

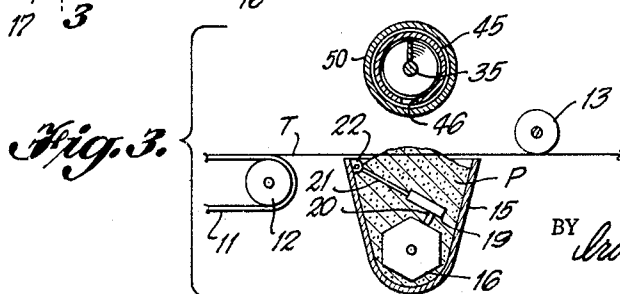
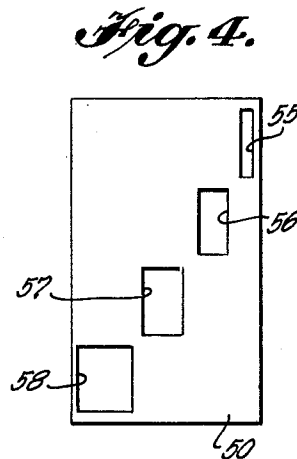
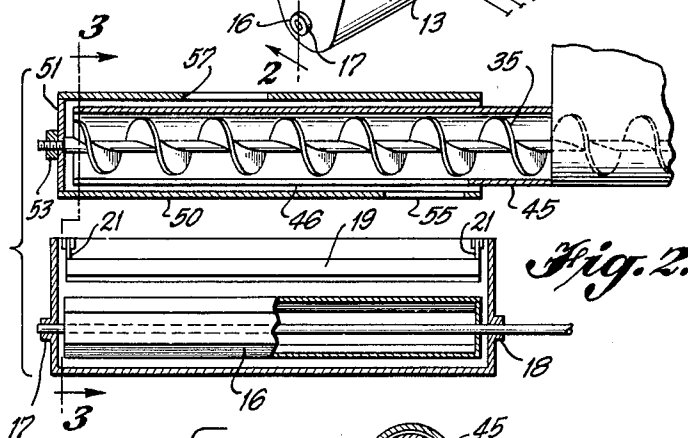
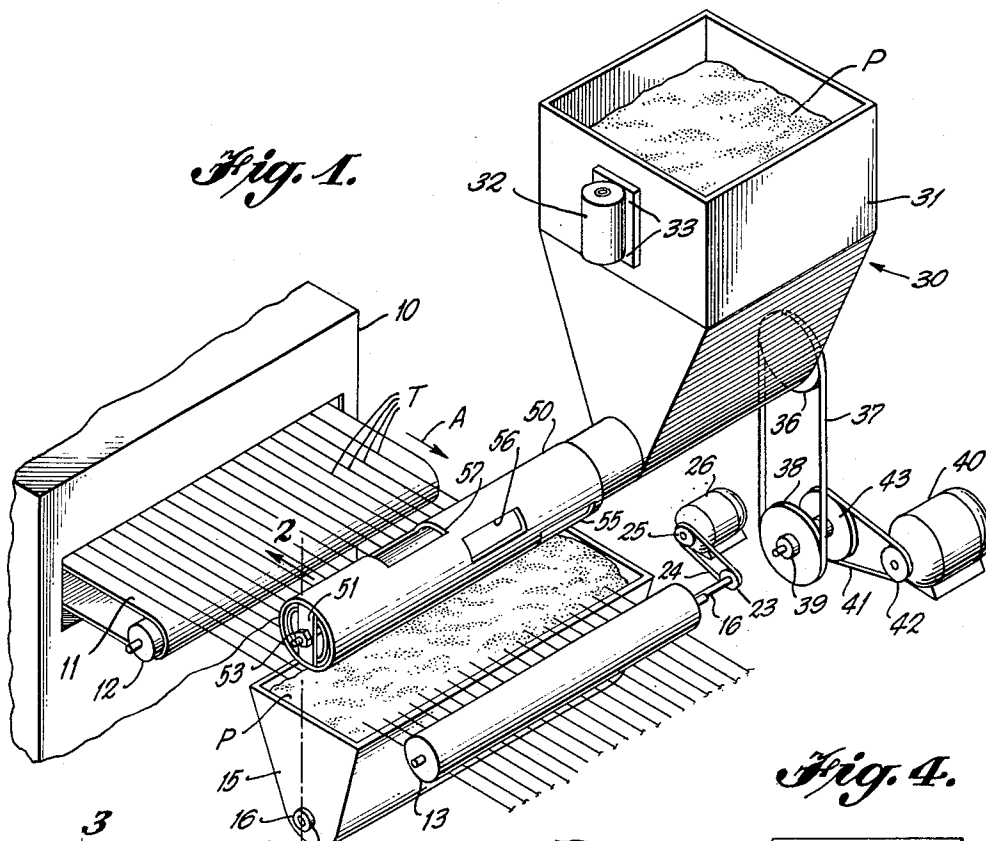
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K. E. WILHELM

