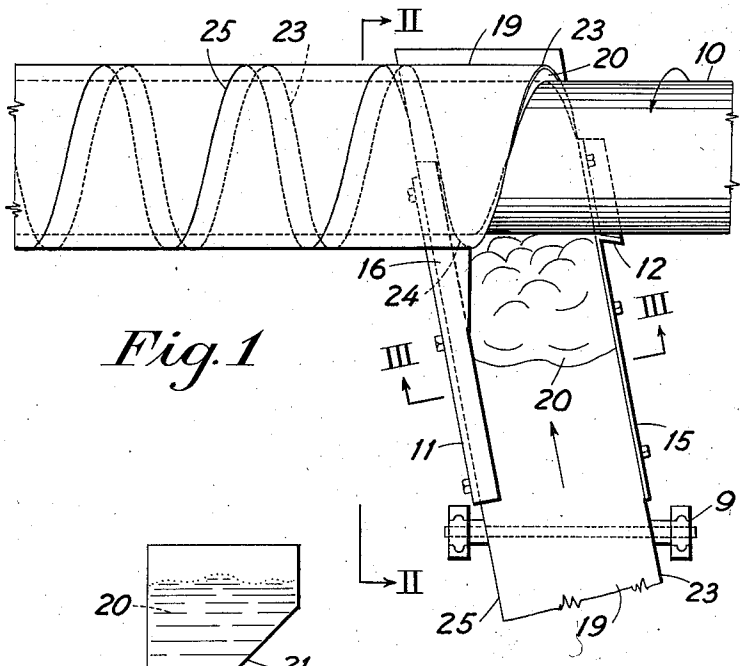


Fig. 1

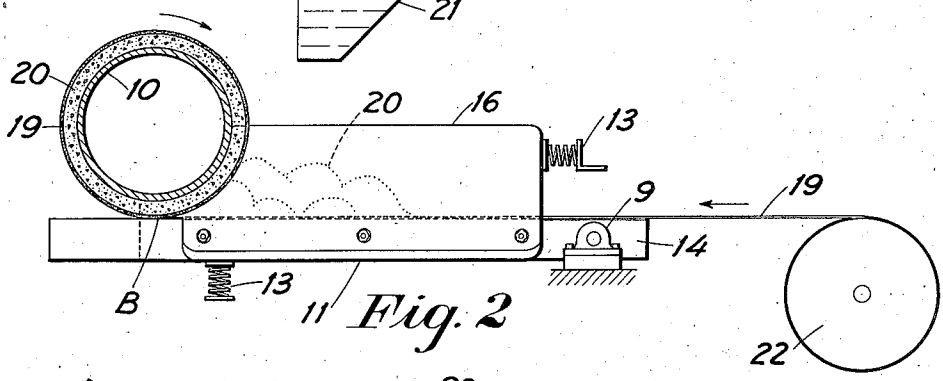


Fig. 2

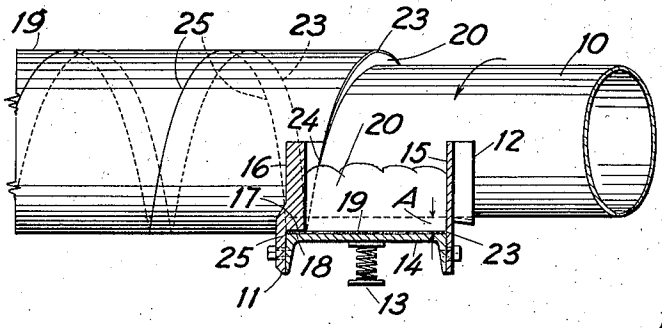


Fig. 3

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PIPE WRAPPING MACHINE

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7 Claims. (Cl. 25—30)

This invention relates to a machine for wrapping cylindrical objects, such as pipe, with a relatively thick coating of a plastic material, such as a bituminous or cementitious mastic, which hardens or sets to form a firm adherent protective layer; and is particularly directed to a method of and means for applying such plastic material on a continuous tape or band of flexible material which is smoothly and uniformly lapped at the joints between adjacent turns.

Heretofore, pipes and the like have been wrapped with bitumen-impregnated paper, felt, cloth and the like, which has been lapped at the joints to form an initially waterproof layer. It has been found, however, that such treatments do not offer adequate or permanent protection against corrosion due to their being damaged by concentrated soil stresses, or by expansions and contractions and temperature changes, for example as when carrying hot oil at 140° F. in a buried pipe line. Accordingly, relatively thick coatings of an initially plastic material such as a hot or cold bituminous mastic, with or without a filler or a cementitious binder such as Portland cement, have been developed and successfully utilized. These may be applied by extrusion or by being carried upon a continuous tape or band of flexible material, such as paper or fabric, or even thin metal, which is passed through a guiding chute or channel, and is wrapped helically about the pipe, with the mastic inside and next to the pipe surface. Such a one is disclosed and claimed in the copending application of C. S. McDonald, et al, Serial No. 504,726, filed December 26, 1930.

