

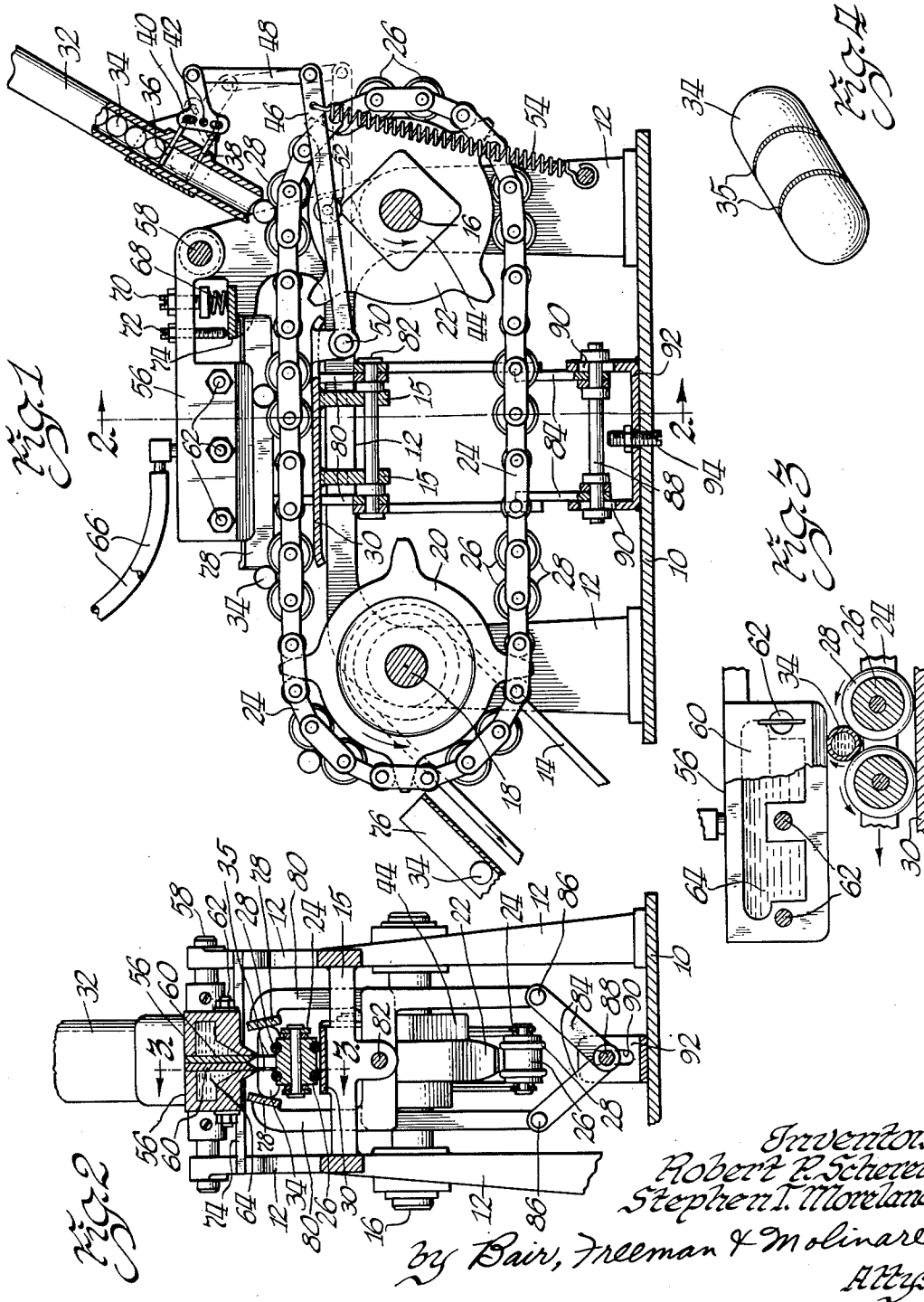
June 29, 1954

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2,682,253

COLOR BANDING MACHINE FOR CYLINDRICAL OBJECTS

Filed March 15, 1952



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UNITED STATES PATENT OFFICE

2,682,253

COLOR BANDING MACHINE FOR
CYLINDRICAL OBJECTS

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Application March 15, 1952, Serial No. 276,867

14 Claims. (Cl. 118—219)

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This invention relates to an encircling machine particularly designed for applying circles or bands of color around cylindrical objects such as gelatin capsules or the like.

One object of our invention is to provide a machine which automatically performs the encircling operation without the necessity of manually handling the objects or performing any manual operations in connection with the encircling thereof.

More specifically, it is an object of our invention to provide a conveyor for cylindrical articles such as capsules, which conveyor is designed to carry the capsules under inking elements in such manner as to cause them to "roll" along the inking edges thereof and thereby have applied thereto continuous circles of colored media such as an aqueous solution which, after application, will upon drying provide colored stripes around the capsules preferably sharply contrasting with the color of the capsule itself, thus giving to the capsule a distinctive appearance for designating manufacturer's origin, for indicating the contents of the capsule or for any other use wherein colored circles around capsules or other objects are desirable.