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APPARATUS FOR DUSTING TACKY FILAMENTS WITH POWDER

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INVENTOR

*Kurt E. Wilhelm*

BY *Drons, Birch, Swindle, & McKie*  
ATTORNEYS

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## 3,147,144 APPARATUS FOR DUSTING TACKY FILAMENTS WITH POWDER

Kurt E. Wilhelm, Barrington, R.I., assignor to Rohm & Haas Company, Philadelphia, Pa., a corporation of Delaware

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This invention relates generally to the art of producing threads or filaments of latex, rubber and similar materials. More particularly, the invention is directed to apparatus for dusting tacky filaments of latex, rubber and similar materials with a dusting powder such as talc to reduce the tackiness and thereby facilitate subsequent handling of the threads or filaments.

As used herein, the term talc is meant to be embrative of any powdered dusting material capable of use to reduce surface tackiness and thereby facilitate the subsequent handling incidental to the manufacture of threads or filaments of latex, rubber and similar materials. Also, for convenience in describing the application of the apparatus to a particular area of use, the term latex will be used hereinafter in the specification and claims. However, it is intended that this term be only exemplary of an application of the apparatus and not limiting on the invention scope since the apparatus is useable generally in dust coating lengths of tacky latex, rubber and similar materials.

In various manufacturing operations employed in the production of lengths of filaments or threads of latex it is necessary to reduce the tackiness of the surface of the filaments so that they may be, for example, wound on reels or collected in suitable containers without the danger of their sticking together. This objective has been achieved by dust coating the filaments with talc. In these operations, the effective coating with a dusting powder is particularly important since, while the threads or filaments may not possess a great amount of tackiness, if the tackiness is not eliminated or minimized, the threads may stick together to such an extent that they cannot be readily separated when removed from the reel or container for subsequent use.

A particular application for the dusting apparatus of the instant invention may be mentioned in connection with the production of extruded latex thread. In such production as heretofore practiced, a plurality of threads or filaments are simultaneously extruded into a coagulating acid bath and thereafter drawn along parallel paths through a wash bath followed by passing the threads through a heated drying chamber. The plurality of threads are then passed through a vulcanizing chamber where the latex is finally cured to give the final finished thread product.

Rather than individually wind the threads onto a reel or collect them in containers as separate threads, the plurality of threads may be joined into a continuous ribbon, this being done by the threads being only slightly stuck together so that they can thereafter be readily separated from each other when desired. By using this approach, the plurality of threads joined into the ribbon may be conveniently collected in a container, shipped to a point of use and readily separated from the ribbon form into individual thread lengths.

Where a plurality of threads or filaments are to be joined into a ribbon to facilitate subsequent handling, it is of utmost importance that the extent of joining or sticking together of the threads be only sufficient to retain them in the ribbon form. Thus the tackiness of the thread surface existing as the threads leave the drying oven must be reduced to avoid their sticking together so firmly that attempted separation thereafter would result in the

threads being destroyed. To reduce this tackiness, the surface of the threads may be dusted with a powdered dusting material such as talc thereby leaving the threads with only enough tackiness to hold them together when brought together into a ribbon.

