Aug. 28, 1956 J. J. CHADDERTON ET AL 2,760,679

ARTICLE FEEDING APPARATUS

Filed July 31, 1952 4 Sheets-Sheet 1

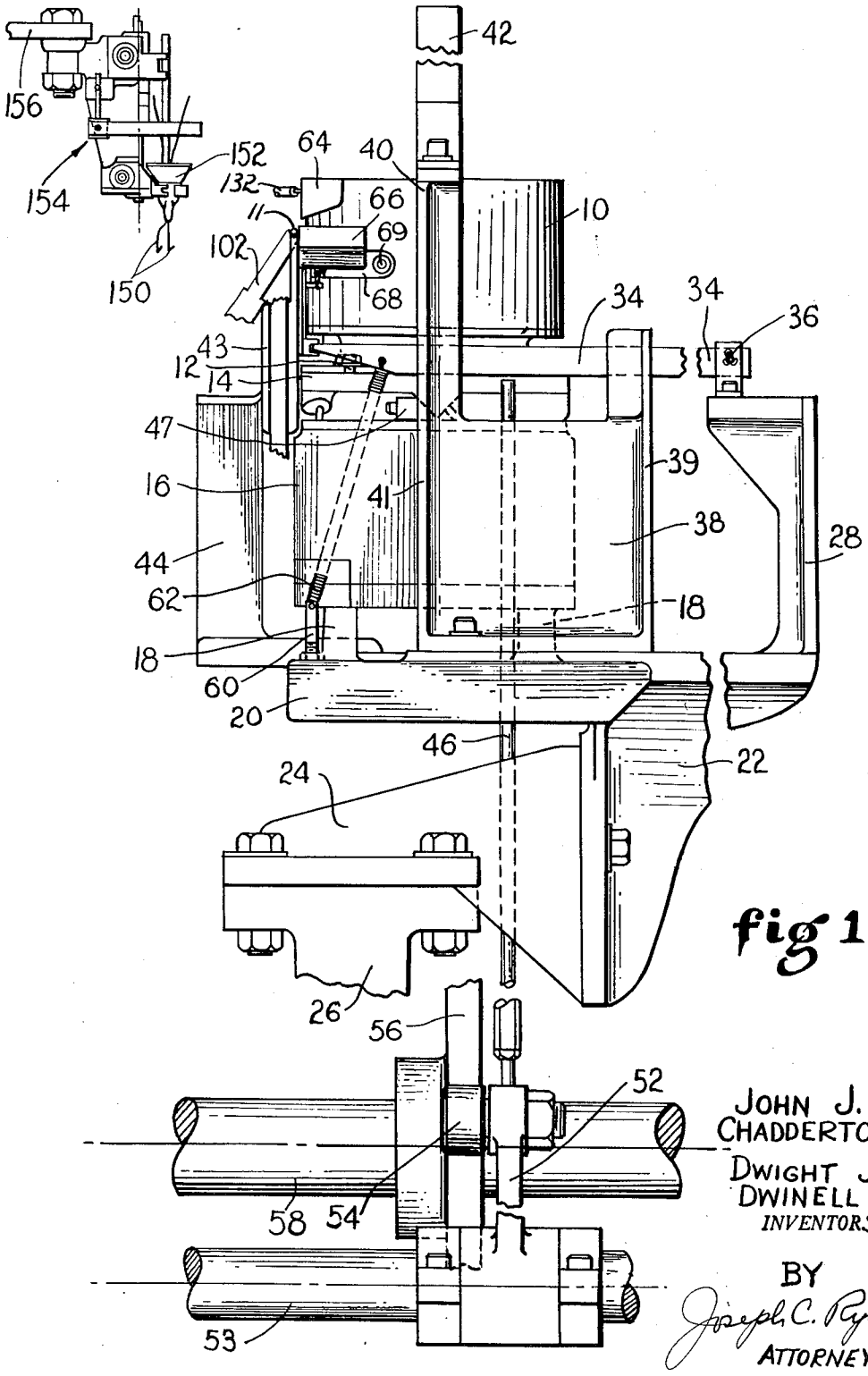


fig 1

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ARTICLE