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COATING AND STRIPPING DEVICE
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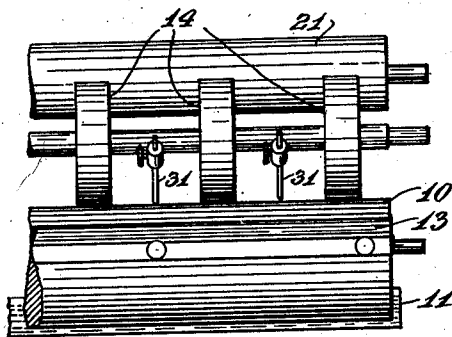
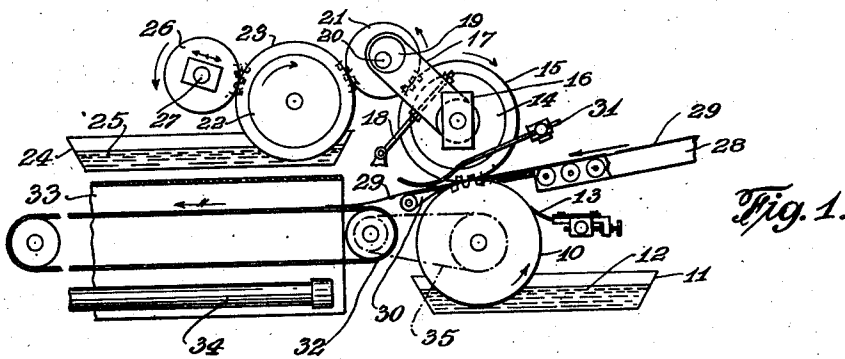
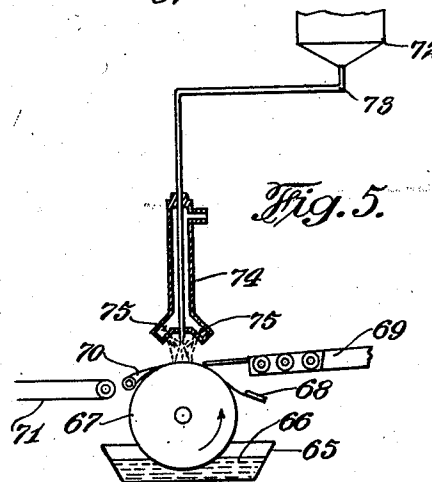
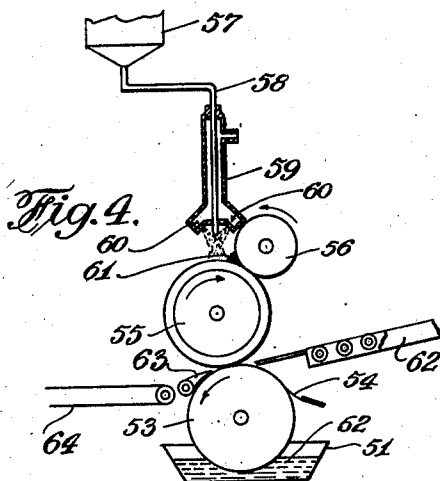
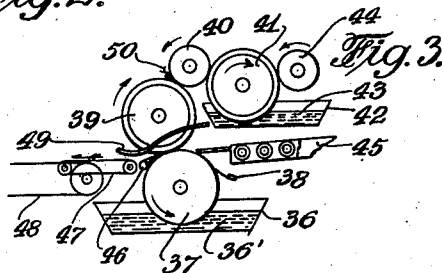


Fig. 2.



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COATING AND STRIPPING DEVICE

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10 Claims. (Cl. 91-18)

This invention relates to coating and stripping devices similar to those shown and described in my co-pending application, Serial No. 735,556, filed July 17th, 1934, for Coating and stripping, and of which the present case is a continuation in part.

The objects of this invention are to provide a machine whereby sheet work in general, and particularly sheet work which does not possess an inherent body stiffness, may be coated without the employment of grippers for propelling the work while the coating is applied thereto.

Another object of this invention is to provide a machine for coating individual, relatively pliable, soft, thin sheets in which the coating operation takes place simultaneously with the propelling operation of the work, and in which the work is stripped in respect to the coating means at the moment the coating is being applied, all without the use of grippers.

Another object of this invention is to provide within such coating device suitably operable work-supporting and work-propelling means, whereby the work is caused to temporarily adhere to, or to be retained by, or to be held and forced against a movable supporting surface, while being coated, for the purpose of stripping and conveying the work during the coating operation without the employment of grippers.