Where continuous lengths of threads are passed through a pile of talc to dust coat them, the continuous passage of the threads tends to produce channels or passages through the talc. In this respect, it may be noted that talc, by its finely powdered nature, has a tendency to arch or bridge against free flow into a void area formed in a pile of the material.

A further problem arises in connection with supplying powder to maintain a continuously uniform pile of powder through which the plurality of threads are to be passed in being dusted. The importance of maintaining a uniform pile of powdered dusting material will be appreciated when it is realized that should only one of the plurality of threads pass through a portion of the dusting apparatus where no talc pile is present, this thread will remain tacky and when joined with the other threads into a ribbon will stick to the adjacent threads with such force that the ribbon cannot be re-separated into individual threads. Thus, the entire ribbon may become useless for the particular manufacturing operation in which the threads from the ribbon are to be employed.

It is a primary object of the instant invention to provide improved apparatus for dusting tacky filaments or threads with a powdered dusting material to reduce the tackiness of the surface thereof.

A further object of the instant invention is to provide apparatus for dust coating filaments of latex, rubber and similar materials having a tacky surface wherein a generally uniform pile of dusting material is maintained through which the filaments or threads are passed in being dust coated.

It is also an object of the instant invention to provide apparatus for reducing the tackiness of filaments or threads of latex, rubber and similar materials wherein a plurality of threads are simultaneously dust coated by being drawn through an elongated pile of dusting material and wherein dusting material is supplied to the pile generally uniformly along its length to insure maintenance of the pile for effective continuous dusting of the plurality of threads.

It is also an object of the instant invention to provide apparatus embodying features for achieving the above object and wherein agitating means are provided beneath the pile to maintain it in a state of flow whereby the threads passing therethrough will be effectively dust coated.

The above and other more specific objects and novel features of the instant invention will be apparent from the following description taken in conjunction with the accompanying drawing. It is to be expressly understood, however, that the structure shown on the drawing is for the purpose of illustration only and is not intended to define limits of the invention but rather to merely illustrate a preferred embodiment and structure incorporating the features of the instant invention.

In the accompanying drawings forming a part of this specification and wherein like reference characters are employed to designate like parts throughout the several views:

FIGURE 1 is a perspective view showing somewhat diagrammatically the features of the dusting apparatus of the instant invention in relation to portions of machinery for producing a plurality of extruded latex threads.

FIGURE 2 is a sectional view taken on line 2-2 of FIGURE 1.

FIGURE 3 is a sectional view taken on line 3-3 of FIGURE 2.

FIGURE 4 is a developed view of the distributor sleeve associated with the feeding device for dusting material shown in FIGURES 1 through 3.

FIGURE 1 of the drawing illustrates the apparatus of the instant invention generally associated with portions of machinery employed in the production of extruded latex threads or filaments. As shown thereon, the threads T are moving in the direction of arrow A out of a heating chamber 10, the threads being supported on an endless belt 11. The belt 11 which may be of stainless sheet steel is trained around bend pulley 12 to carry the threads through the drying chamber 10. Merely by way of background, it may be pointed out that the threads, prior to entering drying chamber 10, are extruded into a coagulating acid bath and thereafter passed through a wash bath before being introduced into chamber 10 and carried there-through on belt 11. The structure preceding chamber 10 is not illustrated since it is conventional.

After leaving the belt 11, the threads T pass through the dusting apparatus of the instant invention and under roller 13 after which they may be more readily manipulated and handled since the tackiness of the thread surfaces will have been reduced by their passage through the dusting apparatus. The dusting apparatus includes a trough 15 which retains a quantity of powdered dusting material such as talc. This material is piled up in trough 15 as shown more clearly in FIGURES 1 and 3 so that the threads T in passing between belt 11 and roller 13 are guided in paths which cause the threads to be immersed in the powdered material P.

