Oct. 31, 1933. J. W. FAULKNER 1,932,727

COATING MACHINE

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Fig. 1.

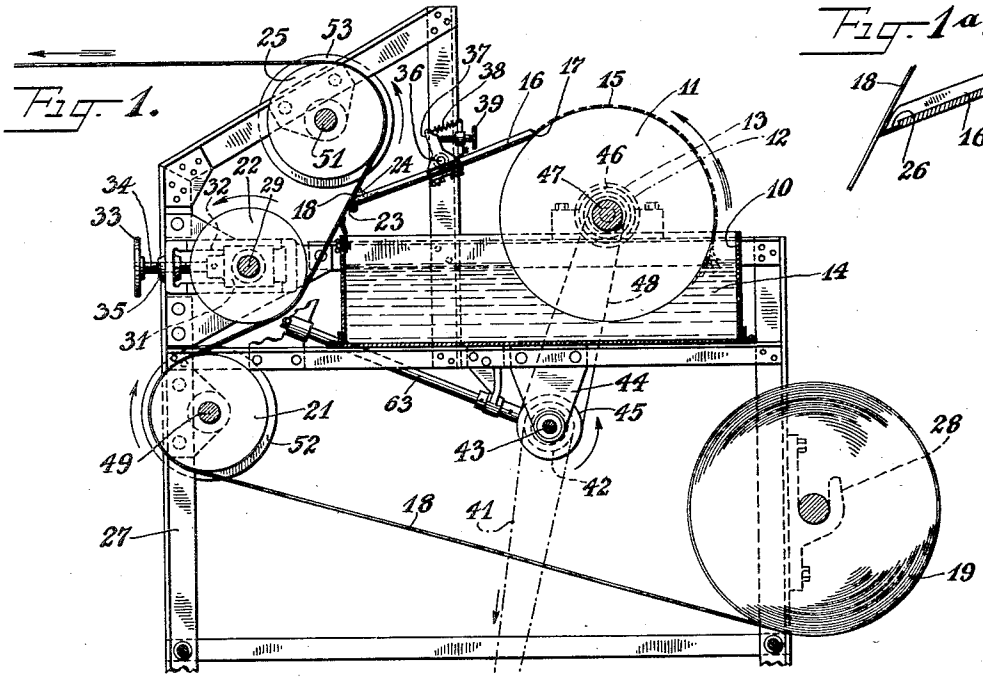


Fig. 1a.

Fig. 2.

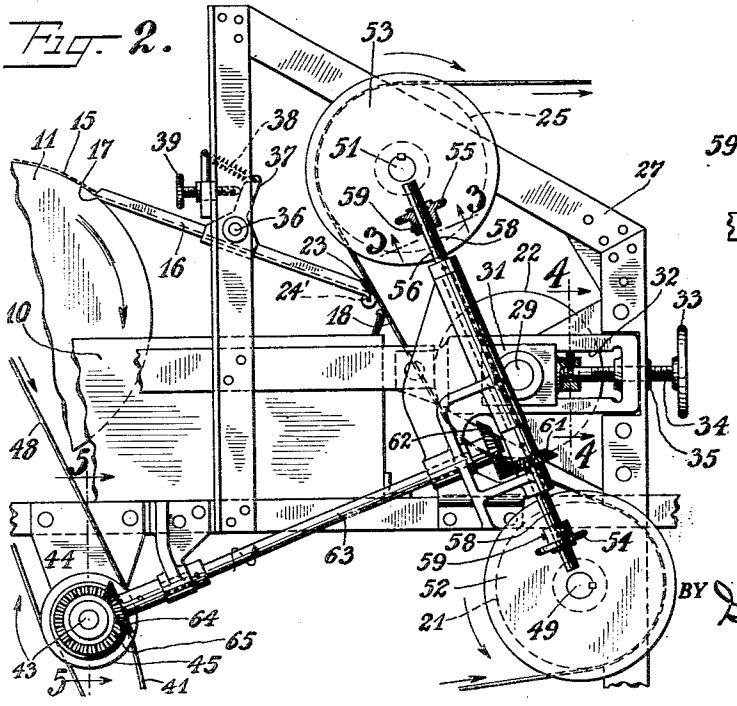


Fig. 3.