FEEDING APPARATUS

Filed July 31, 1952 4 Sheets-Sheet 2

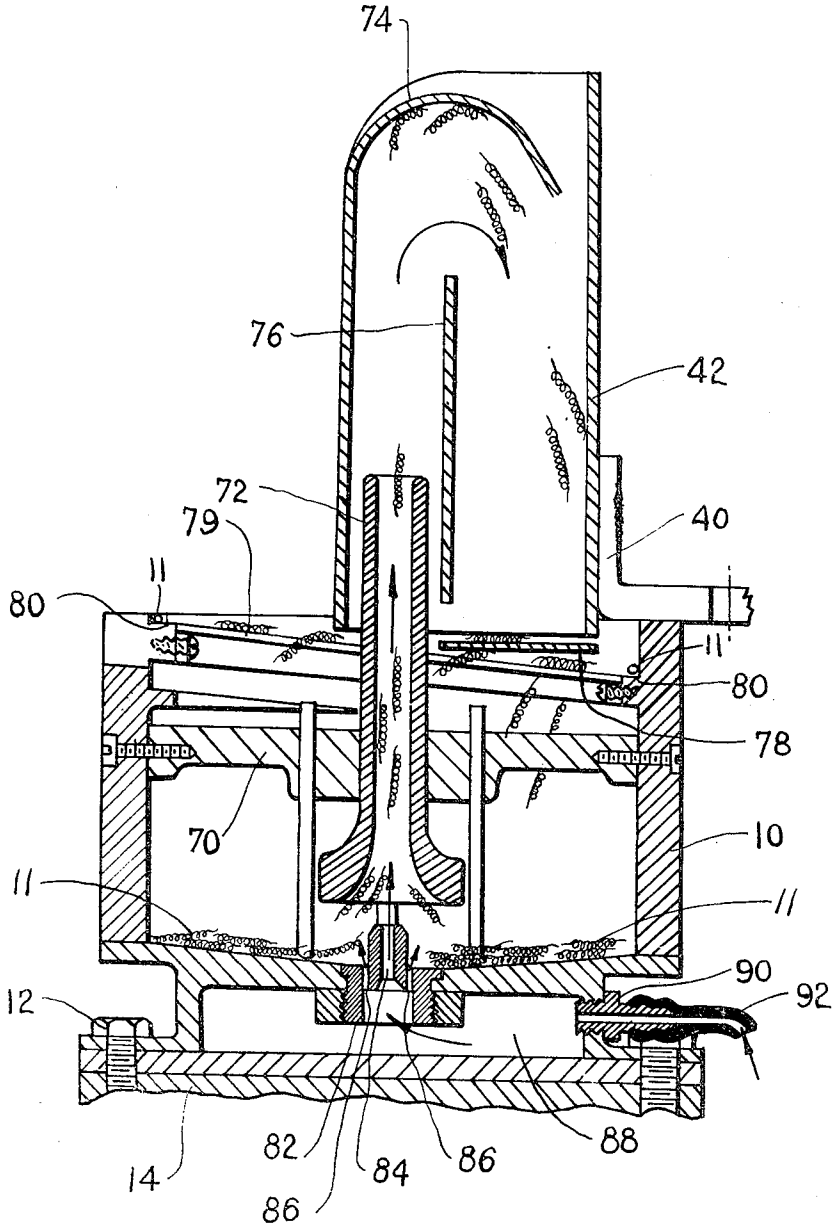


fig. 2

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ARTICLE FEEDING APPARATUS