The trough 15 has a shaft 16 journaled at 17 and 18 in the end walls of the trough so as to be rotatably mounted to extend along the lower portion of the trough. The shaft 16 where it passes through trough 15 is provided with a polygonal exterior cross section, a hexagonal cross section being illustrated in FIGURES 2 and 3. An agitator member 19 extends longitudinally within the trough above shaft 16 and is provided with a rider element 20 which rests on the polygonal surface of shaft 16. Arms 21 extend from the ends of member 19 to the side wall of trough 15 and are connected to such wall at points 22 so that the member may be movable in an arcuate path which extends generally vertically within the trough 15. Shaft 16 carries a pulley 23 at one end which is driven by belt 24 connected to the pulley 25 on motor 26. This motor drives the shaft 16 to provide optimum agitation of the talc in trough 15.

It will be appreciated that upon rotation of shaft 16, the engagement of rider element 20 with the polygonal surface of such shaft will cause agitator member 19 to oscillate about points 22 and thereby promote agitation of the pile of powder P in the trough. By this action, the production of channels or passages through the pile of material P where the threads T pass will be avoided and as long as the quantity of material is sufficient, the threads will be effectively coated or dusted with the material by being immersed in the upper portion of the material pile.

As the threads T are continuously drawn through the pile of material P, the quantity of material will be reduced by the amount used in dust coating the threads. It is thus necessary that the pile be replenished to at all times insure that the threads will be immersed in the pile and thereby have the entire surface thereof effectively dust coated to reduce the tackiness.

A feeding mechanism 30 is mounted above the trough 15 to distribute powdered dusting material into the trough and maintain a fairly uniform height along the length of the pile of material P through which the threads T are drawn. This mechanism includes a hopper 31 which retains a supply of the dusting material P to be fed to the trough 15. The mounting structure to support the mechanism 30 relative to trough 15 is not illustrated on the drawing since any of a variety of appropriate supports may be employed to mount the elements in operative relationship to the threads to be dust coated.

As mentioned above, the powdered dusting material P such as talc, by reason of its finely powdered condition, has a tendency to arch or bridge when it is maintained in any substantial quantity as in a pile. Thus, where talc is withdrawn from the bottom of a hopper such as 31, the talc may arch or bridge over the withdrawal outlet forming a cavity which starves the device operating to withdraw material from the hopper. To offset this tendency, a vibrator 32 is mounted on the wall of hopper 31. This vibrator may be of any suitable commercially available form and is secured by bolts 33 to the side wall of the hopper. The vibrator 32 may be electrically driven to impart a vibrating or jarring action to the hopper 31, thereby jarring the material P to maintain it in a relatively freely flowable condition. Thus, as long as material remains in the hopper, it will be always available for withdrawal from the bottom of hopper 31. Should the bridging or arching of the material P in hopper 31 be particularly acute, a plurality of vibrators 32 may be provided, one mounted on each side wall of hopper 31.

To feed the material P from the hopper 31, there is provided a feed screw 35 which extends outwardly from the lower end of the hopper disposed to overlie the longitudinal dimension of trough 15. As shown most clearly in FIGURE 2, a portion of screw 35 is disposed in the lower end of hopper 31 such that, upon rotation of the screw, material will be picked up within the hopper and forced outwardly by the screw flights of the screw. The inner or rear end of screw 35 extends outside hopper 31 and has a pulley 36 mounted thereon which is driven by a belt 37 engaged with a pulley 38. The pulley 38 is mounted on a shaft 39. The shaft 39 and pulley 38 mounted thereon are suitably driven by motor 40, connected by a belt drive including belt 41, motor pulley 42, and pulley 43 secured to the end of shaft 39. Although not illustrated, it will be appreciated that suitable bearings for rotatably supporting shaft 39 will be provided in installation of the apparatus of the instant invention.