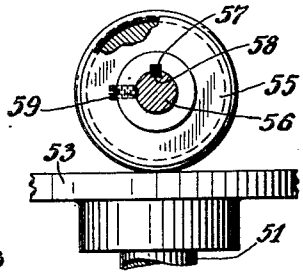
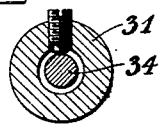


Fig. 4.



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Fig. 5.

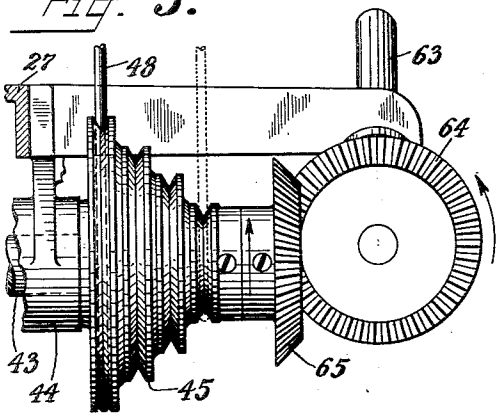


Fig. 6.

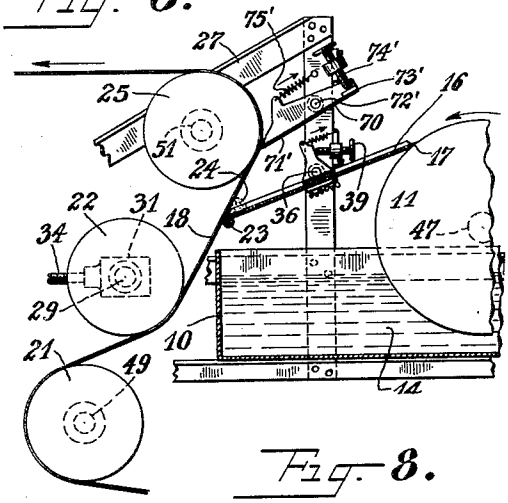


Fig. 7.

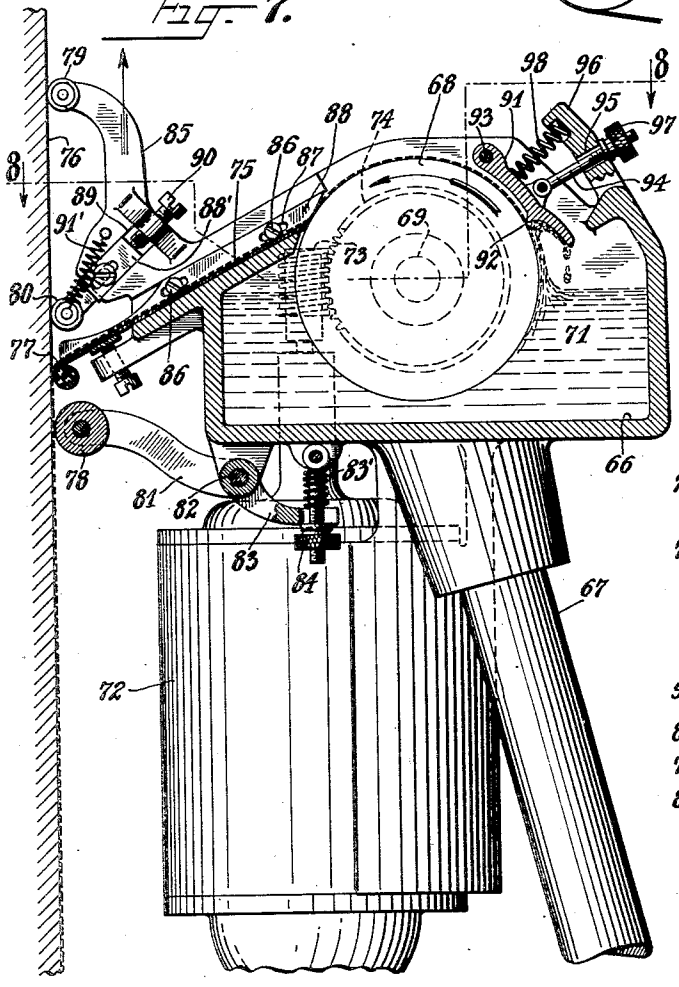
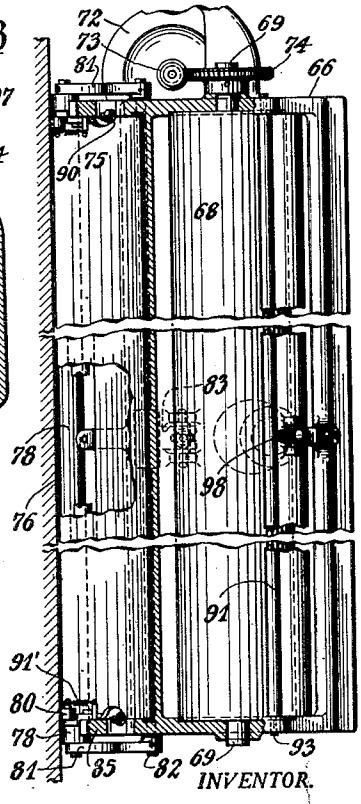