The usual method of helical wrapping is without lapping the tape, but merely attempting to bring the adjacent edges together, and almost invariably results in helical gaps or spaces between turns, through which a part of the plastic coating is squeezed out. Since it is very essential that all the plastic material be tightly squeezed and compressed against the pipe during the coating operation, the coating beneath this helical gap is unavoidably left in an uncompressed and porous state, and furthermore, the necessary transverse bond between adjacent wraps or turns of the coating is not accomplished. It has been demonstrated that the material in such a joint is spongy and weak, compared to the remaining tightly compressed body of the coating beneath the tape.

The successful lapping of a simple impregnated paper or cloth tape offers no great difficulty, but when a tape is to be applied with a thick layer of mastic carried on the same tape, considerable difficulty is encountered in getting the tape to overlap without the interposition of particles of the plastic material. Inasmuch as the tape is preferably dry and unimpregnated, to give a smooth and non-sticking final product, it is quite desirable that its outer surface be kept clean at all points in the wrapping process.

A further and more important reason for keeping the plastic material of the coating off of the tape already wrapped about the pipe is to prevent the trailing edge of this fibrous or other tape from being forced by the succeeding turn into the coating already applied, so that it approaches or actually contacts the pipe surface. If this sandwiching of the plastic between the lapped portions is allowed to occur, the tape so forced in may form a wick or capillary path for moisture to reach the pipe surface and set up severe localized corrosion. Even if a non-capillary material, such as a metal foil, is used for the tape, the discontinuity or crevice formed in the coating may pass moisture to the pipe surface. Furthermore, the plastic which has been deposited outside the tape is not bonded to the main coating, and is very easily broken off, leaving a thin and weak spot in the coating.

This invention avoids such gaps in the coating, and by making an actual lapping of a part of the tape, subjects the plastic material beneath such lapped portion to a double compression, as will be apparent from the drawing and description below.

It is an object of this invention to provide a means for applying a thick layer of a plastic material to a cylindrical body together with a carrying and wrapping tape of flexible material whereby a smoothly finished coating is formed and adjacent turns of the tape are overlapped, thus producing the substantial equivalent of a seamless coating.

Another object is to provide a means for guiding a plastic material being applied to a moving cylinder on a continuous tape in such a manner that none of the material will encroach upon that portion already coated and covered by the tape.

Another object is to provide a means for coating a pipe with a helically wound tape carrying plastic material and lapping the leading edge over the previously applied trailing edge of the tape without pressing the said trailing edge into the coating already on the pipe.

Another object is to provide a method of coating pipe by helically wrapping a flexible tape carrying a body of plastic material and overlap-

ping said tape to obtain uniform compression and density of the plastic material.

Another object is to provide a guiding chute for a flexible tape carrying a plastic material which is to be applied to a moving cylinder, which will allow successive turns of the tape to overlap the previously wrapped portion of the cylinder without either the interposition of any of the plastic material or the formation of voids or porous places in the coating.

Another object is to provide an entirely automatic and self-contained means for accomplishing the wrapping and lapping steps outlined above.

These and other objects and advantages will become apparent from the description which follows, and from the accompanying drawing, which forms a part of this specification and illustrates a preferred embodiment of the invention.

In the drawing:

Figure 1 is a plan of a guiding chute applying a plastic material to a helically moving pipe, and illustrates the means for guiding and lapping the tape.

Figure 2 is a vertical sectional view on line II—II of Figure 1, and shows the plastic material feed and chute supporting means.

Figure 3 is a vertical sectional view on line III—III of Figure 1, and illustrates the configuration of the guide member for the plastic coating material, as well as a tape lapping means.

Referring to the drawing, the pipe **10** is illustrated as being advanced helically with respect to the chute **11**, which may be done by holding the latter stationary and simultaneously rotating and advancing the pipe in the direction shown, or by giving the pipe a simple rotation and traversing the chute longitudinally. Suffice it to say that the pipe is advanced helically relatively to the chute **11** by any suitable means (not shown) and the spacer shoe **12** of the chute **11** is pressed firmly against its outer surface as by spring **13**, so as to follow any irregularities such as may be caused by crooked pipe, etc. Chute **11** is preferably pivotally and slidably mounted in a plane parallel to the axis of pipe **10** on bearing **9**. The angle shown between the longitudinal axes of the chute and pipe corresponds to the helix angle of the wrapped coating.

Chute **11** is made up of a bottom plate **14**, a side plate **15**, which carries spacer shoe **12** mentioned above, and a shaped guide plate **16**, which is on the opposite side of the chute from plate **15**. Referring to Figure 3, guide plate **16** is adjustably secured to the edge of bottom plate **14** and is stepped at **17** so as to leave a space **18** into which the leading edge of the flexible tape **19** may be received and kept free of the plastic material **20**, which is fed from a suitable hopper **21** onto tape **19**, and is wrapped thereby about the pipe **10**. The width of step **17** corresponds to the amount of overlap between the adjacent turns of tape **19**, as shown in Figure 1. The thickness of the final coating is determined by the distance "A" between the top of the bottom plate **14** and the bottom of spacer shoe **12**, as shown in Figure 3. It may be varied widely, depending on the pipe diameter and the degree of protection required, ranging from ¼ inch on 1 inch pipe to 1½ inch on 26 inch pipe. These figures are merely illustrative of the results obtained by this invention.