The driving connection between motor 40 and shaft 39, which in turn drives screw 35, will be such that upon operation of motor 40, the shaft 39 and screw 35 will rotate at a comparatively slow speed of only a few revolutions per minute. The slow rotation of screw 35 will gradually force material from the bottom of hopper 31 outwardly along screw 35 where it is distributed along the length of trough 15 as described hereinafter. Preferably motor 40 will be a variable speed direct current motor so that the speed of screw 35 can be adjusted to supply talc at a rate equal to the amount removed from trough 15 which amount will depend on the running speed of the thread T, the size of the threads, the number of threads and other factors.

A casing 45 extends outwardly from the lower end of hopper 31 and encloses the outwardly projecting end of screw 35. In the illustrated embodiment, the casing 45 is open at its outer end adjacent the outer end of screw 35 and is provided with a longitudinally extending slot 46 along the lower portion of the casing. Slot 46 provides an outlet for the material P which is supplied by hopper 31 and forced along casing 45 by the rotating movement of screw 35. Although in the illustrated embodiment a continuous longitudinal slot 46 is shown, it will be readily recognized that the slot 46 may be replaced by a series of spaced openings or other arrangement of outlet means such that the material being distributed may be discharged from a plurality of points along the length of casing 45 and thereby be distributed along the length of trough 15.

A distributor sleeve 50 is mounted concentrically of casing 45 to be rotatable relative to the casing. The sleeve 50 has a bar 51 extending diametrically across its outer end with the ends of the bar secured to the walls of sleeve 50. Bar 51 is apertured at its center and is engaged with the outer end of screw 35 which is threaded to receive a nut 53 by means of which the bar 51 and

sleeve 50 secured to such bar are fastened to rotate with the screw 35.

The sleeve 50 is provided with a series of dispensing apertures, four such apertures 55, 56, 57 and 58 being shown on the drawings. These dispensing apertures are spaced longitudinally along the length of distributor sleeve 50 in a generally spiral path. As shown more clearly in FIGURE 4, which is a developed view of the sleeve 50 illustrating the relationship of apertures 55, 56, 57 and 58 before the sheet metal material is formed into the sleeve, the apertures are of increasing width commencing with the aperture nearest the inner end of sleeve 50 and screw 35. Thus, when sleeve 50 rotates, the apertures 55, 56, 57 and 58 are moved in succession into communication with the outlet slot 46 in casing 45 with the apertures forming a valve means to dispense material from casing 45 through selected portions of the length of slot 46 as sleeve 50 rotates.

FIGURE 4 illustrates that the innermost aperture 55 on sleeve 50 is of relatively narrow width, whereas each of the apertures 56, 57 and 58 is of somewhat greater width. Thus, as the sleeve 50 is rotated, the inner end of slot 46 will be opened through aperture 55 for a relatively short period, whereas each of slots 56, 57 and 58 will open the portion of the slot 46 with which they respectively cooperate for a greater period of time.

This relationship of the apertures 55, 56, 57 and 58 assuming a constant supply of material along the length of slot 46 in casing 45, would result in a greater amount of material being distributed into trough 15 at the outer end of sleeve 50 than is distributed through trough 15 beneath the inner end of the sleeve. However, the slow rotative speed of screw 35 feeds only a limited amount of material from hopper 31 and the successively increased size of the apertures tends to offset the fact that a lesser amount of material is available for dispensing at the outer end of screw 35 than is present adjacent the inner portion of the screw that is disposed above the path of movement of aperture 55.

It may be noted that should the rate of material fed by screw 35 be such that all of the material moved from hopper 31 is not dispensed through slot 46 and the cooperating apertures 55, 56, 57 and 58, any excess material may pass outwardly through the open end of casing 45 and open end of sleeve 50 around the bar 51. Such excess material can be collected separate from trough 15 since it is not deemed desirable to accumulate an excessive amount of material at one point in the trough which condition could result should excess material passing from the outer end of the casing 45 drop into the trough.