Still another object of this invention is to provide in a coating device, and in connection with a movable work-supporting and work-propelling means suitable stripping devices for separating the coated work from such work-supporting and propelling means, immediately after the application of a coating to the work.

Another object of this invention is to so construct and arrange the coating device as to render it applicable for providing a coating to pliable, relatively soft and thin sheets in either the form of strips or upon the entire face or upon parts of its face, at any desired arrangement, and in which the various coating styles may be achieved by only an insignificant re-setting of the different parts constituting the device.

A still further object of this invention is to provide in connection with the movable work-attracting, work support means for precisely controlling the traction-producing medium within which the work support operates.

Another object of this invention is to provide various kinds of coating supplying means and applying means whereby the work is caused to be forced against the movable work support, thereby assuring the adherence of the work against

such work support during the coating operation. A still further object of this invention is to provide in conjunction with a coating device of this kind, guard means extending into the working range of the movable work support and the coating applying means cooperating therewith for preventing inadvertent deviation of the coated work from its intended path.

The foregoing and a number of other important objects and advantages of the present invention will become more fully apparent from the following description and the accompanying drawing, the latter illustrating the principles and most important features of the present device in a purely diagrammatical form, and which drawing is to serve for explanatory purposes only, and therefore are not intended to limit my invention in any way to the actual showing, and in which

Fig. 1 is a diagrammatical side elevation of one form of my device, showing the essential parts thereof in one form of their arrangement;

Fig. 2 is a partial front elevation of my device, in which the feeder portion is left off and in which the rear parts are not illustrated;

Fig. 3 is a diagrammatical side elevation of a similar arrangement to that shown in Fig. 1, with some of its parts disposed in a somewhat different order from that seen in Fig. 1;

Fig. 4 is a side elevation of a modified form of my device, shown diagrammatically, in which the coating applying means differ in construction from those shown in Figs. 1 and 3; and

Fig. 5 is a side elevation of still another modification in which the coating applying means takes the form of a spray under pressure.

Referring now specifically to the Figures 1 and 2, numeral 10 denotes a work support in the form of a roller, which is preferably provided with a hard, highly polished surface, such as chromium, but which may be provided with minute suction cups, if so desired. This work supporting roller operates within a well or dish 11, partially filled with a quickly evaporative adhesive 12, such as varnish, glue, or any similar form of tack-producing substance. The amount of the adhesive medium elevated and applied over the surface of the work supporting roller 10 is governed by minutely adjustable doctor blade 13, which is flexible and which bears against the entire length of the outer surface of roller 10.

It will be observed that the blade presses against the surface and is not turned with its edge against the direction of rotation of roller 10, but on the contrary, glides, so to speak, in

the direction of rotation of the roller. Work supporting roller 10 is mounted in a fixed bearing within the frame of the machine.

Above working roller 10, there is disclosed a coating applying roller 14, which cooperates with roller 10, and which is provided at its applying surface with a resilient covering 15, preferably of rubber or the like. This coating applying roller is lodged within an adjustable bearing 16, held in connecting arm 17, which latter is adjustable by means of an adjusting screw 18. At the upper end of adjustable arm 17, there is provided an eccentric 19, within which is lodged at 20 a transfer roller 21.

Roller 21 cooperates with roller 14, and also with pick-up roller 22, which is preferably equipped with a resilient working surface 23. Roller 22 operates within a tank 24, filled with coating 25, which is to be applied to the work. In cooperation with roller 22, there is a doctor roller 26, adjustably lodged at 27. All of the rollers 10, 14, 21, 22, and 26 are geared with one another, so that their operation is positive.

It will be observed that roller 10 is offset relative to roller 14, and that feeder 28 is so inclined as to deliver a sheet 29 between the two rollers at practically right angles to the center line passing through the bearings of these rollers. At the right-hand side of work-supporting roller 10, there will be seen strippers 30, in the form of a plurality of sharp fingers, which lightly rest against roller 10, and which are intended to separate work sheet 29 from roller 10.

Above roller 10, there is provided a finger-shaped guard 31, extending into the range of operation of rollers 10 and 14, and is intended to prevent any accidental back flap of sheet 29, after it has passed between rollers 10 and 14.

Adjacent to roller 10, at the left hand side, there is seen a belt conveyor 32, operating within a cover 33, which latter is intended to prevent the dissipation of heat emanating from heater 34. Conveyor 32 is directly driven from work supporting roller 10, as indicated at 35.

