

Nov. 12, 1957

R. E. J. NORDQUIST

2,812,846

CAN ROTATING DEVICE FOR CAN COATING MACHINES

Filed Dec. 10, 1954

3 Sheets-Sheet 1

Fig. 1

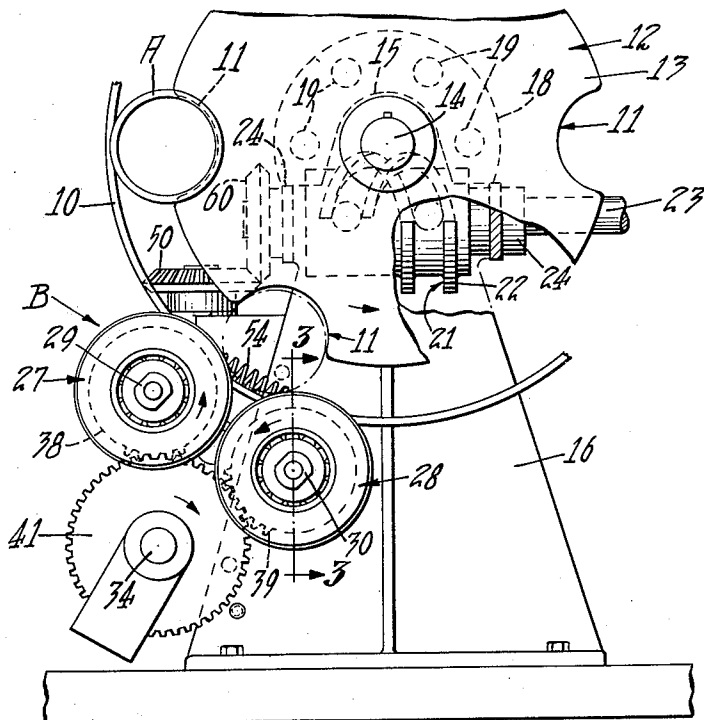
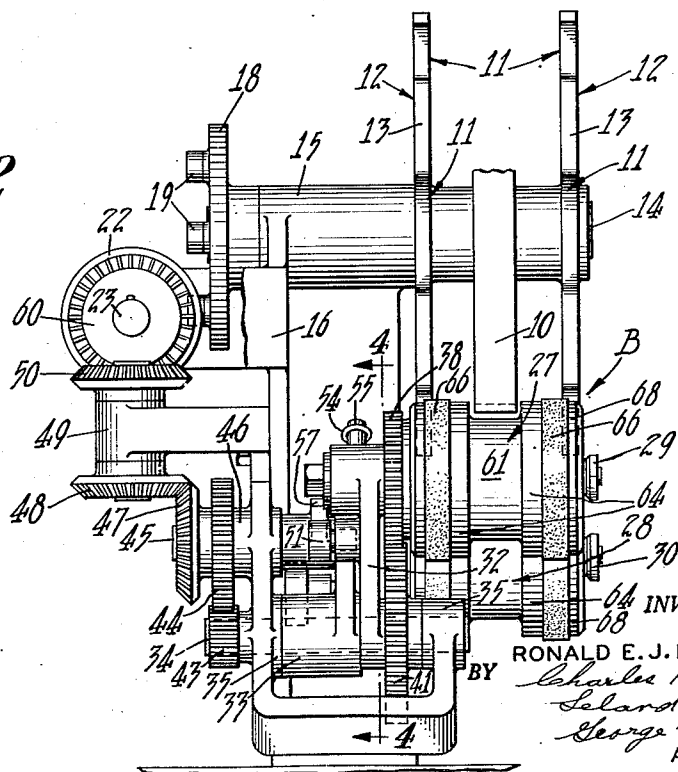