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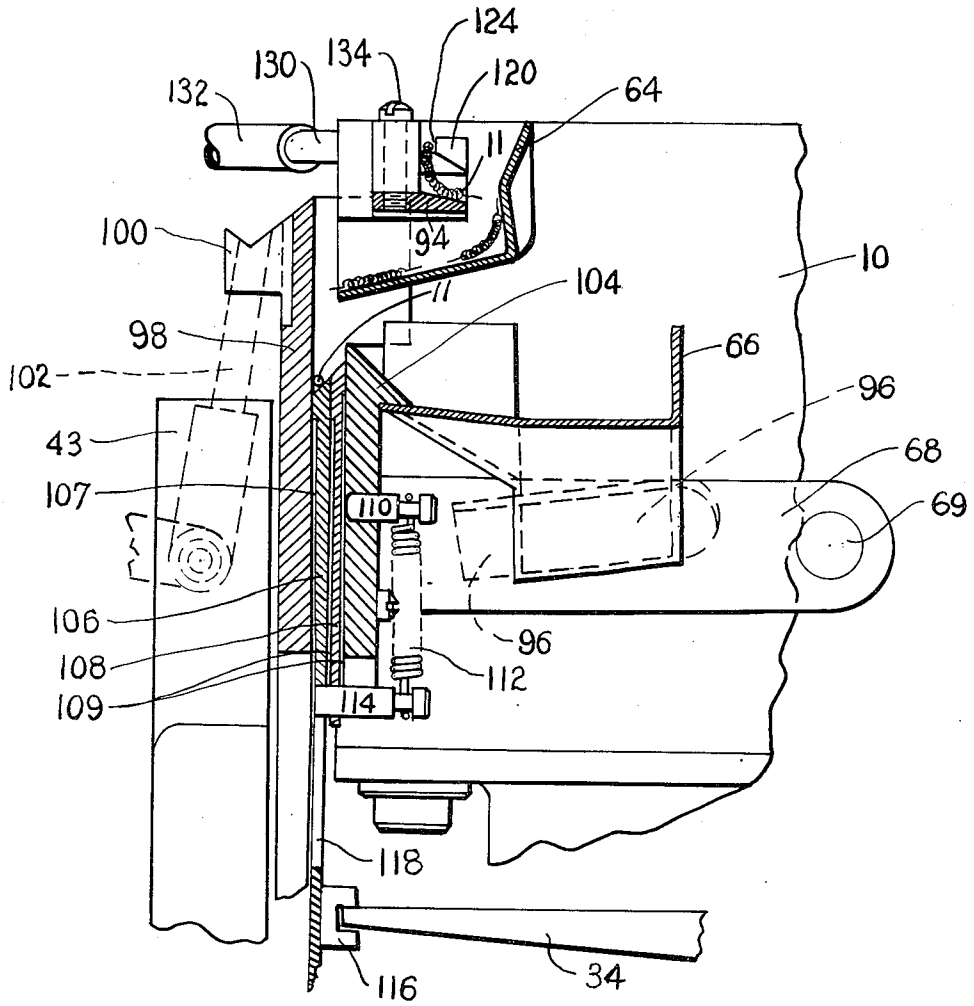


fig. 3

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Aug. 28, 1956 J. J. CHADDERTON ET AL 2,760,679