The purpose of roller 10 operating in adhesive medium 12 is to provide the surface of the work supporting roller with a tacky film, controlled by blade 13, which film, when very thin, rapidly evaporates and increases its tackiness, whereby the undersurface of the work is caused to adhere to the surface of roller 10. In this manner, the work is propelled by roller 10, while a coating is applied to the upper surface of the work by roller 14.

The moment the work passes the contacting point between rollers 10 and 14, the tackiness of the surface of roller 10 strips the work from a possible adherence to roller 14, thus enabling the work being propelled towards conveyor 32. Immediately after having passed the stripping-off point between rollers, the work is mechanically stripped from the work supporting roller 10 by means of stripper fingers 30. Guard 31 is intended to prevent any possible crumpling or folding up of the work passing towards conveyor 32.

It is to be borne in mind that my device is primarily intended to handle sheets of work having no inherent body firmness, as compared with cardboard, tin, fibre, or any other relatively stiff material which does not require being stripped in the manner described above. Material having body stiffness requires no gripping means, and coating and stripping of such material is

therefore relatively simple and well known in the art.

However, work in the form of sheets of pliable, soft material will naturally adhere to the applying roller 14 upon being coated, and therefore requires being pried away from the coating roller, which function is accomplished by the employment of the movable support, which attracts the lower surface of the work while propelling it, and without marring or coating that lower surface.

These results are obtained by the employment of a tack-producing material, which, upon being caused to form a thin, uniform surface, readily gives up its volatiles and becomes a relatively dry adhesive, which will not transfer to the work, but will remain upon the surface of roller 10.

A similar device for coating and simultaneously stripping work in the above described manner is shown in Fig. 3, in which again a vessel 36 is illustrated containing a tack-producing medium 36', and in which is rotatably mounted a work-supporting and propelling roller 37. The thickness of the coating is again controlled by a flexible blade 38. Above roller 37, there will be seen the coating applying roller 39, which is offset in relation to roller 37. Above roller 39, is placed transfer roller 40, which also contacts with supply roller 41, operating within vessel 42, filled with coating material 43. The amount of coating supplied by roller 41 is governed by doctor roller 44.

In front of work-supporting roller 37 is again seen a feeder 45, which delivers sheets between rollers 37 and 39. At the left of roller 37 is again provided a series of stripper fingers 46, and adjacent to these fingers is an intermediate conveyor 47, cooperating with conveyor 48, the latter corresponding to conveyor 32 of Fig. 1. It will be also observed that above the strippers and between a series of rollers 39, there is provided again a guard 49, for preventing the sheet from flapping over or crumpling after it was stripped from rollers 37 and 39.

The difference between the construction shown in Fig. 3 and that illustrated in Fig. 1, is that in Fig. 3 the coating material elevated by roller 41 is transferred to roller 40, and is brought over to applying roller 39 in a just opposite relation to that shown in Fig. 1. Consequently, there is formed a puddle 50, between rollers 40 and 39, which puddle may be regulated as to its size by adjusting roller 40 against roller 39. This puddle is visible, and therefore may be readily controlled for the purpose of supplying just the proper amount of coating material upon roller 39, which is of rather serious importance. In Fig. 1 the puddle is not readily seen, although it is also formed, but due to its invisibility, its control is rather difficult.

A more simplified form of my coating device 60 is illustrated in Fig. 4, in which is again shown a vessel 51, provided with a tack-producing medium 52, in which operates a work-supporting roller 53, and with which cooperates a governing blade 54, which controls the thickness of the film of the tack-producing medium elevated by roller 53. In cooperation with the latter roller, there will be seen a coating applying roller 55; above which roller is shown a controlling or doctor roller 56. The coating material is delivered from closed vessel 57 through one or more pipes 58, which pipes terminate above roller or rollers 55.

The coating material is formed into a mist or spray by means of an air jacket 59, in which are provided suitable apertures, indicated at 60, from 75

which air, under pressure, bears against the flow of the coating material issuing from tip of pipe or pipes 58. Between rollers 55 and 56, there is again shown the formation of a puddle 61, for controlling the amount of coating to be applied upon the material.

To the right of rollers 53 and 55, there is seen the usual work feeder 62, while at the left is shown the usual series of stripper fingers 63 and the conveyor 64. In this figure, the guard, shown in Figs. 1 and 3, is omitted. However, it may be also provided in connection with this construction.