Although as illustrated the sleeve 50 has been shown provided with a series of four apertures, it will be readily recognized that depending upon the operating characteristics desired a greater or lesser number of apertures may be provided. Also, in place of separate apertures, sleeve 50 could be constructed with a single longitudinally extending aperture. This single aperture might extend generally spirally along the length of sleeve 50. With such a single aperture and to achieve the results of the sleeve as illustrated, it would be preferable that the width of the spiral aperture increase gradually from the inner to the outer end of the sleeve, this relationship being desired to achieve generally uniform distribution of the material into trough 15 as it is supplied by rotation of screw 35.

From the above described structure, the operation and functioning of the apparatus of the instant invention will be readily apparent. With the threads T moving from heated chamber 10 on belt 11 in a tacky condition, these threads are guided by roller 13 to pass in parallel paths through the upper portion of the pile of material P in trough 15. As long as these threads are fully immersed in the material P and the material agitated by movement of agitating member 19, each of the threads will be effectively dust coated with the material so that they leave

the pile of material in an essentially non-tacky surface condition.

As the quantity of material in trough 15 is diminished by the dust coating of the parallel threads T continuously passing therethrough, additional material is distributed into the trough along the length thereof by operation of screw 35 and sleeve 50 rotating therewith. The driving of agitator 19 is effected by motor 26 while screw 35 is driven by energizing motor 40. Also, vibrator 32 will be energized to insure free flow of material P downwardly in hopper 31 to be picked up by the moving flights of screw 35.

As the material is forced outwardly along casing 45 by screw 35, the apertures 55, 56, 57 and 58 move in succession into communication with successive portions of longitudinal slot 46 in casing 45. Thereby a quantity of powdered dusting material will drop onto a pile of material in trough 15 with successive quantities being discharged onto the pile as the apertures cooperate in succession with slot 46. Ideally, the structure of screw 35 and its slow rotative speed will be such that the quantity of material moved outwardly through casing 45 will be just adequate to be dispensed through the apertures in sleeve 50 with no excess remaining to be discharged through the outer end of casing 45. As noted above, the increasing width of the successive apertures 55, 56, 57 and 58 will compensate for the decreasing amount of material moved through casing 45 by rotation of screw 35.

It is to be understood that the form of this invention herewith shown and described is to be taken as a preferred example of the same, and that various changes in shape, size and arrangement of parts may be resorted to without departing from the spirit of the invention or the scope of the hereinafter set forth claims.

I claim:

1. Apparatus for applying powdered dusting material such as talc to reduce the tackiness of filaments of latex and similar materials comprising a trough for retaining a pile of powdered dusting material through which the filaments to be dusted are passed, means for agitating the material pile within said trough, a feed screw rotatably mounted to overlie the longitudinal dimension of said trough, a casing enclosing said screw and having outlet means disposed along the lower portion of said casing providing for flow of material from said casing as moved therealong by rotation of said screw, material supply means communicating with the inner end of said screw to supply powdered dusting material to said screw, means for driving said screw, a distributor sleeve encircling said casing, means for rotating said sleeve relative to said casing, said sleeve having dispensing aperture means disposed along the length of said sleeve to cooperate with the outlet means of said casing as said sleeve rotates relative to said casing.

2. Apparatus for applying powdered dusting material such as talc to reduce the tackiness of filaments of latex and similar materials comprising a trough for retaining a pile of powdered dusting material through which the filaments to be dusted are passed, means for agitating the material pile within said trough, a feed screw rotatably mounted to overlie the longitudinal dimension of said trough, a casing enclosing said screw and having outlet means disposed along the lower portion of said casing providing for flow of material from said casing as moved therealong by rotation of said screw, material supply means communicating with the inner end of said screw to supply powdered dusting material to said screw, means for driving said screw, a distributor sleeve encircling said casing, means for rotating said sleeve relative to said casing, said sleeve having dispensing aperture means disposed along the length of said sleeve to cooperate with the outlet means of said casing as said sleeve rotates relative to said casing, said dispensing aperture means having increasing circumferential width from the segment adjacent

said inner end of the screw to the segment adjacent the outer end of said screw.

