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METHOD FOR MANUFACTURING COATED CHAIN

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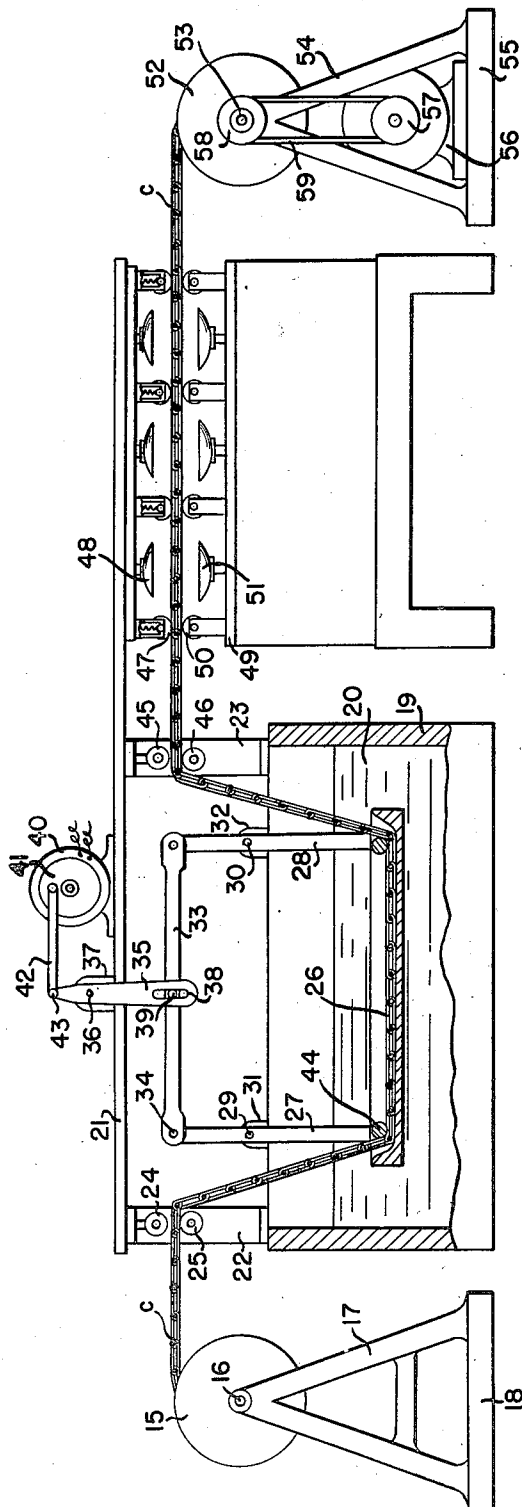


Fig. 1

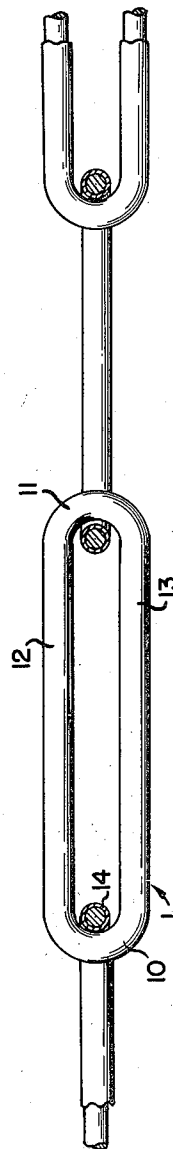


Fig. 2

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METHOD FOR MANUFACTURING COATED CHAIN

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3 Claims. (Cl. 117-99)

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The present invention relates to chains and is concerned primarily with a chain made up of links which have been treated with a protective coating, together with apparatus and method for applying and setting the coating.

This application is a division of application Serial No. 16,348, filed March 22, 1948.

The ordinary conventional chain which is made up of a plurality of metallic links is subjected to a wide variety of conditions of service usage. Under many of these conditions, the chain is open to attack by the corrosive action of the elements to which it is exposed. Such attack has heretofore materially impaired the service life of the chain. Moreover, when a chain is in any way manipulated, the interlocking links rub against each other with a frictional action which creates wear.

With the foregoing conditions in mind, the present invention has in view as its foremost objective the provision of a chain made up of a plurality of interlocking links, each of which has been treated with a protective coating which not only protects the metallic links from corrosive attack, but which also serves as a lubricant to resist friction and wear between the interlocking links.

In the application of Alexander McDonald, Serial No. 709,770, filed November 14, 1946, now issued as Patent No. 2,509,875, and entitled "Improvements in and Relating to Coating Compositions," there is disclosed a coating composition which consists essentially of finely comminuted zinc suspended in sodium silicate. Such a composition is susceptible of being applied to the links of a chain, and after application being set by heating.

Accordingly, a further objective of the invention is the provision of a chain consisting of metallic interlocking links which have been coated with a protective composition of finely divided zinc suspended in sodium silicate, in accordance with the teachings of the above identified patent application.

In providing a protective coating for the links of the chain, in accordance with noted objectives, it is necessary to be sure that each link is completely coated with the composition as any bare spots would be highly undesirable. Accordingly, a further objective of the invention is the provision of apparatus which may be employed to completely coat each link.