Referring now to Fig. 5, there is illustrated a vessel 65, which again is filled with a tack-producing medium 66, in which latter work supporting roller 67 operates. Blade 68 controls the thickness of the film of the tack-producing material elevated by roller 67. To the right of the roller there is a feeder 69, and at the left, there is seen stripper fingers 70 and conveyor 71. Immediately above roller 67, there is shown a device similar to that illustrated in Fig. 4, and consisting of a closed supply tank 72, filled with coating material, from which tank issues one or more pipes 73, which are surrounded at their delivery end with an air jacket 74, through which air pressure is directed by apertures 75, against the flow of coating material issuing from pipe 72.

It will be observed that in this modification, not only the spraying of the coating material is accomplished by the air pressure from jacket 74, but at the same time, the position of the jacket is so near the work-supporting roller 67, that the material to be coated is urged against the roller in lieu of an applying roller, such as illustrated in Fig. 4 at 55. In this modified form, the coating is entirely produced by spraying, and lends itself to providing coating upon the work either in the form of stripes, or over the entire sheet, or any part thereof, all depending upon the arrangement and the number of sprays provided above roller 67.

In all of the illustrations shown, the coating and stripping operation is intended for material in sheet form, which is relatively soft and pliable, and which does not possess inherent body firmness, and would ordinarily require the employment of grippers throughout the coating operation, and it is the principle of this invention to produce such coating and to strip the work by the employment of a movable support, which will attract the undersurface of the work sufficiently to provide not only traction for propelling the work during the coating operation, but which attraction will counteract the adhesive action of the coating material.

One of the important features of this invention also resides in the fact that such gripperless coating operation lends itself to an almost continuous procedure, that is to say, that while the device is intended to handle individual sheets, the handling is so rapid that the sheets may be fed in a continuous succession, either separated from each other but by little spaces, or practically abutting with one another, thereby simulating the coating of a continuous web, such as a gummed tape.

It is also to be borne in mind that either one of the devices illustrated may be employed for what is known as strip coating, that is, to provide one or any number of strips upon the surface of the work to be coated or may be employed for partial or full surface coating, as may be desired. For this purpose, the coating applying rollers are

exchangeable and adjustable relative to one another and relative to the work-supporting rollers.

In Fig. 2, there is illustrated a series of rollers for strip coating. Their distance may be altered and rollers of different widths may be employed. By the same token, a solid roller may be employed over the entire width of the work supporting roller, thereby providing coating over the entire surface of the work. The same principle applies to the illustration shown in Figs. 4 and 5.

Summarizing, all of the devices described and illustrated in the forms shown, or in any desired modified arrangement, are intended for gripperless coating and handling of work consisting of individual, relatively soft and pliable sheets, which do not possess sufficient body firmness to follow unaided throughout the coating operation, and which sheets are intended to be coated in continuous and close succession, so as to simulate the coating of a continuous web.

Furthermore, the operation of all of my devices shown depends upon a movable work support which not only supports, but propels the work during the coating operation, and which also provides for the stripping of the work from a coating applying roller, if such device is employed, such work-supporting roller being so designed as to temporarily attract the undersurface of the work successively at all points of the work, without coating or marring such undersurface, while coating is supplied to the opposite face of the work at the points where and while the work is being attracted by the work-supporting roller.

Obviously, the different structures shown in the drawing are capable of being modified when the work to be handled demands such modification, and I therefore reserve for myself the right to make changes and improvements in my invention as may become necessary, without departing from the broad scope thereof, as set forth in the annexed claims.

I claim:

1. In a gripperless coating device for handling work in the form of individual sheets of relatively soft, pliable material, possessing little or no inherent body firmness, and which sheets are to be coated in a continuous, close succession, so as to simulate the coating of a continuous web, movable work supporting and propelling means, provided with a work engaging, tacky surface film designed, while said means are in motion, to temporarily attract and release, successively, all points of one face of the work, lying between its two ends, without coating or marring that one work surface, and means in cooperation with said propelling means for simultaneously coating the opposite face of the thus attracted and propelled work, at the points of attraction.

2. In a gripperless coating device for handling work in the form of individual sheets of relatively soft, pliable material, possessing little or no inherent body firmness, and which sheets are to be coated in a continuous, close succession, so as to simulate the coating of a continuous web, movable work supporting and propelling means, having an adhesive, non-transferring film surface, and adapted, while in motion, to temporarily attract and release, successively, all points of one face of the work, coating applying means, in cooperation with said former means, adapted to force the work thereagainst and simultaneously apply a coating to the opposite face of the moving work, at substantially the points of attraction.