3. Apparatus as recited in claim 2 wherein said means for rotating said sleeve comprises a connecting means between the outer ends of said sleeve and said screw.

4. Apparatus for applying powdered dusting material such as talc to reduce the tackiness of filaments of latex and similar materials comprising a trough for retaining a pile of powdered dusting material through which the filaments to be dusted are passed, means for agitating the material pile within said trough, a feed screw rotatably mounted to overlie the longitudinal dimension of said trough, material supply means communicating with the inner end of said screw to supply powdered dusting material to said screw, a casing enclosing said screw and having a slot extending longitudinally along the lower portion thereof, means for driving said screw, a distributor sleeve encircling said casing and connected to be driven by said screw, said sleeve having dispensing aperture means disposed along the length of said sleeve and arranged relative to said sleeve to provide cooperation of successive segments of said aperture means with said slot in said casing as said sleeve rotates relative to said casing.

5. Apparatus as recited in claim 4 wherein said dispensing aperture means comprises a series of apertures spaced longitudinally along the length of said sleeve in a generally spiral path with the circumferential width of said apertures increasing between the aperture adjacent said inner end of the screw and the aperture adjacent the outer end of said screw.

6. Apparatus for applying powdered dusting material such as talc to reduce the tackiness of filaments of latex and similar materials comprising a trough for retaining a pile of powdered dusting material through which the filaments to be dusted are passed, means for agitating the material pile within said trough, a hopper to retain a supply of dusting material to be fed to said trough in replenishing material as used in dusting the filaments, vibratory means mounted on said hopper to maintain said material in a flowable state, a casing communicating at its inner end with the lower interior portion of said hopper and extending outwardly therefrom to overlie the longitudinal dimension of said trough, said casing having a slot extending longitudinally along the lower portion thereof, a rotatably mounted feed screw within said casing rotatable to move material from said hopper along said casing to be discharged through said slot, means for driving said screw, a distributor sleeve encircling said casing and connected to be driven by said screw, said sleeve having a series of apertures therein cooperable with the slot in said casing to dispense dusting material into said trough as it is moved through said casing by rotation of said screw, said apertures being spaced longitudinally along the length of said sleeve in a generally spiral path so that the apertures move in succession in communication with said slot upon rotation of said sleeve relative to said casing, and said apertures being of decreasing circumferential width commencing with the aperture adjacent the outer end of said screw.

7. Apparatus for applying powdered dusting material such as talc to reduce the tackiness of filaments of latex and similar materials comprising a trough adapted to retain a piled quantity of dusting material to provide a portion of the pile through which the filaments to be dusted are passed, means within said trough for agitating the dusting material therein to promote complete dusting of the filaments passing through the pile, a hopper to retain a supply of dusting material to be fed to said trough in replenishing material as used in dusting the filaments, a feed screw extending outwardly from the lower end of said hopper above the length of said trough, a casing enclosing said screw, said casing having a slot extending longitudinally along the lower portion thereof, a distributor sleeve mounted concentrically of said casing and connected to said screw to rotate therewith, said sleeve having a series

of apertures therein cooperable with the slot in said casing to dispense dusting material into said trough as it is moved through said casing by rotation of said screw, said apertures being spaced longitudinally along the length of said sleeve in a generally spiral path so that the apertures move in succession into communication with said slot upon rotation of said sleeve relative to said casing, said apertures being of decreasing circumferential width commencing with the aperture adjacent the outer end of said screw, and means for driving said screw and said shaft to distribute dusting material along the length of said trough and agitate the material for complete dusting of filaments continuously passing through the material.

