June 11, 1968 J. J. FARRELL 3,387,585

APPARATUS FOR METERING A COATED CARRIER

Filed March 21, 1967 2 Sheets-Sheet 1

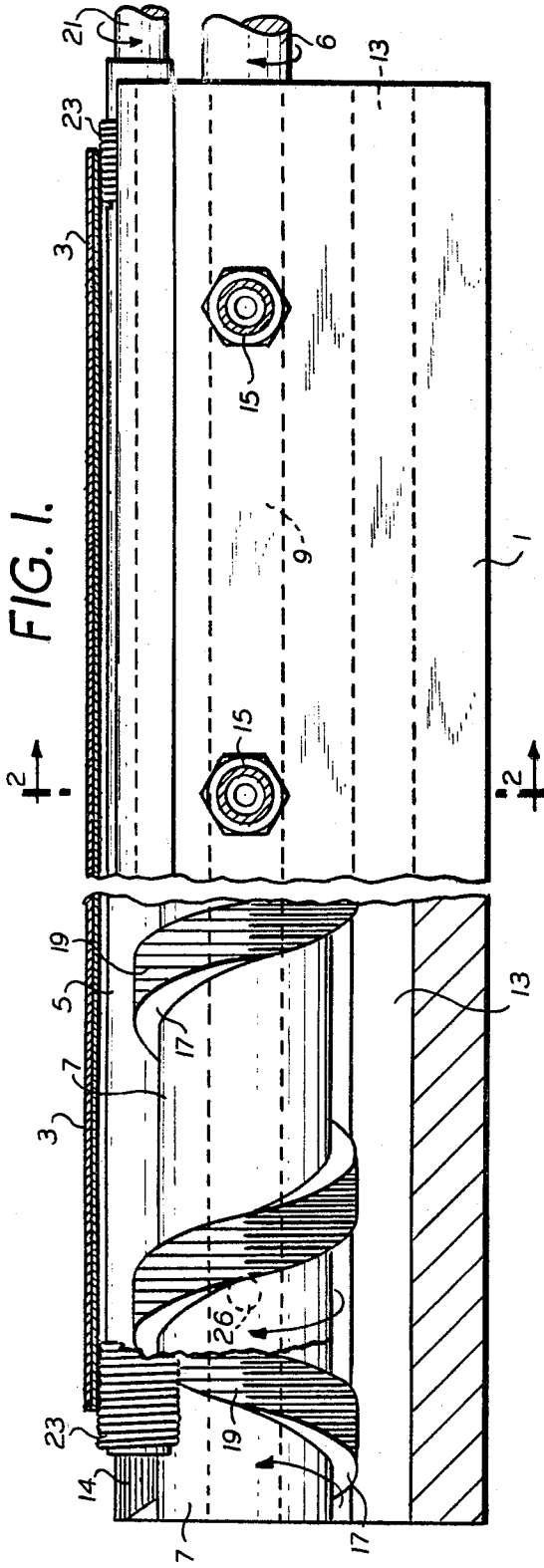


FIG. 1.