Fig. 2



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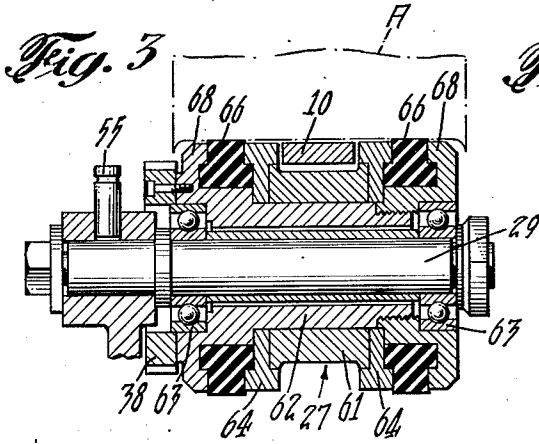
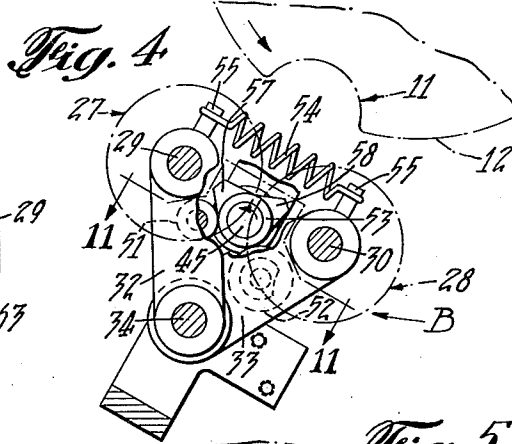
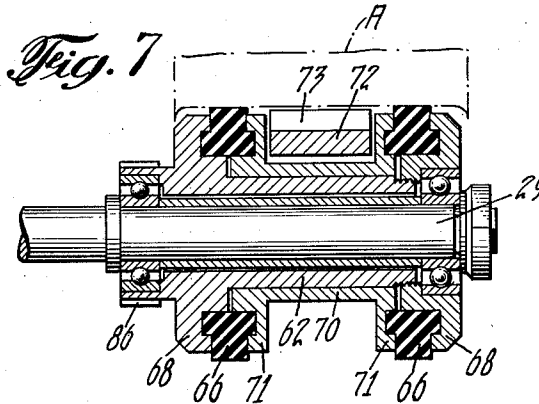
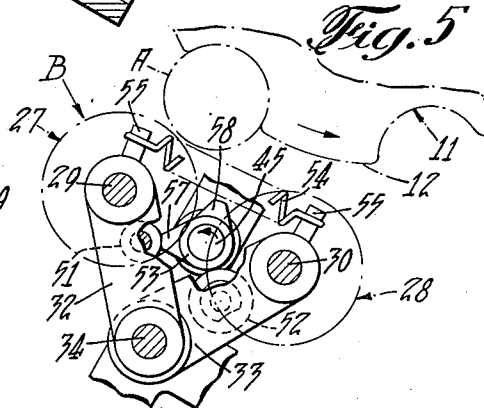
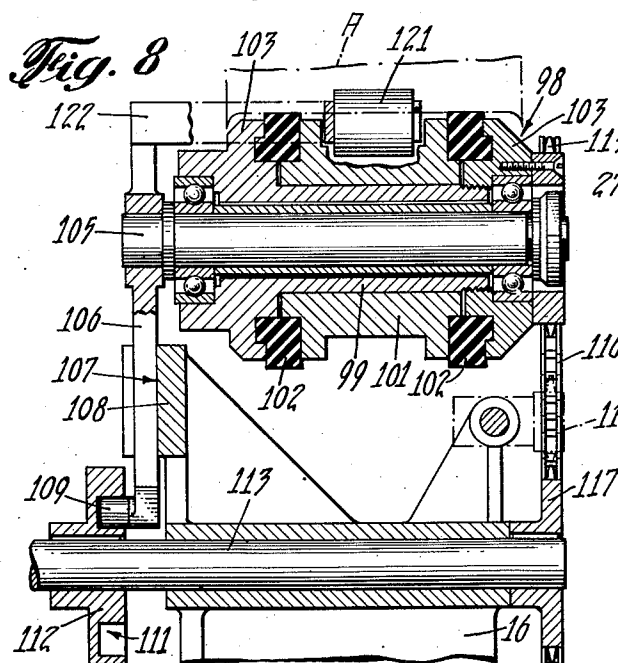
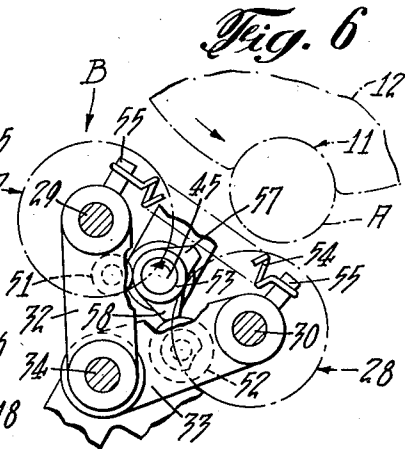
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CAN ROTATING DEVICE FOR CAN COATING MACHINES