8. Apparatus for applying powdered dusting material such as talc to reduce the tackiness of filaments of latex and similar materials comprising a trough adapted to retain a piled quantity of dusting material to provide a portion of the pile through which the filaments to be dusted are passed, a shaft journaled to lie along the lower portion of said trough, said shaft having a polygonal external cross-section, an agitator member mounted on said trough to be movable in a generally vertical path, means carried by said member engaged with said shaft to oscillate said member through said path upon rotation of said shaft and thereby agitate the pile of dusting material within said trough, a hopper to retain a supply of dusting material to be fed to said trough in replenishing material as used in dusting the filaments, a feed screw extending outwardly from the lower end of said hopper above the length of said trough, a casing enclosing said screw, said casing having a slot extending longitudinally along the lower portion thereof, a distributor sleeve mounted concentrically of said casing and connected to said screw to rotate therewith, said sleeve having a series of apertures therein cooperable with the slot in said casing to dispense dusting material into said trough as it is moved through said casing by rotation of said screw, said apertures being spaced longitudinally along the length of said sleeve in a generally spiral path so that the apertures move in succession into communication with said slot upon rotation of said sleeve relative to said casing, said apertures being of decreasing circumferential width commencing with the aperture adjacent the outer end of said screw, and means for driving said screw and said shaft to distribute dusting material along the length of said trough and agitate the material for complete dusting of filaments continuously passing through the material.

9. Apparatus for distributing particulate material along an elongated path comprising hopper means for retaining a supply of the material to be distributed, a casing communicating at its inner end with the lower interior portion of said hopper means and extending outwardly therefrom to overlie the elongated path along which the material is to be distributed, said casing having outlet means disposed along the lower portion thereof, a rotatably mounted feed screw within said casing rotatable to move material from said hopper means along said casing to be discharged through said outlet means, means for driving said screw, a distributor sleeve encircling said casing, means for rotating said sleeve relative to said casing, said sleeve having dispensing aperture means disposed along the length of said sleeve to cooperate with the outlet means of said casing as said sleeve rotates relative to said casing.

10. Apparatus as recited in claim 9 wherein said means for rotating said sleeve comprises a connecting means between the outer ends of said sleeve and said screw.

11. Apparatus for distributing particulate material along an elongated path comprising hopper means for retaining a supply of the material to be distributed, a casing communicating at its inner end with the lower interior portion of said hopper means and extending outwardly therefrom to overlie the elongated path along which the material is to be distributed, said casing having outlet means disposed along the lower portion thereof, a ro-

tatably mounted feed screw within said casing rotatable to move material from said hopper means along said casing to be discharged through said outlet means, means for driving said screw, a distributor sleeve encircling said casing, means for rotating said sleeve relative to said casing, said sleeve having dispensing aperture means disposed along the length of said sleeve to cooperate with the outlet means of said casing as said sleeve rotates relative to said casing, said dispensing aperture means having increasing circumferential width from the segment adjacent said inner end of the screw to the segment adjacent the outer end of said screw.

12. Apparatus for distributing particulate material along an elongated path comprising hopper means for retaining a supply of the material to be distributed, a casing communicating at its inner end with the lower interior portion of said hopper means and extending outwardly therefrom to overlie the elongated path along which the material is to be distributed, said casing having a slot extending longitudinally along the lower portion thereof, a rotatably mounted feed screw within said casing rotatable to move material from said hopper means along said casing to be discharged through said slot, means

for driving said screw, a distributor sleeve encircling said casing and connected to be driven by said screw, said sleeve having dispensing aperture means disposed along the length of said sleeve and arranged relative to said sleeve to provide cooperation of successive segments of said aperture means with said slot in said casing as said sleeve rotates relative to said casing.

13. Apparatus as recited in claim 12 wherein said dispensing aperture means has increasing circumferential width between the segment adjacent said inner end of the casing and the segment adjacent the outer end of said casing.

14. Apparatus as recited in claim 13 wherein said dispensing aperture means comprises a series of apertures spaced longitudinally along the length of said sleeve in a generally spiral path.

#### References Cited in the file of this patent

##### UNITED STATES PATENTS

|           |                   |               |
|-----------|-------------------|---------------|
| 1,957,270 | Keen et al. ----- | May 1, 1934   |
| 2,515,455 | Lipton -----      | July 18, 1950 |
| 2,630,906 | Philipp -----     | Mar. 10, 1953 |