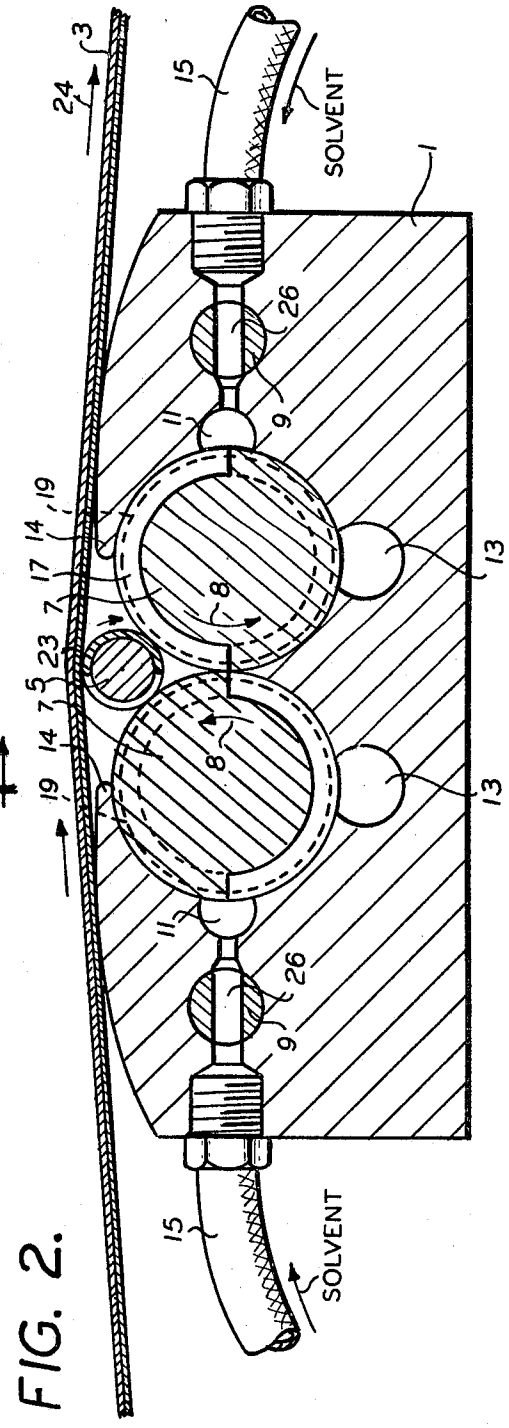


FIG. 2.

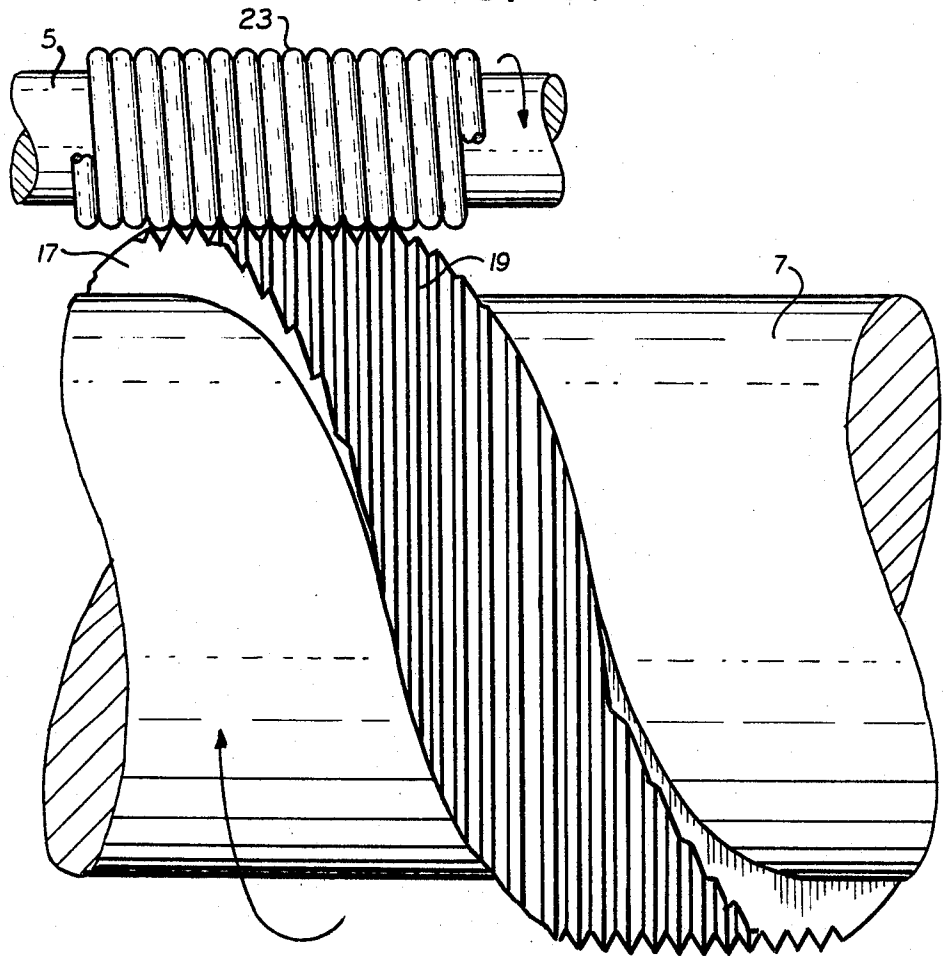
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APPARATUS FOR METERING A COATED CARRIER

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FIG. 3.