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3 Sheets-Sheet 2



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CAN ROTATING DEVICE FOR CAN COATING MACHINES

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3 Sheets-Sheet 3

Fig. 9

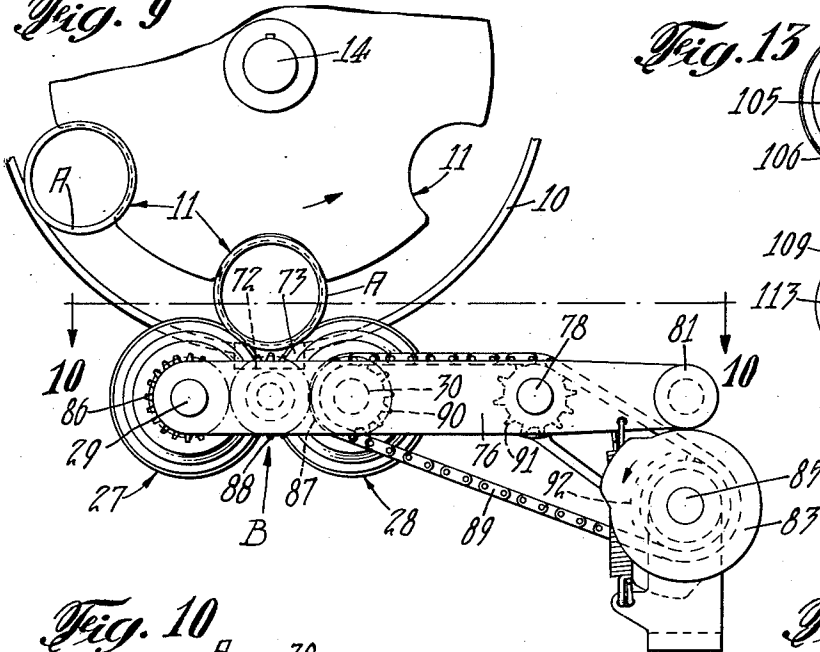


Fig. 13

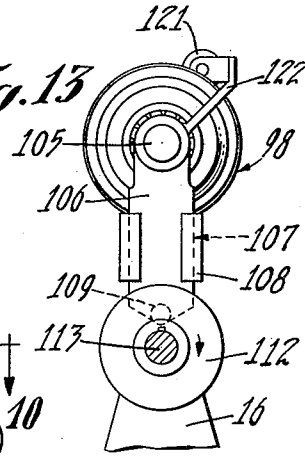


Fig. 10

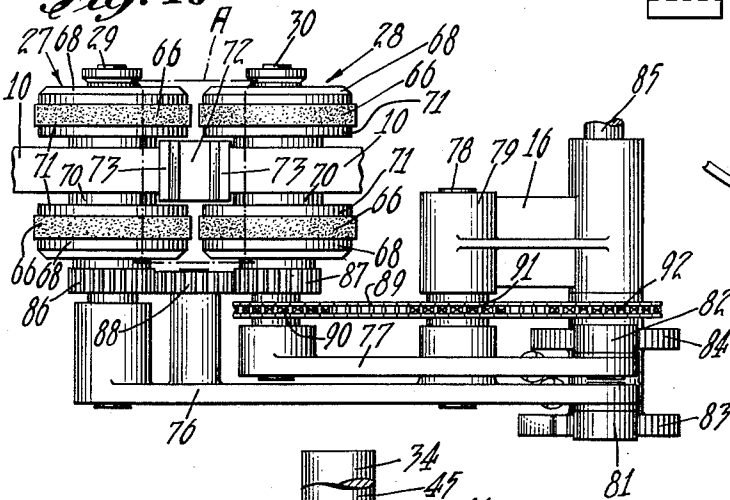


Fig. 12

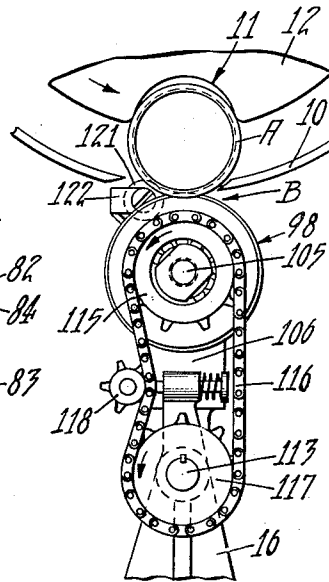
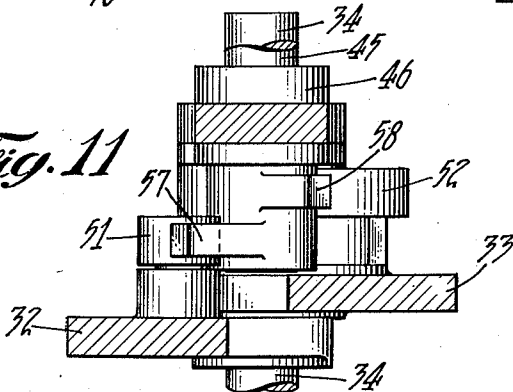


Fig. 11



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CAN ROTATING DEVICE FOR CAN COATING MACHINE

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Application December 10, 1954, Serial No. 474,497

10 Claims. (Cl. 198—33)

The present invention relates to coating machines in general and more specifically to machines for spraying the interior surfaces of open can or container bodies with a film of coating material and has particular reference to improved devices for freely rotating or spinning the bodies for the coating operation.