ARTICLE FEEDING APPARATUS

Filed July 31, 1952 4 Sheets-Sheet 4

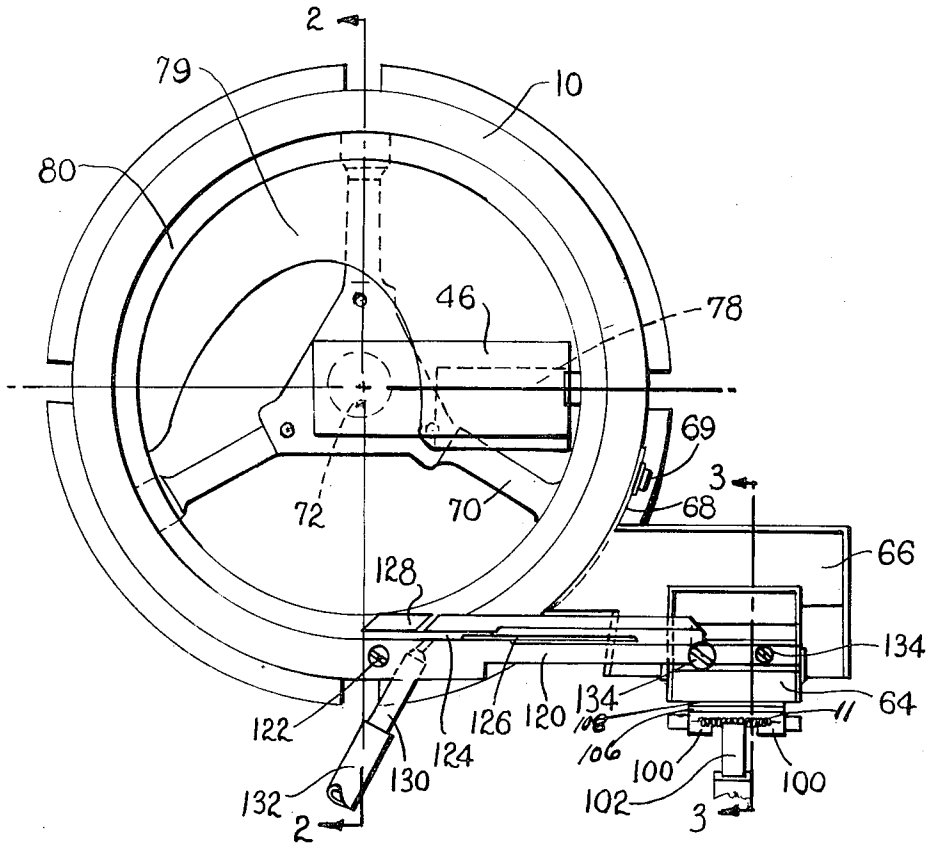


fig. 4

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2,760,679

ARTICLE FEEDING APPARATUS

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Application July 31, 1952, Serial No. 301,914

8 Claims. (Cl. 221—225)

This invention relates to article feeding apparatus and more particularly to apparatus for feeding coils for electric lamps and the like and articles of similar configuration.

In the manufacture of electrical devices, such as incandescent lamps for example, mounting of a coil is one step in the manufacturing operation. The coil is usually fed to a lamp stem on a mount machine which automatically affixes the coil to the lead wires and/or support wires of the lamp stem. Various apparatus have been developed for automatically feeding certain types of lamp coils. For example, an apparatus for automatically feeding "horse-shoe" type incandescent lamp coils is shown in U. S. Patent 2,597,354 to H. B. Maloney, entitled "Filament Transfer and Mounting Apparatus For Lamp Stems." However, there are some types of coils which, due to their configuration and/or the manner in which they are to be mounted on the lamp stem, do not readily lend themselves to be fed automatically. In some cases the coils are hand-mounted. In other cases, the coils are fed manually or semi-automatically and then mounted automatically. In the case of straight coils, it has been the practice heretofore to have an operator position them one by one on a conveyor which carries them to a transfer arm which, in turn, carries them to mounting position on the lamp stems. Thus the speed with which the feeding of straight coils may be effected is limited by the speed with which an operator can perform the manual operation of positioning the coils on the conveyor. Efforts to eliminate this manual operation by the employment of a conventional vibratory feeder in which the articles to be fed are advanced up a runway on the inside of a vibrating reservoir from the bottom thereof proved unsuccessful because the coils became entangled due to the vibration and could not, therefore, be properly fed up the runway.

However, we have found that when the coils are advanced pneumatically from the floor of a vibrating reservoir to a runway on the inside and adjacent to the top thereof, straight coils may be fed automatically.