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APPARATUS FOR METERING A COATED CARRIER

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ABSTRACT OF THE DISCLOSURE

This specification discloses apparatus for metering the coating applied to a web. A round rod wrapped with a helix of wire contacts with the coating on the web and picks up excess coating. In order to make this metering apparatus suitable for organic solvent based coating (which tends to clog metering apparatus) as well as for aqueous based coating, the helical wire wrapping is continuously cleaned by contact with convolutions of helical fins on shafts that have threads, on the circumference of their helical fins, of the same pitch as the helical wire wrapping. The helical fins dip into solvent that cleans them continuously as they rotate.

BRIEF DESCRIPTION OF THE INVENTION

Apparatus for metering a coated carrier

This invention relates to a metering apparatus useful in continuous and uniform removal of excess coating from a coated carrier.

The term "metering," as known in the art, relates to treating an already coated web or carrier in such a fashion that a predetermined constant thickness is imparted to said carrier by removing any coating thereon in excess of a desired thickness.

More particularly, the invention relates to an apparatus whereby aqueous based coating, as well as organic solvent based coatings, may be uniformly and continuously metered.

So far, the art is well versed with apparatus for metering aqueous based coatings. However, to my knowledge and up to the present, no simple metering apparatus is known whereby organic solvent based coatings may be continuously, uniformly, and practically metered.

A well-known inconvenience encountered by the art when other than aqueous coatings are being metered is clogging of the operable wiping and/or scraping means. This is due, principally, to accumulation on said means of wiped excessive coating removed from the carrier. Said clogging reflects on the accuracy and performance of the metering operation because the above-mentioned means become impeded from uninterruptedly and continuously metering the moving coated carrier, unless, by a cumbersome and costly cleaning operation, the accumulation is removed from the apparatus.

Accordingly, a principal object of the invention is to provide a metering apparatus capable of treating aqueous and organic solvent based coatings.

A further object of the invention is to provide a metering apparatus whereby a coated carrier may be continuously metered without undesired interruptions to clean the apparatus and remove accumulated coating excess.

A still further object of the invention is to provide an apparatus of simple and economical nature intended to reduce operational expenses involved in metering coated carriers.

The invention further resides in certain novel features of the construction and in the combination and arrangement of parts of the apparatus in which the invention is embodied. Further objects and advantages of the invention will be apparent to those skilled in the art to which

the invention pertains from the following description of the preferred embodiment thereof with reference to the accompanying drawings in which:

FIG. 1 is a side elevation partially in section of the metering apparatus.

FIG. 2 is a vertical transverse sectional view taken along lines 2—2 of FIG. 1.

FIG. 3 is an enlarged fragment of a helical shaft and the wiping wire wound rod.

In the drawings, similar numbers refer to similar parts throughout the several views.

Through FIGS. 1–3 of the drawings, there is shown by general reference numeral **1** an elongated block having cylindrical channels **2** substantially extending along its length. The upper face portion of said block is open, defining an elongated aperture substantially extending along said block length, and ending in respective right and left hand prongs **14**.

Each elongated block side is sloped in a downward plane toward each side as shown by numerals **12**. Each one of said channels **2** is intended to accommodate and rotatably retain therewithin a helical shaft shown by reference numerals **7**, each one of said helical shafts having identical diameter and length dimensions and extending substantially along the length of the block. Shaft **6** of each helical shaft projects out of the block and is driven by means not shown. Only shaft projection **6** of one of shafts **7** is shown in FIG. 1.

Separately actioned driving means are provided to rotate said helical shafts in the direction shown by arrows **8** in FIG. 2 in a counter-clockwise direction.