In can manufacture the interior spraying of can bodies is commonly effected in machines having rotating turrets provided with peripheral pockets in which the bodies are located for advancement through the machine and by which the bodies are positioned at the spraying station of the machine. At the spraying station the bodies are rotated in their pockets while the coating material is projected against the inner surfaces of the bodies. The contact of the bodies with the pocket wall creates a drag on the bodies which interferes with their proper rotation and sometimes mars the outer surface of the bodies, especially if the outer surfaces are lithographed or otherwise decorated.

The instant invention contemplates overcoming these difficulties.

It is an object, therefore, of the instant invention to provide in a can body spraying machine improved devices for rotating the bodies to be sprayed, wherein the bodies are partially withdrawn from their confining turret pockets at the spraying station to space the bodies from the pocket walls so that the bodies may be rotated free of the pockets, without creating any drag on the bodies or without marring their outer surfaces.

Another object is the provision of such can body rotating devices wherein the bodies may be readily located and supported at the spraying station free of their confining pockets for concentric rotation relative to a spray nozzle or other coating element.

Another object is the provision of such can body rotating devices wherein the rotating elements are shifted out of and into the path of travel of the advancing bodies in synchronism with the advancement of the bodies by their turret to provide for free entrance of the bodies into the spraying station and exit from the station without interference with the rotating devices.

Numerous other objects and advantages of the invention will be apparent as it is better understood from the following description, which, taken in connection with the accompanying drawings, discloses a preferred embodiment thereof.

Referring to the drawings:

Figure 1 is a front elevation of a coating machine embodying the instant invention, with parts broken away;

Fig. 2 is an end elevation of the machine as viewed from the left in Fig. 1, with parts broken away;

Fig. 3 is an enlarged sectional detail of a can spinning roller used in the machine, the view being taken substantially along the line 3—3 in Fig. 1;

Figs. 4, 5 and 6 are schematic views taken substantially along the line 4—4 in Fig. 2, and illustrating the can

2

spinning rollers in different positions as an incident to moving a can into and out of spinning position;

Fig. 7 is a view similar to Fig. 3 showing a modified form of roller;

Fig. 8 is a view similar to Fig. 3 showing a second modified form of roller;

Fig. 9 is a view similar to Fig. 1 showing a modified form of machine in which the modified roller shown in Fig. 7 is used, parts being broken away;

Fig. 10 is a top plan view as taken substantially along the line 10—10 in Fig. 9;

Fig. 11 is a sectional view taken substantially along the broken line 11—11 in Fig. 4, with parts broken away;

Fig. 12 is a fragmentary front elevation of a second modified form of the machine in which the second modified roller shown in Fig. 8 is used; and

Fig. 13 is a rear elevation of the parts shown in Fig. 12.

As a preferred or exemplary embodiment of the invention Figs. 1, 2, 3, 4, 5, 6 and 11 of the drawings disclose principal parts of a coating or spraying machine of the character disclosed in United States Patent 2,189,783 issued February 13, 1940 to F. Eberhart on a coating machine for spraying the interior surfaces of sheet metal can bodies A (Fig. 1) having one or both of its ends open.

In the machine, the can bodies A are received from any suitable source of supply, preferably rolling on their sides, and are fed into individual half round molds or pockets 11 (Figs. 1 and 2) of a vertically disposed intermittently rotatable turret 12 as disclosed in the above mentioned Eberhart Patent 2,189,783. The turret 12 advances the bodies A intermittently in spaced and timed order along a curved path of travel adjacent the outer periphery of the turret into and through a coating or spraying station B where the coating operation takes place while the located body is rotated on its own axis while the turret is at rest, and thence into a discharge station where the coated can bodies are discharged from the machine. A curved guide rail 10 disposed adjacent the outer periphery of the turret 12 retains the can bodies in their turret pockets 11 during this travel.

The coating of the can bodies while at the spraying station may be effected in any suitable manner such as by projecting a spray of the coating material into the rotating bodies as shown in the Eberhart patent above mentioned or as by moving a nozzle into and out of the rotating body at the spraying station as shown in United States Patent 2,103,270 issued December 28, 1937 to J. H. Murch on Can Spraying Machine.