In accordance with the principles of our invention as illustrated and described in the specific example thereof set forth in the accompanying drawings and specification, straight coils are automatically fed from a reservoir thereof to a coil transfer arm which transports each coil to the lamp stem on which it is to be mounted. More specifically, the apparatus comprises a coil reservoir mounted on a vibratory unit, a funnel disposed in the reservoir and a hood disposed above the reservoir and enclosing the top of the funnel. Coils are fed from the floor of the reservoir through the funnel and into the hood by gas under pressure introduced into the reservoir through the base thereof. The coils are deflected by the roof of the hood and fall onto a feeding plate mounted in the reservoir near the top thereof. Vibration of the reservoir moves the coils from the feeding plate to a runway which extends about the inside wall of the reservoir adjacent to the top thereof and thence to a coil feeding finger mounted

on top of the reservoir and in register with the runway. The coil feeding finger directs the coils into a chamber which has a pair of reciprocable slides disposed therein. One of these slides feeds the coils individually to a coil transfer arm which carries the coils to the lamp stems on which they are to be mounted and the other slide holds a coil in reserve for the coil-feeding slide.

In the specific embodiment of our invention shown in the accompanying drawings, Figure 1 is a side elevational view of a coil feeding apparatus.

Figure 2 is a vertical section of the coil reservoir taken along the line 2—2 of Figure 4.

Figure 3 is a vertical section of the coil feeding apparatus taken along the line 3—3 of Fig. 4.

Figure 4 is a plan view of the coil feeding apparatus.

The apparatus of this invention is readily adaptable to lamp mount making machinery since it is an accessory thereto and may be mounted thereon at the filament mounting station and the mechanically actuated portions thereof may be driven from the main drive shaft of the mount machine. For example, when the apparatus of this invention is employed with the machine shown in the co-pending application of Gardner et al. Serial No. 637,440 filed December 27, 1945, now Patent No. 2,637,144, its mechanically actuated portions may be driven from the main drive shaft 33 of that machine.

Referring now to the drawings, particularly Figure 1 thereof, coil reservoir 10 is attached by bolts 12 to mounting plate 14 of vibratory unit 16. Vibratory unit 16 is mounted on legs 18 upstanding on table 20. Table 20 has a bracket 22 formed integral therewith, the bracket 22 being attached to bracket 24 mounted on main standard 26 which supports the entire apparatus. Bracket 22 has table 28 mounted thereon on which slide actuating lever 34 is pivotally mounted at 36. Bracket 38, mounted on table 20, has a channel cut in each of the legs 39 and 41 thereof, through which slide actuating lever 34 extends. Bracket 40, upstanding on leg 41 of bracket 38, supports hood 42 which overlies the coil reservoir 10. Bracket 44, upstanding on table 20 serves as a support for base plate 43 of the coil feeding slide assembly described below. Slide actuating lever 34 is actuated by rod 46, the top of which engages the lower longitudinal edge of lever 34. Stop 47 mounted on leg 41 of bracket 38 arrests the downward movement of lever 34 and determines the rest position thereof. Rod 46 is mounted on one end of rocker arm 52 on rocker shaft 53 the other end of arm 52 being provided with cam roller 54 which rides on cam 56 mounted on drive shaft 58. Table 20 is provided with stud 60 upstanding thereon, to which one end of spring 62 is connected, the other end of spring 62 being connected to lever 34. The reservoir 10 has a coil delivery chute 64 mounted adjacent to the periphery thereof. Coil return chute 66 has a mounting plate 68 formed integral therewith which is attached to the outside wall of the reservoir 10 by screw 69. A coil transfer arm 102, to which the coil feeding apparatus of this invention delivers coils, is disposed adjacent thereto. The arm 102 transfers coils from the coil feeding apparatus (by suitable means not shown since it does not constitute a part of this invention) to the lead wires 150 of a lamp stem 152 seated on a lamp stem supporting head 154 mounted on conveyor 156 which may be of the type shown in the co-pending application of R. M. Gardner et al. Ser. No. 637,440 filed December 27, 1945, entitled "Automatic Lamp Stem Fabricating Apparatus" now Patent No. 2,637,144.