Each one of said shafts **7** is freely rotatable independently of the other within said channels, and their proximity should not be misinterpreted as a situation of frictional engagement.

Numeral **17** refers to a spiral threaded rib projecting from the periphery of each one of shafts **7**. Said ribs define a number of substantially equidistant flights extending from one shaft end to the other. Numeral **19** designates a threading on the surface of said rib **17**, said threading being in normal angular orientation with respect to the longitudinal axis of the shaft.

Numeral **5** shows an elongated rod extending substantially the length of, and rotatably mounted in, said block **1**. The shaft **21** of rod **5** projects as shown in FIG. 1 and is driven by means not shown. Rod **5**, as shown in the drawings, is placed intermediate and in frictional engagement with said helical shaft **7**, the vertical plane of rod **5** being at right angles with the horizontal plane of the axes of helical shafts **7**. Numeral **23** refers to a wire helically wound around the periphery of said rod **5**, the windings optionally extending along the entire length of rod **5**, or, alternatively, extending only over selected portions of rod **5**.

An important feature of the invention is that said wire **23** must be of such a gauge that each wire turn will coincide and snugly fit into the valley defined between the crests of threads **19**. The wire windings **23** are rotatable in the direction indicated by arrow **10** (FIG. 2), and the interstices between adjacent windings are frictionally and slidably engaged by said threaded portions **19** of helical ribs **17** of helical shafts **7**.

Said wire wound rod **5** is operatively provided with driving means which are independent of the above-mentioned helical shaft driving means.

It should be particularly noted that rod **5** and helical shafts **7** are being rotated in the direction shown in the drawings, particularly in FIG. 2, in an identical number of revolutions per minute. However, because of the fact that said helical shafts have larger diameters than rod **5**, their respective surfaces will on rotation frictionally engage wire windings **23** on rod **5** at a higher speed than

that of the moving surface of the wire wound rod. In this way, a strong frictional and sliding contact is obtained between said helical shafts and the wire wound rod even though no axial thrust will be imparted to rod 5.

Numeral 3 shows a coated web or carrier moving over block 1 in the direction indicated by arrows 24 in contact engagement with the windings on rod 5. The spiral wire windings on rod 5 when contacting coated web 3, moving in the shown direction, wipe off and remove from said carrier, due to said frictional contact, a determined amount of surplus coating which will adhere to the wire surface. This wiping and removing operation is constant and uniform while said wire winding on the rod is kept unclogged and deprived of coating removed from the carrier.

The operation of maintaining said wire windings within the above-described efficient operative conditions is performed by said helical shafts 7 which, as previously described, when frictionally and slidably meshing by means of threads 19 on ribs 17, scrape from the wire windings such coating as has been removed from the carrier. Subsequent to said operation, the scraped material will fall on said helical shafts between pitch openings of said flights 17 where, due to the rotatable movement of said helical shafts, the ribs will displace said excess material toward coating discharge means which will be later described.

Numeral 13 shows elongated cylindrical channels on body 1 situated under shafts 7. These channels receive excess coating scraped off from rod 5 by the above-described excess coating removal action. Accordingly, channels 13 perform an excess coating discharge means for the helical shafts 7 which in turn act as scraping means; meanwhile, rod 5, with its wire winding 23, operates as coating wiping means acting on moving carrier 3.

Finally, the apparatus of the invention includes solvent means defined in and out the block intended to assist the discharge operation conducted by cylindrial channels 13 extending inside of the block. These means appear in FIG. 2 where numeral 15 shows solvent inlet pipes projecting into block 1 wherethrough a solvent solution is conducted forcedly to impinge on a side of helical shafts 7 in order to solubilize such coating as has been scraped off rod 5 and facilitate the discharge of said material through discharge channels 13. If desired, a screw conveyor can be located in channel 13 to pump same out.