The turret 12 (Figs. 1 and 2) having the peripherally spaced pockets 11 preferably comprises a pair of spaced and parallel discs 13 mounted on one end of a horizontal turret shaft 14 carried in a bearing 15 formed in a frame 16 which constitutes the main frame of the machine as shown in the Eberhart Patent 2,189,783. The shaft 14 and the turret 12 connected thereto are intermittently rotated through stepped or partial rotations by an indexing device which includes an indexing wheel 18 mounted on the shaft 14.

The indexing wheel 18 carries adjacent its outer periphery a plurality of equally spaced cam rollers 19, one for each turret pocket 11, arranged in a circle for successive engagement with a conventional interrupted cam groove 21 of a continuously rotating indexing cam 22 disposed adjacent the wheel 18. The indexing cam 22 is mounted on a drive shaft 23 journaled in bearings 24 formed in the machine frame 16. The drive shaft 23 may be driven in any suitable manner, preferably as shown in the Eberhart patent.

During each revolution of the indexing cam 22, the machine operates through one cycle of operation. In the first part of this cycle, the cam 22 rotates the turret

12 through one step or partial rotation, thus advancing all can bodies A in the turret pockets 11 one step along their curved path of travel and advancing one of the can bodies into the coating station B. During the remaining portion of the cycle, the turret 12 is held stationary to hold the one can body at the coating station. It is during this stationary period in the cycle of operation of the turret that the can body at the coating station is rotated on its axis and coated interiorly as mentioned heretofore.

Rotation of the can body A at the coating station B is effected by a pair of adjacently disposed spinning rollers 27, 28 located at the coating station, adjacent the outer periphery of the turret 12 and in the path of travel of the can body. The spinning rollers 27, 28 are rotatably mounted on respective horizontal shafts 29, 30 carried in the free outer ends of a pair of roller arms 32, 33 (Figs. 2, 4, 5, 6 and 11) both of which at their opposite ends are pivotally mounted on a common horizontal roller drive shaft 34 carried in bearings 35 formed in the machine frame 16.

The spinning rollers 27, 28 are rotated rapidly in unison and in a counterclockwise direction as viewed in Figs. 1, 4, 5 and 6 by spur gears 38, 39 which surround the respective roller shafts 29, 30 and are secured to the respective spinning rollers 27, 28 (see Fig. 3). These gears 38, 39 mesh with and are rotated by a common gear 41 mounted on the drive shaft 34. The drive shaft 34 may be driven in any suitable manner from any of the rotating parts of the machine. One manner of driving the shaft, as shown in the drawings is through a gear connection with the indexing cam shaft 23. For this purpose, the drive shaft 34 carries a gear 43 which meshes with a gear 44 carried on a shaft 45 journaled in a bearing 46 formed in the machine frame 16. The shaft 45 preferably is located between the roller arms 32, 33. One end of the shaft 45 carries a bevel gear 47 which meshes with and is rotated by a bevel gear 48 mounted on a short vertical shaft carried in a bearing 49 on the frame 16. The upper end of the shaft carries a bevel gear 50 which meshes with and is driven by a bevel gear 60 on the indexing cam shaft 23. The shaft 45 preferably makes one revolution for each revolution of the indexing cam shaft 23 for a purpose to be hereinafter explained. However the ratio between the gears 43, 44 and gears 38, 39, 41 preferably is such as to rotate the spinning rollers 27, 28 at a greatly increased speed.

The spinning rollers 27, 28 are arranged to be successively shifted out of and back into the path of travel of the can bodies A as a body advances into and moves out of the coating station B so that the rollers do not interfere with the travel of the can bodies. For this purpose, the roller arm 32 carries a cam roller 51 (Figs. 4, 5, 6 and 11) and the opposite arm 33 carries a cam roller 52, both of which engage against a cam hub 53 mounted on the other end of the shaft 45. A tension spring 54, stretched between and connected to pins 55 secured in the free ends of the roller arms 32, 33, yieldably draw the roller arms toward each other and keep the rollers 51, 52 in contact with the cam hub 53.