3. In a gripperless coating device for handling work in the form of individual sheets of relatively soft, pliable material, possessing little or no inherent body firmness, and which sheets are to be coated in a continuous, close succession, so as to simulate the coating of a continuous web, movable work supporting and propelling tacky, readily evaporative adhesive means, means in cooperation therewith for rendering its moving supporting surface work-attracting, thereby facilitating a temporary attraction and an immediately following release, successively, of all points of the entire undersurface of the work, coating applying means in cooperation with said movable work supporting means, constructed and arranged to force the work against the latter and to simultaneously coat its upper surface, while the undersurface of the work is thus temporarily attracted for the purpose of moving the work.

4. In a gripperless coating device for handling work in the form of individual sheets of relatively soft, pliable material, possessing little or no inherent body firmness, and which sheets are to be coated in a continuous, close succession, so as to simulate the coating of a continuous web, rotary work supporting means for supporting the undersurface of, and for propelling the work, said means operatively mounted in a tack-producing medium for rendering its work-supporting surface work-attracting, minutely adjustable, highly flexible medium control means cooperating with said rotary work supporting means, and coating applying means constructed and arranged to simultaneously force the work against said rotary means and to apply a coating to the upper surface of the work, while the latter is in motion, and substantially at the moment of attraction, and substantially opposite the area of the undersurface which becomes attracted.

5. In a gripperless coating device for handling work in the form of individual sheets of relatively soft, pliable material, possessing little or no inherent body firmness, and which sheets are to be coated in a continuous, close succession, so as to simulate the coating of a continuous web, a rotary work supporting and propelling element, a rotary coating applying element, in cooperation therewith, a tack-producing medium covering in a thin, controlled layer the supporting surface of said propelling element for rendering that surface work-attracting, control means for said medium in the form of a finely adjustable, highly resilient blade, in cooperation with said work propelling element, said coating element constructed and arranged to force the undersurface of the work against the propelling element and to simultaneously coat the upper surface of the work, while the work is in motion, substantially opposite to the attracted area of the undersurface and substantially during the period that area of the undersurface becomes attracted.

6. In a gripperless coating device for handling work in the form of individual sheets of relatively soft, pliable material, possessing little or no inherent body firmness, and which sheets are to be coated in a continuous, close succession, so as to simulate the coating of a continuous web, a rotary work supporting and propelling element, coating applying means in cooperation therewith and constructed and arranged to urge the work

against said element and to simultaneously apply a coating to the upper face of the work, and controlled, tack-producing means, adhering to, and designed to render the work-supporting surface of said element work-attracting, for the purpose of operatively engaging the undersurface of the work, thus facilitating the propulsion of the work, at the moment its upper face receives a coating from said applying means, and resilient, finely adjustable control means for said tack-producing means, in cooperation with said rotary propelling element.

7. In a gripperless coating device for handling work in the form of individual sheets of relatively soft, pliable material, possessing little or no inherent body firmness, and which sheets are to be coated in a continuous, close succession, so as to simulate the coating of a continuous web, a rotary work supporting and propelling element operatively mounted in a controlled, tack-producing medium, adapted to render its work-engaging surface work-attracting, for the purpose of propelling the work by way of attracting its undersurface, resilient, finely adjustable means for controlling the thickness of said medium carried by said propelling element, in cooperation with the latter, and coating applying means distanced from, but in cooperation with said element, constructed and arranged to force the undersurface of the work against the latter, and to simultaneously apply a coating upon the free, upper surface of the work, at substantially the moment when, and over substantially the area where the undersurface of the work becomes attracted.

8. In a gripperless coating device for handling work in the form of individual sheets of relatively soft, pliable material, possessing little or no inherent body firmness, and which sheets are to be coated in a continuous, close succession, so as to simulate the coating of a continuous web, a vessel containing a tack-producing medium, a rotary work-supporting and work-propelling cylinder, operating in said medium, finely adjustable, highly resilient means in cooperation with said cylinder, for controlling the thickness of said medium elevated by, and retained upon the surface of said cylinder, for the purpose of rendering its work-supporting surface work-attracting, thereby facilitating the propulsion of the work, when the cylinder is in motion, air-pressure operated coating applying means disposed above, but distanced from said cylinder, and constructed and arranged to force the undersurface of the work against the work-supporting, tacky surface of the moving cylinder, while simultaneously applying a coating upon the upper surface of the work, at substantially the moment the undersurface of the work becomes attracted.

9. In a gripperless coating device, as set forth in claim 1, and finger-shaped means in cooperation with and within the range of operation of said work supporting and propelling means, for preventing the coated work from deviating from its intended course of progress.

10. In a gripperless coating device of claim 1, a finger-shaped work guard in cooperation with and disposed above said work supporting and propelling means for preventing a back flap or crumpling of the coated work.

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