The tape **19** is continuously permitted to feed forwardly through chute **11** from a suitable supply, such as a reel **22**, and is maintained under tension so as to feed smoothly and uniformly. The plastic material **20** is usually quite stiff and wedges into the space between the advancing pipe surface and the tape **19** as shown in Figure 2, piling up to form an excess at this point, so that a uniform and sufficient quantity passes around the pipe beneath the tape **19** and forms a uniformly compressed coating without gaps or voids.

Referring to Figures 1 and 3, it will be seen that there is a tendency for the plastic material in chute **11** to pile up and encroach upon the trailing edge **23** of the tape **19**, as that edge passes beneath and over the pipe **10** and completes its revolution to the lapping point "B" at the extreme forward edge of the step **17** of guide plate **16**. This is prevented by shaping the inner forward edge **24** of guide plate **16** inwardly to substantially the helix formed by the trailing edge **23** of the tape **19**, as shown in Figures 1 and 3. Thus the leading edge **25** of tape **19**, which passes through space **18** beneath guide plate **16**, will lap smoothly at point "B" over an uncontaminated outer surface of the preceding turn of tape **19**, and will overlap the trailing edge **23** by the amount determined by the width of the slot or channel formed by the bottom plate **14** and the step **17** in guide plate **16**. This will produce a smoothly wrapped and lapped tape over a dense homogeneous coating of initially plastic material on pipe **10**.

The essential feature of this invention appears to reside in a shaped guide plate or member for a chute of this general character, which will simultaneously permit a quantity of plastic material to be carried by a continuously fed tape around a cylinder to form a coating thereon, protect the outer surface of the already placed tape from contamination by the plastic material, and provide a protected edge of the tape which is so guided to smoothly overlap a portion of the tape on the coating already applied to the cylindrical member.

Although a specific construction embodying this invention has been described and illustrated, it is to be understood that the invention is not limited to that arrangement, and all such modifications and changes as come within the scope of the following claims are embraced thereby.

I claim:

1. A pipe coating machine of the type described comprising a chute disposed at an angle to said pipe and spaced therefrom, said chute adapted to guide a flexible tape to be wrapped helically around said pipe by the relative motion thereof, means for supplying plastic material onto said tape whereby a continuous coating of appreciable thickness is formed on said pipe beneath said tape, means for lapping adjacent turns of said tape, and means associated with said chute for preventing said plastic material from contacting the already wrapped tape.

2. A pipe coating machine of the type described comprising a chute disposed at an angle to said pipe and spaced therefrom, said chute adapted to guide a flexible tape to be wrapped helically around said pipe by the relative motion thereof, means for supplying plastic material onto said tape, one side of said chute being shaped substantially to the helix traced by the trailing edge of said flexible tape whereby said plastic material is prevented from contacting the already wrapped tape.

3. A pipe coating machine of the type described, comprising a chute disposed at an angle to said pipe and spaced therefrom, said chute

adapted to guide a flexible tape to be wrapped helically around said pipe by the relative motion thereof, means for supplying plastic material onto said tape, one side of said chute being shaped substantially to the helix traced by the trailing edge of said flexible tape whereby said plastic material is prevented from contacting the already wrapped tape, and a slot in said chute adapted to receive a portion of said tape whereby adjacent turns of said tape are lapped as they pass onto said pipe.

4. In a pipe coating machine of the type described, in which a pipe to be coated is moved helically with respect to the coating application means, a coating applying chute provided with two sides and a bottom, spacing means at one side of said chute whereby the bottom is maintained at an unvarying distance from the surface of the pipe, and the opposite side of said chute shaped substantially to the helical path of a point on the edge of the finished coating already wrapped upon said pipe.

5. In a pipe coating machine of the type described, in which a pipe to be coated is moved helically with respect to the coating application means, a coating applying chute, a tape guided by said chute to wrap helically about said pipe and means for supplying plastic material onto said tape, that portion of said chute containing such plastic material being of such cross-sectional configuration that no point of its width along the surface of contact with the pipe and coating overlaps the helix formed by the trailing edge of said tape as it wraps about said pipe.

6. In a pipe coating machine of the type described, in which a pipe to be coated is moved helically with respect to the coating application means, a chute provided with two sides and a bottom, spacing means at one side of said chute whereby the bottom is maintained at an unvarying distance from the surface of the pipe, the bottom of said chute forming a guide for a flexible tape, means for supplying plastic material onto said tape whereby said plastic material is carried onto said pipe with said tape as a helical wrapping, the opposite side of said chute shaped to protect the already wrapped tape from contact with the plastic material in said chute, and a horizontal slot in said last named side adapted to receive an edge of said flexible tape and lap it over the tape on the coated portion of said pipe.

7. A method of coating pipe with a flexible tape bearing a body of plastic material of appreciable thickness on a portion of its width, comprising the steps of wrapping said tape and said body helically about said pipe and simultaneously lapping the leading edge of said tape, which bears no plastic material, over the trailing edge of the preceding turn, whereby a substantially seamless coating of plastic material is formed on said pipe beneath said tape.

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