The cam hub 53 carries a radially projecting lug cam 57 which is engageable only with the cam roller 51 on arm 32 and also carries a similar radially projecting lug cam 58 which is engageable only with the cam roller 52 on arm 33. These lug cams 57, 58 are located relative to each other in such a manner that during a single rotation of the shaft 45, i. e. during one cycle of operation of the machine, the cam 57 engages and pushes outwardly the cam roller 51 on the roller arm 32 as shown in Fig. 5, and thus shifts the spinning roller 27 out of the path of travel of a can body as it approaches and enters the coating station B during a partial rotation of the turret 12. As the turret comes to rest to locate the can body at the coating station, the lug cam 57 rides off the cam roller 51 and permits the spring 54 to draw the arm 32 and the attached spinning roller 27 back into place to cooperate

with the spinning roller 28 in engaging and spinning the can body A, while the turret 12 remains at rest.

Following the spinning operation during which time the interior of the can body is coated, the turret 12 begins another partial rotation to move the coated body out of the coating station and to bring a new one into the station for coating. At the beginning of this partial rotation of the turret, the lug cam 58 engages and pushes outwardly the cam roller 52 on the roller arm 33 as shown in Fig. 6, and thus shifts the spinning roller 28 out of the path of travel of the can body, ahead of the advancing body and thus permits the body to advance unobstructedly. When the body passes out of range of the spinning roller 28, the cam 58 rides off the cam roller 52 on the arm 33 and thus permits the spring 54 to draw the spinning roller 28 back into body rotating position for a repeat spinning operation on the next can body being advanced into the coating station.

As a can body A moves into the coating station B and is located for spinning by the spinning rollers 27, 28, when the turret 12 comes to rest after a partial rotation, the can body is withdrawn from its retaining pocket 11 a sufficient distance to permit the body to clear the pocket defining walls so that the body may rotate freely without any dragging or retarding action as hereinbefore mentioned. To facilitate this withdrawing action, the guide rail 10 is relieved or cut away at this point to clear the can body.

This body withdrawing action preferably is effected by magnetic attraction. For this purpose and as a preferred form of the invention, each spinning roller 27, 28 is provided with a cylindrical permanent magnet 61 (see Fig. 3) mounted concentrically on a roller hub 62 supported on ball bearings 63 carried on the spinning roller shafts 29, 30. The magnets 61 (one for each spinning roller 27, 28) are disposed along the roller shafts 29, 30 preferably in a centralized position relative to the side wall of the can bodies A as best shown in Fig. 3. Each magnet 61 is provided with a pair of annular, ring-like pole pieces 64 which engage against opposite sides of the magnet and which are larger in diameter.

The outer cylindrical faces of the magnets normally are disposed slightly above the inner guiding face of the guide rail 10 but are spaced away from a can body A at the coating station a distance sufficient to permit withdrawal of the can body from its turret pocket 11 toward the pole pieces 64. Adjacent each pole piece 64, the spinning rollers 27, 28 are provided with resilient friction rings 66, preferably made of rubber or other friction material for engagement with the withdrawn can body to effect its rotation.

The friction rings 66 are slightly larger in diameter than the pole pieces 64 to hold the can body slightly out of contact with the pole pieces. The rings 66 preferably are formed with laterally extending shoulders which engage under cooperating shoulders formed on the pole pieces 64 and on a pair of clamp rings 68 located at the outer ends of the roller hub 62 to clamp in place endwise all of the members on the hub. One of the clamp rings 68 is formed integral with the hub 62 while the other ring is threadedly secured to the hub. The roller drive gears 38, 39 are secured to the integral ring.

When a can body A is located at the coating station B by the turret 12 stopping in a rest position, the two spinning rollers 27, 28 are disposed in spaced relation to the can body and on opposite sides of the body to form a substantially V-shaped nest for the body as best shown in Figs. 1 and 4. The pole pieces 64 on the rollers set up a magnetic field in the region of the can body and thus attract the body toward the pole pieces. This magnetic attraction pulls the body down out of its turret pocket 11 and holds it against the friction rings 66.

With the body thus free of its pocket, the rotating spinning rollers 27, 28 rapidly rotate the body in the nest between the rollers and in a clockwise direction as

5

viewed in Figs. 1 and 4. It is during this rotation of the body that its interior surfaces are coated as hereinbefore mentioned. Since the body is free of its pocket, no drag is created on the body to cause slippage or to reduce its speed of rotation, or to retard it in any way. Thus a more uniform thickness of the coating material may be applied to the body surfaces. For similar reasons the outer surfaces of the body are free from scratching, marring or other surface damaging effects while at the coating station.

Upon completion of the coating operation, the turret 12 advances through another partial rotation to remove the coated body from the coating station. At the beginning of this partial rotation, the spinning roller 28 moves out of the way and thus removes its magnetic field and hence reduces the magnetic pull on the body. With only the opposite spinning roller 27 engaging and still rotating the body, the advancing turret 12 through a portion of the defining walls of the pocket 11 pushes the body forward away from the roller and thus stops the body from rotating. At the same time the guide rail 10 pushes the body upwardly into fully seated relation in its pocket and thus advances with the turret toward the discharge station while being retained in its pocket by the guide rail 10.