Referring now to Figure 2, the reservoir 10 has a tripod 70 mounted therein which supports a funnel 72. The hood 42 which overlies the reservoir 10 has a deflector plate 74 therein at the top thereof, a baffle plate 76 therein extending longitudinally thereof, and a laterally

extending deflector plate 78 at the bottom thereof. A feeder table 79, disposed within the reservoir and secured thereto, lies beneath hood 42 and deflector plate 78, and extends about a portion of the reservoir, one side thereof being contiguous with a runway 80 extending about the inside wall of the reservoir adjacent to the top thereof. The floor of the reservoir 10 has a nozzle 82 mounted therein. The nozzle 82 has a main port 84 therein in register with the funnel 72 and auxiliary ports 86 adjacent to the main port 84. The base of the reservoir 10 is provided with a chamber 88 and a nozzle 90 mounted in the wall thereof. Hose 92, a portion of which is shown, connects nozzle 90 to a source of gas under pressure not shown.

Referring now to Figure 3, the coil delivery chute 64 has a baffle 94 mounted therein. The coil return chute 66 is inclined downwardly and feeds into an opening 96 in the wall of the reservoir 10. Base plate 43 has a fixed channel plate 98 mounted thereon, the upper edge of which is beveled. A pair of guide blocks 100 are mounted on plate 98 adjacent to the top thereof, the guide blocks being spaced from one another a distance sufficient to permit entry of coil transfer arm 102 therebetween. Plate 104 is mounted on channel plate 98 with reciprocable slides 106 and 108 disposed therebetween. Slide 106 is supported on the free end of lever 34 by means of a bifurcated block 116 mounted on slide 106 into which lever 34 extends. Slide 108 is supported from plate 104 through pin 110 mounted on plate 104, pin 114 mounted on slide 108, and spring 112 which connects pin 110 to pin 114. Pin 114 extends through slide 108 on which it is mounted and into elongated slot 118 in slide 106. Slide 106 is provided with a relief 107 on the face thereof which abuts plate 98 and slide 108 is provided with reliefs 109 to reduce surface friction and prevent binding.

Referring now to Figure 4, coil feeding finger 120 is mounted on the periphery of reservoir 10 by screw 122. Finger 120 has a channel 124 formed therein in register with the exit end of runway 80, and an elongated slot 126 cut in the channel 124. The finger 120 is beveled at 123 to provide for the return to the floor of the reservoir 10 of all coils moving off of runway 80 at this point which do not enter channel 124. Nozzle 130, mounted on finger 120 and extending into channel 124, is connected through hose 132 to a source of gas under pressure, not shown. Coil delivery chute 64 is mounted on finger 120 by screws 134.

The operation of the apparatus of our invention will now be described. Referring first to Figures 1 and 2, the reservoir 10 is provided with a supply of coils 11, gas under pressure, such as air for example, is introduced into the chamber 88 in the base of the reservoir through hose 92 and nozzle 90, and the vibratory unit 16 is energized. The vibratory unit 16 employed in the specific embodiment of our invention described herein is designed to effect vibration of the reservoir 10 at the rate of about 30 cycles per second, with the amplitude of vibration being between about .015 and .030 inch. The concavity of the floor of the reservoir 10 and the vibration of the reservoir by the vibratory unit 16 cause the coils to move towards the center, beneath the funnel 72. Gas emanating from ports 86 of nozzle 82 blows the coils upwardly into the funnel 72. Gas emanating from the main port 84 of nozzle 82 blows the coils through the funnel 72 and against plate 74 which deflects the coils and directs them downwardly onto the deflector plate 78 and thence to the feeder table 79. As illustrated in Figure 2, some of the coils fall off of the feeder table 79 back into the body of coils on the floor of the reservoir. Most of the coils however, due to the vibration of the feeder table 79, are directed onto the runway 80 which extends about the inside wall of the reservoir. Vibration of the reservoir 10 advances the coils along the runway 80.