A still more detailed objective is the provision of apparatus which will coat the links of a chain with a protective composition by a continuous

operation. These ends are achieved by providing apparatus which includes as an essential element a tank or vat containing an adequate supply of the coating composition. The chain is immersed in the composition and the immersed portion is oscillated so as to loosen the interlocks and make sure that the entire surface of each link is fully covered. After immersing from the vat the chain is passed through certain drying units which function to set the coating.

Still another object of the invention lies in the provision of a method for coating the links of a chain with a protective composition as above outlined. This method is characterized as being continuous, and includes the steps of first cleansing the links, then immersing the chain in a bath of coating composition and while so immersed oscillating the links to adequately loosen the interlocks.

After being immersed for a prescribed period of time, the chain is withdrawn and passed through a drying unit which sets the coating composition.

Various other and more detailed objectives and advantages of the invention such as arise in connection with carrying out the above noted ideas in a practical embodiment will in part become apparent and in part be hereinafter stated.

The invention, therefore, comprises a chain which is made up of metallic links, each of which has been fully covered with the protective coating which functions as a lubricant at the interlocks between the links. The invention also embraces apparatus and method for so coating the links of the chain.

For a full and more complete understanding of the invention, reference may be had to the following description and the accompanying drawing wherein:

Figure 1 is a side view, partly in section and partly in elevation and somewhat diagrammatic of apparatus which may be employed to coat the links of the chain with a protective composition in accordance with precepts of this invention; and

Figure 2 is an enlarged detailed view of a portion of a chain showing certain links and sections.

Before describing the apparatus and methods which may be employed to produce a coated chain in accordance with the precepts of this invention, attention is first called to the exact nature of the coating material which is to be employed.

Such a coating material consists essentially of a finely divided or comminuted metal, such as

zinc, lead, aluminum, magnesium, cadmium, or alloys thereof. This finely divided material is combined with sodium silicate in which the ratio of sodium oxide to silica is approximately 1:2.6. This composition is essentially a suspension.

If desired, certain lead compounds may be added to this basic composition to incorporate desirable properties therein. Thus, if red lead be added, the attack of zinc by the alkali is delayed. Other lead compounds which may be added are lead chromate, litharge and white lead. In all cases the metallic dust which is employed in the basic composition must be finely comminuted, the average particle size should be no greater than three microns. This feature of the fine nature of the particles is highly important, as it is believed that many of the desirable properties of the coating are derived from this factor. Following are given a few examples of a coating material which is suitable to the method and products of the present invention.

Example I

Sodium silicate of ratio $\text{Na}_2\text{O}:\text{SiO}_2$		
of 1:2.6-----	milliliters--	30
Zinc dust-----	grams--	100

Example II

Red lead-----	ozs--	8
Lead chromate-----	ozs--	4
Sodium silicate of ratio $\text{Na}_2\text{O}:\text{SiO}_2$ or		
1:2.6-----	pts--	6
Mix thoroughly and add:		
Superfine zinc powder-----	lbs--	21
(particle size—90% not larger than		
6 microns)		

Example III

Red lead-----	grams--	7
Lead chromate-----	do----	5
Zinc dust-----	do----	163
Sodium silicate having the ratio of $\text{Na}_2\text{O}:\text{SiO}_2$		
of from 1:2.3 to 1:3.0-----	milliliters--	31

Assuming that an appropriate coating material of the type above described is available, certain novel methods of producing a coated chain will now be described.

While the present invention is susceptible of being employed in conjunction with almost any type of chain, the chain shown in Figure 2 is taken as illustrative of a chain which is meeting with widespread use.

Such a chain is made up of a plurality of links "L," each of the links "L" comprising bend portions 10 and 11 also and between which extends straight sides 12 and 13. It is evident that the bend portion 10 of one of the links interlocks with the bend portion of the respective adjacent link.

The entire surface of the bend portions 10 and 11, as well as the straight sides 12 and 13, are covered with a coating composition 14 in a manner hereinafter to be described and this coating 14 may be any of the compositions above catalogued.

It is important to note that where the bend portions 10 and 11 interlock, this coating 14 functions as a lubricant to minimize wear which is created at an incident to friction between these points.

Referring now to Figure 1, one apparatus which may be employed for achieving the coating construction depicted in Figure 2 will be described. A reel 15 is shown as pivotally mounted on a pedestal 17 that upstands from a base 18. This

reel 15 carries a supply of the chain which is designated "C," or the chain supply may be otherwise located and the chain "C" merely passed over the reel 15 in which it is evident the latter functions merely as a sheave or guide. It is assumed that the apparatus hereof operates on the chain after it has been thoroughly cleaned. This may be accomplished by first subjecting it to an acid bath after which it should be washed and blasted.

A vat or tank is represented at 19, and this tank contains a supply of the particular coating composition which is to be employed. This composition is in liquid form and is represented at 20. It may be any of the compositions above described.

The tank 19 is positioned beneath one end of a table 21 that is supported between uprights 22 and 23. A pair of guide rollers 24 and 25 are carried by the uprights 22 and 23 and the chain "C" passes between those guide rollers, and thence downwardly into the coating composition 20 in which it is immersed.