In a modified form of the invention as shown in Figs. 7, 9 and 10 the magnet is separated from the spinning rollers 27, 28 and is held in a stationary position between the rollers. The operating result is substantially the same as in the preferred form and has the advantage of facilitating replacement of the rubber friction rings 66 when they become worn.

In this modified form of the invention the spinning roller hub 62 is surrounded by a sleeve 70 (Fig. 7) which is provided with a pair of spaced annular flanges 71 which are shouldered to cooperate with the clamp rings 68 in clamping the friction rings 66 in place in the spinning roller structure. In the central space between the flanges 71, a stationary permanent magnet 72 having short vertically disposed legs 73 is provided to create the magnetic field which pulls the can body down onto the friction rings 66. The magnet 72 preferably is disposed in the substantially V-shaped nest between the two spinning rollers 27, 28 at a level slightly below the outer faces of the friction rings 66 for the same purpose as in the preferred form of the invention. The guide rail 10 is cut away adjacent the V-shaped nest and its ends are connected to the magnet 72 to support the magnet and hold it in a stationary position.

In this modified form of the invention, the spinning roller shafts 29, 30 are carried in substantially horizontal levers 76, 77 (Figs. 9 and 10) which intermediate their length are carried on a common pivot shaft 78 secured in a bearing 79 in the machine frame 16. The outer or opposite ends of the levers 76, 77 carry cam rollers 81, 82 respectively which operate against respective edge cams 83, 84 mounted on a common drive shaft 85. The drive shaft 85 may be actuated in any suitable manner to rotate in time with the rotation of the turret 12 to shift the spinning rollers 27, 28 out of and into the path of travel of the can bodies as hereinabove explained in connection with the preferred form of the invention. For this purpose the drive shaft 85 may be connected to the indexing cam shaft 23 as in the preferred form.

The spinning rollers 27, 28 are rotated as in the preferred form by spur gears 86, 87 (Figs. 9 and 10) which are mounted on the roller hubs 62 (see Fig. 7) and which mesh with an idler gear 88 mounted on a short shaft carried in the lever 76. Gear 87 is driven by an endless chain 89 which operates over a sprocket 90 attached to the gear 87, an idler sprocket 91 carried on the pivot shaft 78, and a drive sprocket 92 on the drive shaft 85.

In a further modified form of the invention as shown

6

in Figs. 8, 12 and 13 a single spinning roller 98 is disposed at the coating station B. This spinning roller 98 preferably comprises a rotatable hub 99 which carries a cylindrical horseshoe magnet 101 and a pair of resilient friction rings 102 disposed one adjacent each end of the magnet. Clamp rings 103 at the ends of the hub 99 clamp the magnet and the friction rings together endwise to provide a unitary structure.

The spinning roller 98 is rotatably mounted on a horizontal shaft 105 projecting outwardly from a vertical slide 106 carried in a slideway 107 formed in a bracket 108 secured to the machine frame 16. The slide 106 carries a cam roller 109 which operates in a cam groove 111 of a continuously rotating face cam 112 mounted on a drive shaft 113 which is rotated in any suitable manner in time with the rotation of the turret 12, such as by gear connection with the indexing cam shaft 23 as in the preferred form of the invention. The cam 112 raises and lowers the slide 106 to shift the spinning roller 98 out of and into the path of travel of the can body entering and leaving the coating station B as in the preferred form of the invention.

The spinning roller 98 is continuously rotated by a sprocket 115 which is connected with the spinning roll and which is rotated by an endless chain 116 driven from a sprocket 117 mounted on any suitable rotating shaft, such as the shaft 113 or the shaft 34 disclosed in the preferred form. A yieldably mounted idler sprocket 118 is provided to take up the slack in the chain during movement of the slide 106.

In order to retain the can body A at the station B during its rotation by the spinning roller 98, a stop roller 121 is provided to contact the body adjacent the spinning roller 98. The roller 121 (Figs. 8 and 12) is carried in an arm 122 which projects out from the slide 106.

It is thought that the invention and many of its attendant advantages will be understood from the foregoing description, and it will be apparent that various changes may be made in the form, construction and arrangement of the parts without departing from the spirit and scope of the invention or sacrificing all of its material advantages, the form hereinbefore described being merely a preferred embodiment thereof.