Fig. 8.



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UNITED STATES PATENT OFFICE

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COATING MACHINE

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Application May 31, 1929. Serial No. 367,591

2 Claims. (Cl. 91—43)

This invention relates to machines for coating surfaces and relates more particularly to a machine for coating indefinite lengths of sheet material.

When applying a coating substance to a surface it is often necessary to use coating liquid such as quick or slow drying or non-drying substances which are difficult to deposit except by a spraying operation which method is not only relatively slow but wasteful. When attempting to apply a liquid layer by applying the surface to be coated to a film of coating liquid carried about a feed roller the contacting relation between the film on the roller and the surface to be coated results in the creation of a vacuum which when broken, as the surface moves, leaves waves or ridges caused by the sucking action making it impossible to attain a smooth uniform deposit.

It is an object of the present invention, therefore, to avoid the above disadvantage and provide a machine wherein a smooth even layer of a coating liquid may be applied to surfaces in an economic and expeditious manner.

Another object of the invention is to provide a machine for applying a coating to a surface in the absence of a vacuum between the applying means and the surface being coated.

Another object of the invention is to provide a machine wherein a wall of coating liquid may be applied to a surface.

Another object of the invention is to provide a machine capable of cooperating with the material to be coated so as to avoid the application of a non-uniform layer to the surface of the material.

Other objects and advantages of the invention will be more readily understood by reference to the following description together with the accompanying drawings in which

Fig. 1 is a side elevational view of a machine embodying the present invention.

Fig. 1*a* is a fragmentary view of a modified form of guide.

Fig. 2 is an enlarged detail view showing driving mechanism viewed from the opposite side of Fig. 1.

Fig. 3 is a view taken on line 3—3 in Fig. 2.

Fig. 4 is a view taken on line 4—4 in Fig. 2.

Fig. 5 is a detail view of a cone variable for a feed roller.

Fig. 6 is a detail view of a modification of the invention showing a tension element.

Fig. 7 is a side elevational view of the present invention constructed for use as a portable device, and

Fig. 8 is a view taken on line 8—8 in Fig. 7.

Briefly the present invention may comprise a container having a supply of liquid coating material therein. A cylinder or roller is partly immersed in the liquid and rotated at a given speed. A guide in the form of a plate is provided with a knife edge which edge is disposed in tangential contact with the unsubmerged surface of the roller over which a film of liquid is carried. The guide is inclined downwardly and the knife edge thereof causes liquid to pass from the roller and flow down the guide. The material to be coated is disposed contiguous to the lower edge of the guide and the angle or corner between the guide end and the material constitutes a pocket which retains a wall of or body of coating liquid.

The material to be coated may be moved upwardly, that is, in a direction substantially opposite to the direction of flow of the liquid down the guide. The edge of the guide may be flexible to accommodate variations in the surface to be coated and when the material is moved the coating liquid will be laid on the surface under nearly ideal conditions and in a manner very similar to the application of a liquid with a brush.

With the present construction a coating liquid may be applied to all character of bodies to either deposit a superficial surface layer or to impregnate the material. For example, laces, veilings, curtain screens, or the like may be coated or impregnated.

It is also obvious that although the present machine is shown for coating continuous lengths of material, it will also be found practical for coating short sections of flexible or hard bodies which may be of irregular shape.