Referring now to Figure 4, when the coils on the runway 80 reach the coil feeding finger 120, they move, one at a time into channel 124, the excess falling down the incline 123 into the bottom of the reservoir. When each coil in channel 124 reaches a point therein adjacent to nozzle 130, it is blown forward and out of the channel into chute 64. The channel 124 is provided with slot 126 to free the coil-feeding finger 120 of small particles of foreign matter which may tend to collect therein.

Referring now to Figure 3, the coils 11 which are ejected from the channel 124 of finger 120 are deflected by the baffle 94 onto the delivery chute 64 which directs them into the chamber between channel plate 98 and cover plate 104 above slides 106 and 108. Slide 106 delivers the coils, one at a time, to coil transfer arm 102 and slide 108 holds a coil in reserve for delivery to slide 106. Actuation of the slides 106 and 108 is effected by rod 46 (Fig. 1) through the slide actuating lever 34. The slides are shown in their rest position in Figure 3. Upward movement of the rod 46 is transmitted into upward movement of slide 106 through lever 34 and block 116. As the slide 106 moves upwardly, the slide 108 loaded by spring 112 moves therewith until the upward movement of the slide 108 is arrested by engagement of the pin 114 with the bottom of plate 104. At this point, the beveled ends of slides 106 and 108 are slightly above the beveled end of plate 104. Although the upward movement of the slide 108 has been arrested, the slide 106 continues to move upwardly, the pin 114 riding in the elongated slot 118 in slide 106, until its upper end reaches a point just below the upper edge of channel plate 98. During this portion of the stroke of slide 106, a coil is carried in the pocket defined by the beveled end of slide 106 and the adjacent face of channel plate 98, and a coil is held in the pocket defined by the beveled end of slide 108 and the adjacent face of slide 106, all other coils which may have been delivered by the coil delivery chute 64 having been returned over the beveled edge of plate 104 to the reservoir 10. The slide 106 is then returned downwardly to its rest position without delivering the coil carried thereby to the transfer arm 102, the return of the slide being effected by spring 62 (Fig. 1) on which a load had been placed by the upward stroke thereof. As the slide 106 nears the end of its return stroke, it strikes the pin 114 on slide 108 and both slides 106 and 108 move downwardly together to the rest position as shown in Figure 3. The slides 106 and 108 then move upwardly together in the same manner as described above except that this time the slide 106 moves upwardly until the beveled end thereof is in register with the beveled end of channel plate 98, thus permitting a coil 11 carried thereby to roll into the coil transfer arm 102. The slides 106 and 108 then return to their rest positions in the manner just described.

Although it may be found in some cases not to be necessary to have the slides 106 and 108 reciprocate twice as described above during each coil delivery cycle, it has been found to be very advantageous to do so because it insures the presence of a reserve coil on the beveled end of slide 108 ready to be fed to the coil delivery slide 106. It minimizes the possibility of slide 106 moving upwardly to delivery position without a coil therein since, if no coil is fed to the slides 106 and 108 during the time the beveled end of slide 106 is above the beveled end of slide 108, the reserve coil on the top of slide 108 will drop down onto the top of slide 106 when the slide 106 moves downwardly to a position where its beveled end is in register with the beveled end of slide 108.

What we claim is:

1. Article feeding apparatus comprising: a reservoir for a plurality of articles; an inclined runway extending about the inside wall of said reservoir adjacent to the top thereof; an article-dispensing finger mounted on said reservoir and in register with said runway; a funnel upstanding in said reservoir but spaced from the floor thereof;

means for blowing articles from the floor of said reservoir through said funnel to said runway; and means for vibrating said reservoir to effect an advancement of articles upwardly along said runway and through said article-dispensing finger.

2. Article feeding apparatus comprising: a reservoir for a plurality of articles; an inclined runway extending about the inside wall of said reservoir adjacent to the top thereof; an article-dispensing finger mounted on said reservoir and in register with said runway; a funnel upstanding in said reservoir but spaced from the floor thereof; a hood enveloping the top of said funnel and overlying a portion of said runway; means for blowing articles from the floor of said reservoir through said funnel and said hood to said runway; and means for vibrating said reservoir to effect an advancement of articles upwardly along said runway and through said article-dispensing finger.