I claim:

1. In a coating machine for spraying a film of coating material on the interior surfaces of open ended can bodies, the combination of an intermittently rotatable turret having peripherally spaced pockets for advancing can bodies into and out of a body coating station, means for intermittently rotating said turret, a spinning roller disposed at said station for frictionally engaging and rotating a said can body introduced into said station for a coating operation, means for rotating said spinning roller, and magnetic means disposed at said station for moving said can body out of its turret pocket and into frictional engagement with said spinning roller.

2. In a coating machine of the character defined in claim 1 wherein said magnetic means is a stationary magnet disposed adjacent the spinning roller.

3. In a coating machine of the character defined in claim 1 wherein said magnet means is a magnet rotating adjacent said spinning roller.

4. In a coating machine for spraying a film of coating material on the interior surfaces of open ended can bodies, the combination of an intermittently rotatable turret having peripherally spaced pockets for advancing can bodies into and out of a body coating station, means for intermittently rotating said turret, a spinning roller disposed at said station for frictionally engaging and rotating a said can body introduced into said station for a coating operation, means for rotating said spinning roller, means for shifting said spinning roller toward and away from the path of travel of the can bodies to clear said path of said roller during advancement of a can body into and out of said coating station, and means disposed

7

at said station for moving said can body out of its turret pocket and into frictional engagement with said spinning roller.

5. In a coating machine for spraying a film of coating material on the interior surfaces of open ended can bodies, the combination of an intermittently rotatable turret having peripherally spaced pockets for advancing can bodies into and out of a body coating station, means for intermittently rotating said turret, a pair of spaced and peripherally adjacent spinning rollers disposed at said station and forming between them a substantially V-shaped nest for receiving and frictionally rotating a said can body introduced into said station, means for rotating said rollers in unison and in the same direction, means for shifting said spinning rollers independently of each other in succession toward and away from the path of travel of the can body to clear said path of said rollers during advancement of said can body into and out of said coating station, and means disposed at said station for moving said can body out of its turret pocket and into frictional engagement with said spinning roller.

6. In a coating machine for spraying a film of coating material on the interior surfaces of open ended can bodies, the combination of an intermittently rotatable turret having peripherally spaced pockets for advancing can bodies into and out of a body coating station, means for intermittently rotating said turret, a pair of spaced and peripherally adjacent spinning rollers disposed at said station and forming between them a substantially V-shaped nest for receiving and frictionally rotating a said can body introduced into said station, means for rotating said rollers in unison and in the same direction, and magnetic means disposed at said station for moving said can body out of its turret pocket and into frictional engagement with said spinning rollers.

7. In a coating machine of the character defined in claim 6 wherein said magnetic means is a pair of rotatable magnets disposed one adjacent each of said spinning rollers.

8. In a coating machine of the character defined in claim 6 wherein said magnetic means is a stationary magnet disposed adjacent said spinning rollers.

9. In a coating machine for spraying a film of coating material on the interior surfaces of open ended can bodies, the combination of an intermittently rotatable turret having peripherally spaced pockets for advancing can bodies into and out of a body coating station, means for inter-

8

mittently rotating said turret, a pair of spaced and peripherally adjacent spinning rollers disposed at said station and forming between them a substantially V-shaped nest for receiving and frictionally rotating a said can body introduced into said station, said rollers being rotated in unison and in the same direction and being mounted on yieldably held pivot arms, cam means operable against said arms for shifting said rollers independently of each other and in succession toward and away from the path of travel of the can bodies to clear said path of said rollers during advancement of a can body into and out of said coating station, means for actuating said cam means in time with the advancement of said can bodies, and means disposed at said station for moving said can body out of its turret pocket and into frictional engagement with said spinning roller.

10. In a coating machine for spraying a film of coating material on the interior surfaces of open ended can bodies, the combination of an intermittently rotatable turret having peripherally spaced pockets for advancing can bodies into and out of a body coating station, means for intermittently rotating said turret, a spinning roller disposed at said station for frictionally engaging and rotating a said can body introduced into said station for a coating operation, means for rotating said spinning roller, and means disposed at said station for moving said can body out of its turret pocket and into frictional engagement with said spinning roller, said spinning roller and said means for moving a can body out of its turret pocket being combined in a unitary structure comprising a rotatable hub, a cylindrical magnet carried on said hub, a pair of ring-like pole pieces disposed one adjacent each end of said magnet for drawing said can body out of its pocket, a pair of resilient friction rings disposed one adjacent each of said pole pieces for receiving and rotating said withdrawn can body, and a pair of clamp rings disposed one adjacent each of said friction rings at the ends of said assembly and threadedly attached to said hub for clamping together endwise all of said members in a unitary structure.

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