With the present machine it is possible to not only apply quick or slow drying substances but substances such as paste, powder solutions, dyes, paints, enamels, varnish, lacquer, water, spirits, oil, grease, wax, gum in solution, rubber solutions or rubber in paste form, sizing material, or the machine may be used for finishes such as tar, asphaltum, stains, cleansing solutions, treating solutions or for processing surfaces such as cloth or any absorbing material or non-absorbing material as metal, or for oil cloth, linoleum floor coverings, woven wire or metal sheeting.

A practical embodiment of the present invention may include a container or trough 10 having a cylindrical roller 11 journaled in bearings 12 and 13 and partly submerged in a liquid coating material 14 in the container 10. The container may be continuously supplied by any suitable liquid supply leveling device, which maintains a constant amount of coating liquid in the container.

The roller 11 is rotated by means to be hereinafter described and when rotated a film 15 of liquid adheres to the surface of the roller and is carried therearound. An inclined guide

or conductor 16 in the form of a plate is disposed with a knife edge 17 in tangential relation to the surface of the roller 11. The direction of rotation of the roller 11 is toward the knife edge 17 so that as the roller revolves the liquid carried from the container flows down the guide and against material 18 to be coated.

The material 18 may be lead from a supply roll 19 over a driven roller 21, an adjustable idler roller 22 and in contacting or near contacting relation to a lower edge 23 of the guide 16. Thus the liquid flowing down the guide is stopped by the material 18 and a wall 24 of liquid is formed or built up against the material. The material in conjunction with the end of the guide provides a pocket 24' to hold the wall of liquid. Means to be later described may be operated to move the material causing it to travel past the wall 24 and receive a layer of coating substance and pass over a driven roller 25. The wall 24 is continuously replenished by the feed roller 11 and after the material is coated it may pass through a drying oven (not shown) and be gathered on a roll in the usual manner.

For the purpose of providing a more adequate supply of material at the lower end of the guide 16 a pocket 26 of greater capacity may be provided as shown in Fig. 1a. The end 23 of the guide 16 may be formed of a flexible material such as felt or rubber so that it may be held in tight relation to the moving material, the flexibility allowing for variation in the surface of the material being coated.

The present mechanism may be supported on a suitable framework 27 having bearings 28 to support the roll of material 19.

The roller 21 as well as the roller 25 are supported on shafts suitably journaled in bearings integral with the framework 27. The adjustable idler roller 22 is mounted on a shaft 29 journaled in blocks 31 slidable in guide 32 and a hand wheel 33 is provided at one end of a threaded rod 34 which is rotatable in a nut 35 so that a rotation of the hand wheel will operate to move the roller 22 toward or away from the material 18 and thus vary the tension thereon.

The guide 16 is mounted on a trunnion 36 and is provided with a lever arm 37 operating under the action of a spring 38 to hold end 17 against the roller 11. An adjustment screw 39 is provided so that the degree of contacting pressure between the end 17 of the guide and the roller 11 may be varied. An adjustment of screw 39 also operates to change the angle of the guide to govern the rate of flow of the liquid to the pocket 24'.

Means for driving the present mechanism may comprise a chain or belt 41 connected with any suitable source of power, as for example a motor (not shown). The belt 41 may engage a pulley 42 secured to a main driving shaft 43 journaled in bearings 44. The feed roller 11 is driven through the agency of a pair of cone sheaves 45 and 46. The sheave 46 being secured to shaft 47 which carries the feed roller 11. The sheave 45 is secured to the main driving shaft 43. Motion is translated from sheave 45 to sheave 46 through belt 48. By shifting the position of the belt 48 on the sheaves the rate of rotation of the feed roller 11 may be varied. This variable drive for the feed roller although shown as employing cone pulleys or sheaves may if desired be of the disk friction drive construction such as illustrated for driving rollers 21 and 25.

As more clearly shown in Fig. 2 the rollers 21 and 25 are keyed to shafts 49 and 51 respectively and are provided with friction disks 52 and 53 against which wheels 54 and 55 frictionally engage. The wheels 54 and 55 are adjustable on a shaft 56. Each of the wheels is provided with a slot 57 (see Fig. 3) to receive a feather 58 on the shaft 56. The wheels 54 and 55 may thus be moved to a given position for the required respective speeds of the rollers 21 and 25 and secured to the shaft by set screws 59. The shaft 56 is provided with a bevel gear 61 in mesh with a bevel gear 62 at one end of a counter shaft 63. The opposite end of the shaft 63 is provided with a bevel gear 64 in mesh with a bevel gear 65 on the main driving shaft 43.