3. Article feeding apparatus comprising: a reservoir for a plurality of articles; an inclined runway extending about the inside wall of said reservoir adjacent to the top thereof; an article-dispensing finger mounted on said reservoir and in register with said runway; a funnel upstanding in said reservoir but spaced from the floor thereof; means for blowing articles from the floor of said reservoir through said funnel to said runway; means for vibrating said reservoir to effect an advancement of articles upwardly along said runway and into said article-dispensing finger; and pneumatic means connected to said finger for ejecting articles therefrom.

4. Article feeding apparatus comprising: a reservoir for a plurality of articles; an inclined runway extending about the inside wall of said reservoir adjacent to the top thereof; an article-dispensing finger mounted on said reservoir and in register with said runway; a funnel upstanding in said reservoir but spaced from the floor thereof; a hood enveloping the top of said funnel and overlying a portion of said runway; means for blowing articles from the floor of said reservoir through said funnel and said hood to said runway; means for vibrating said reservoir to effect an advancement of articles upwardly along said runway and into said article-dispensing finger; and pneumatic means connected to said finger for ejecting articles therefrom.

5. Article feeding apparatus comprising: a reservoir for a plurality of articles; an inclined runway extending about the inside wall of said reservoir adjacent to the top thereof; an article-dispensing finger mounted on said reservoir and in register with said runway; a funnel upstanding in said reservoir but spaced from the floor thereof; means for blowing articles from the floor of said reservoir through said funnel to said runway; means for vibrating said reservoir to effect an advancement of articles upwardly along said runway and through said article-dispensing finger; a slide disposed beneath said article-dispensing finger and in article-receiving relationship therewith; and means for reciprocating said slide to eject therefrom the articles which are delivered thereto by said finger.

6. Article feeding apparatus comprising: a reservoir for a plurality of articles; an inclined runway extending about the inside wall of said reservoir adjacent to the top thereof; an article-dispensing finger mounted on said reservoir and in register with said runway; a funnel upstanding in said reservoir but spaced from the floor thereof; a hood enveloping the top of said funnel and overlying a portion of said runway; means for blowing articles from the floor of said reservoir through said funnel and said hood to said runway; means for vibrating said reservoir to effect an advancement of articles upwardly along said runway and through said article-dispensing finger; a slide disposed beneath said article-dispensing finger and in article-receiving relationship therewith; and means for reciprocating said slide to eject therefrom the articles which are delivered thereto by said finger.

7. Article feeding apparatus comprising: a reservoir for a plurality of articles; an inclined runway extending about the inside wall of said reservoir adjacent to the top thereof; an article-dispensing finger mounted on said reservoir and in register with said runway; a funnel upstanding in said reservoir but spaced from the floor thereof; means for blowing articles from the floor of said reservoir through said funnel to said runway; means for vibrating said reservoir to effect an advancement of articles upwardly along said runway and into said article-dispensing finger; pneumatic means connected to said finger for ejecting articles therefrom; a slide disposed beneath said article-dispensing finger and in article-receiving relationship therewith; and means for reciprocating said slide to eject therefrom the articles which are delivered thereto by said finger.

8. Article feeding apparatus comprising: a reservoir for a plurality of articles; an inclined runway extending about the inside wall of said reservoir adjacent the top thereof; an article-dispensing finger mounted on said reservoir and in register with said runway; a funnel upstanding in said reservoir but spaced from the floor thereof; a hood enveloping the top of said funnel and overlying a portion of said runway; means for blowing articles from the floor of said reservoir through said funnel and said hood to said runway; means for vibrating said reservoir to effect an advancement of articles upwardly along said runway and into said article-dispensing finger; pneumatic means connected to said finger for ejecting articles therefrom; a slide disposed beneath said article-dispensing finger and in article-receiving relationship therewith; and means for reciprocating said slide to eject therefrom the articles which are delivered thereto by said finger.

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