Inlet pipes 15 lead through valves 9 to distribution manifolds shown by numeral 11 defining cylindrical channels extending longitudinally along the side of said helical shafts. The valves 9 define solvent flow controlling means and when opened allow the channels defined by distribution manifolds 11 to become filled with said solvent. Accordingly, when said rotatable valves 9 are closed, the flow of solvent into manifolds 11 is interrupted.

The dimensions of the apparatus here disclosed and the speed of operation of the various parts thereof, of course, may be determined, in part, by the type of material handled and, in part, by the rate of performance desired. These can be readily determined by those skilled in the art, as well as possible modifications and adaptations of the structures herein disclosed, without departing from the fundamental principles of the invention. Consequently, although a specific embodiment has been illustrated and described in detail, it is to be understood that the invention is not limited to those details except as may be required by the spirit and scope of the appended claims.

Having thus described the invention, what I claim is:

1. An apparatus for metering a coated moving carrier comprising helically grooved, rotatably mounted coat wiping means for contacting a carrier's coated surface to remove a portion of coating therefrom, helically grooved, rotatably mounted scraping means in frictional and meshing contact with said wiping means to remove coating material from said wiping means, means for driving said wiping means and said scraping means at the same number of revolutions per minute, and means to remove coating material from said scraping means and to discharge said last removed material outwardly of the apparatus.

2. An apparatus for metering a coated moving carrier comprising a block, rotatably mounted coat wiping means supported by said block to contact and to remove a portion of coating from said moving carrier, said wiping means including a roll with a helically grooved peripheral face, rotatably mounted scraping means supported by said block including a second roll with helical peripheral projections that engage the grooves in the first roll to remove coating material from said first roll, means to drive the rolls of said wiping and scraping means at the same number of revolutions per minute, said block defining a conduit opening adjacent said scraping means, means to introduce solvent through the conduit toward said scraping means, flow regulating means to regulate the flow of solvent material, and means cooperating with said scraping means to receive and discharge washed off material outwardly of the block.

3. The apparatus of claim 2 wherein the roll of said coat wiping means is a rod having a wire helix wound onto its surface and wherein the roll of said scraping means is a shaft having a helical projecting rib which defines threads.

4. The apparatus of claim 3 wherein said scraping means is of a larger diameter than said wiping means.

5. The apparatus of claim 2 wherein said block defines a manifold channel at the end of the conduit adjacent said scraping means.

6. The apparatus of claim 3 wherein said scraping means includes two rolls rotated in the same direction.

7. An apparatus for metering a coated carrier comprising a block having on one face downwardly sloping surfaces, two shafts rotatably mounted in the block, each shaft having a spiral rib projecting above its surface with the rib having a threaded outer surface, a rod having a wire spirally wound on its surface rotatably mounted in the block between the sloping surfaces and positioned between said shafts and in frictional and sliding mesh therewith, driving means for separately driving each one of said wire wound rod and shafts at the identical number of revolutions per minute, said shafts having a larger diameter than said wire wound rod, said block defining a number of solvent conduits each opening into a distribution manifold extending alongside of a shaft, a solvent flow controlling valve for each conduit, and said block defining a channel beneath each shaft for receiving and discharging material outwardly of the apparatus.

References Cited

UNITED STATES PATENTS

357,515	2/1887	Wood et al.	
598,206	2/1898	Nightengale.	
1,108,780	8/1914	Ogg	100—174 X
2,381,961	8/1945	Knowlton	118—262 X
2,530,407	11/1950	Smith.	
2,548,580	4/1951	Bick	118—262 X
2,599,947	6/1952	Sherman et al.	118—104
2,605,684	8/1952	Nagels et al.	118—262 X
2,731,916	1/1956	Koch	15—256.52 X
2,874,674	2/1959	Hornbostel	118—104
3,031,872	5/1962	Kusters.	
3,120,805	2/1964	Simon	15—256.54 X
3,179,083	4/1965	Warner	118—104
3,276,896	10/1966	Fisher	118—637 X

FOREIGN PATENTS

404,894	1/1934	Great Britain.
558,396	1/1944	Great Britain.

OTHER REFERENCES

Berberich, German application 1,161,188, printed Jan. 9, 1964 (Kl-D02d).

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