From the above it will be evident that any desired ratio of speed may be obtained between the feed roller 11 and the rollers 21 and 25 so that the material 18 to be coated may be moved at a given rate of speed and material fed thereto by the feed roller in such manner that a deposit of the proper thickness will be applied in accordance with the character of coating material used.

As shown in Fig. 6 in addition to the guide or knife 16 an additional knife 70 may be employed. This knife or tension member may comprise a plate 71' pivoted at 72' having one end 73' held in contact with an adjustable stop 74' by means of a spring 75'. The member 70 serves to flatten or level the layer of coating liquid received from the end of the guide 16, or for controlling the thickness of the deposited coating material by removing such material as may be in excess of the thickness desired.

It has been found desirable to utilize the present coating apparatus as a portable device and as shown in Figs. 7 and 8 a container or tank 66 may constitute a supporting frame and may be provided with a handle or hand grip 67.

A feed roller 68 may be mounted on and rotatable with a shaft 69 journaled in bearings at opposite sides of the tank 66. The feed roller may be partly immersed in coating liquid 71 and may be rotated by means of a small motor 72 having a worm 73 in mesh with a worm wheel 74 secured to shaft 69. It is obvious that in place of an electric motor any other source of power may be employed, as for example, a pneumatically operated turbine.

A liquid guide 75 is provided for stripping material from the roller 68 and causing the liquid to flow toward the surface 76 to be coated.

When using the portable device the surface to be coated which may be a wall of a room, the device may be held by means of a handle 67 with a lower edge 77 of the guide against the wall. The device may then be moved downwardly and the liquid applied somewhat in the same manner as if applied with a brush.

For the purpose of steadying the device during use a lower guide roller 78 may be employed. A pair of upper guide rollers 79 and 80 may also be employed for movement over the applied coating. These latter rollers may be of soft rubber or the like and provided with surfaces adapted to give a stippled or grained effect to the applied coating. If desired, however, the said rollers 79 and 80 may be omitted. The lower guide roller is carried at one end of an arm 81 pivoted at 82. The opposite end 83 of the arm 81 en-

gages a spring 83' which tensionally maintains the said end 83 against an adjuster nut 84.

The guide rollers 79 and 80 are carried on an adjustable bracket 85 secured to the supporting structure by bolts 86 extending through slots 87 in a plate 88 integral with the bracket 85. The guide roller 80 is independently adjustable being carried on a slide plate 88' movable in a guide 89 and normally held against a stop screw 90 by a spring 91'.

The feed roller 68 may be provided with a stripper-member 91 having a knife edge 92 to vary the amount of material passing over the roller 68. The said member 91 may be pivoted on a shaft 93 and may be held in a given position by a pivoted extension rod 94 extending through an aperture 95 in a projection 96. An end of the rod 94 may be threaded and provided with thumb nut 97 so that the position of the member 91 may be varied to vary the amount of liquid passing over the roller 68. A spring 98 normally urges the member 91 toward the roller 68 while an adjustment of the nut 97 moves the member away from the roller, the member 91 is thus tensionally held in its operative position.

From the foregoing it will be evident that the present invention provides a machine for applying a smooth even layer of a coating liquid to a surface. Although the present embodiment of the invention illustrates the coating of a continuous sheet of material it is obvious that other uses may be found and although a preferred embodiment of the invention is shown in the present structure various modifications may be made without departing from the spirit and scope of the invention as set forth in the appended claims.

What is claimed is:

1. A coating machine comprising a feed roller for a coating liquid, means for removing liquid from said feed roller, means for supporting a sheet of material to be coated, said material operating in conjunction with said first mentioned means to retain a wall of liquid in contact with said material, means for moving said material while in contact with said wall of liquid upwardly away from and at an acute angle with respect to the surface of said liquid, and means for varying the amount of material delivered by said feed roller.

2. A coating machine comprising a liquid coating supply means including a feed roller, an open trough cooperating with said roller to remove liquid therefrom, means for feeding a sheet of material to be coated across the end of the trough remote from said roller, said material and trough end forming a dam in which the liquid collects to form a puddle, and means for directing the sheet of material at an acute angle with respect to the surface of said puddle.

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