A pan 26 is pivotally suspended at the lower ends of arms 27 and 28, and the latter are in turn pivotally mounted at 29 and 30 on ears 31 and 32 which upstand from the side of the tank. A cross bar 33 is pivotally connected at each end to the upper ends of the arms 27 and 28, as indicated at 34. A lever 35 is pivotally mounted as shown at 36 on an ear 37 that is carried on the upper face of table 21. This arm is formed with an elongated slot 38 which receives a pin 39 on the cross bar 33.

An electric motor is represented diagrammatically at 40 and includes a flywheel 41 which is connected by pitman 42 to the upper end of the lever 35 as shown at 43. It is evident that when the electric motor 40 is operated, the pitman 42 is reciprocated and imparts an oscillating motion to the lever 35. This motion, in turn, is transmitted through the pin and slot connection 38 and 39 to the cross bar 33. This causes the arms 27 and 28 to oscillate in the manner of a pendulum and thereby oscillate the pin 36.

It is notable that the side walls of the pan 26 may include guide rollers 44 for confining the chain "C" within the pan. As the oscillating motion takes place the interlocks between the bends 10 and 11 of adjacent links "L" are loosened thereby assuring that the entire area of these bars is covered by the coating composition.

The upright 23 carries a pair of spaced rollers 45 and 46 between which chain "C" passes after it emerges from the tank 19.

The underside of the table 21 carries one half the elements of a heating unit in a form of guide rollers 47 and heating lamps 48. Complementary elements of the heating assembly are carried on the upper side of the table 49 in a form of rollers 50 that are opposite to the rollers 47 and heating lamps 51. The chain "C" is passed between the rollers 47 and 50 and is thereby guided. Heating from the banks of lamps 48 and 51 serves to set the coating which has been applied by immersion. The heat generated will be preferably about 250° F., and the apparatus will be operated at such a speed to keep each link of the chain in the heating unit for a required length of time which will vary from a few minutes to one hour.

After leaving the heating unit the chain "C" passes over the reel 52 on which it may be taken up. If desired the reel 52 may be replaced with

a sheave and the chain passed on to some other place. In any event, the reel 52, or sheave, is pivotally mounted, as indicated at 53 on a pedestal 54 which upstands from a base 55, the latter also carries an electric motor 56 which includes a driving shaft carrying a sheave 57. Another pulley 58 is mounted on the reel 52 and an endless belt 59 passes over the pulleys 57 and 58 and serves to drive the reel 52 from the electric motor 56 in a well known manner. It is evident by operating the electric motor at a certain predetermined speed, the link "C" may be kept immersed in the coating composition 20 for a required length of time and also within the heating unit sufficiently long to assure proper setting.

While preferred specific embodiments of the invention are hereinbefore set forth, it is to be clearly understood that the invention is not to be limited to the exact steps, materials, and constructions illustrated and described, because various modifications of these details may be provided in putting the invention into practice within the purview of the appended claims.

We claim:

1. In the manufacture of a chain consisting of interlocked links, the method which includes the steps of continuously guiding said chain into a bath of a coating composition consisting of finely comminuted zinc 90% of which is capable of passing through a 400 mesh Tyler sieve and is of an average particle size under 6 microns suspended in sodium silicate the ratio of sodium oxide to silica defined in moles being in the range of approximately 1:2.3 to 1:3.0 to immerse a portion of said chain in said bath, maintaining a section of the immersed chain portion composed of a plurality of links in a substantially horizontal plane for a substantial distance while simultaneously imparting a back and forth rocking movement to said horizontally arranged submerged section in the direction of movement of the chain, and subjecting successive sections of horizontally arranged chain links to a back and forth rocking movement as the chain is moved through said bath to loosen the said interlocks between the adjacent links, and to completely cover said links with said composition, withdrawing said covered portions of the chain, and setting the covering thereon by heating to a temperature of about 250° F.

2. In the manufacture of a chain consisting of interlocked links, the method which includes the steps of continuously guiding said chain into a bath of a coating composition consisting of finely divided metal selected from the group consisting of zinc, lead, aluminum, magnesium and cadmium, suspended in an aqueous solution of sodium silicate, maintaining a section of the immersed chain portion composed of a plurality of links in a substantially horizontal plane for a substantial distance while simultaneously imparting a back and forth rocking movement to said horizontally arranged submerged section in the direction of movement of the chain, and subjecting successive sections of horizontally arranged chain links to a back and forth rocking movement as the chain is moved through said bath.

3. In the manufacture of a chain consisting of interlocked links, the method which includes the steps of continuously guiding said chain into a bath of a coating composition consisting of finely divided zinc suspended in an aqueous sodium silicate solution, maintaining a section of the immersed chain portion composed of a plurality of links in a substantially horizontal plane for a substantial distance while simultaneously imparting a back and forth rocking movement to said horizontally arranged submerged section in the direction of movement of the chain, and subjecting successive sections of horizontally arranged chain links to a back and forth rocking movement as the chain is moved through said bath.

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