Another object is to provide pairs of adjacent, side-by-side rollers for supporting and rotating the capsules as they are carried along under the inking elements.

A further object is to provide means for automatically delivering the capsules one at a time to the pairs of rollers of the conveyor in such manner that they are deposited in the trough provided by the pair of rollers.

Still a further object is to provide means engaging the ends of the capsules to retain them against the rollers for proper rotation thereby and for centering them with respect to the rollers so that the circles of color may be applied at definite positions in relation to the length of the capsule.

With these and other objects in view, our invention consists in the construction, arrangement and combination of the various parts of our encircling machine, whereby the objects contemplated are attained, as hereinafter more fully set forth, pointed out in our claims and illustrated in the accompanying drawings, wherein:

Figure 1 is a side elevation of an encircling machine embodying our present invention, one of the side frames being removed and portions of the machine being shown in section to expose details thereof.

Figure 2 is a vertical sectional view on the line 2—2 of Figure 1.

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Figure 3 is an enlarged sectional view on the line 3—3 of Figure 2 to illustrate the encircling operation; and

Figure 4 is an enlarged perspective view of one of the banded capsules.

On the accompanying drawing we have used the reference character 10 to indicate a base plate and 12 a side frame. Two of the side frames 12 are provided as shown in Figure 2 and these are connected together by suitable cross members 15. The side frames 12 are provided with suitable bearings for a drive shaft 18 and an idler shaft 16 on which are mounted sprockets 20 and 22 respectively. Suitable drive means (not shown) is provided for the shaft 18 and may include a belt or chain 14.

We provide a conveyor chain 24 passing around the sprockets 20 and 22 and carrying pairs of rollers 26 arranged side-by-side. These rollers are preferably provided with friction elements or "tires" 28 adapted to contact with a track 30 for rotating the rollers as will hereinafter appear.

A delivery chute 32 is provided for cylindrical objects 34 such as capsules or the like. An escapement mechanism consisting of an upper blade 36 and a lower blade 38 slidably mounted and adapted to alternately enter the delivery chute 32 as shown by dotted and solid lines in Figure 1 is provided. These blades are operatively connected with a rock lever 40 pivoted at 42 and oscillated in timed relation to the sprocket 22 by a cam 44, a lever 46 and a link 48. The lever is pivoted to the frame at 50 and carries a roller 52 biased to engage the cam by a spring 54.

Inking mechanism is provided for applying the ink or other coloring media to the capsules 34 and may consist of hollow bars 56 pivoted at 58 and having closure plates 60 connected therewith as by bolts 62 so that capillary spaces are provided between the plates and the bars for the exit of the ink 64. The ink may be supplied from a suitable reservoir (not shown) by flexible tubes 66.

It is desirable that the inking bars 56 contact very lightly the capsules 34. Therefore we provide counterbalance springs 68 for the inking bars, the tension of which may be adjusted by adjusting screws 70. Also adjustable stop screws 72 are provided to limit the downward movement of the inking bars. The lower ends of the springs 68 are adapted to rest on a cross bar 74 and the stop screws 72 contact this cross bar when there are no capsules being banded.

A suitable discharge chute 76 is provided to receive the capsules 34 after they are encircled and deposit them in a suitable container for removal to other points of operation or for packaging.

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We provide means to center the capsules 34 with respect to the rollers 26 and to retain the capsules down against the rollers during the inking operation. This consists of bars 78 extending along the upper stretch of the conveyor and adapted to contact the ends of the capsules as shown in Figure 2. These bars are slightly inclined from the vertical so that when biased toward each other, they tend to have a slight downward forcing action on the capsule ends to hold them against the tires 28 of the rollers 26.

Levers 80 are provided to support the bars 78 and these levers are pivoted on a rod 82. Each lever 80 is of Z shape and links 84 are pivoted at 86 to their lower ends. A rod 88 is in turn pivoted to the links and serves as a weight to bias the upper ends of the levers 80 toward each other. The rod 88 is movable in vertical slots 90 of a bracket 92 so that the link arrangement insures simultaneous and equal movement of the centering bars 78 toward each other under the bias of the rod 88 or away from each other as a result of the spreading action imparted to the bars 78 by a capsule 34 when located between them. A stop screw 94 is shown in the base plate 10 to limit the downward movement of the rod 88 and thereby the distance between the centering bars 78 to accommodate the length of capsule being encircled.

Practical operation

In the operation of our encircling machine, capsules may be fed from a suitable hopper into the delivery tube 32 and are released therefrom one at a time by the escapement blades 36 and 38 as they reciprocate alternately in opposite directions as shown by solid lines and dotted lines in Figure 1, the reciprocation, of course, being the result of rotation of the idler shaft 16 and its cam 44. The timing is such that a capsule 34 is released so as to roll down the portion of the chute 32 below the escapement mechanism and reach a position resting on the tires 28 of a pair of the rollers 26 each time a pair reaches a position of registry with the discharge end of the chute.

Thereupon the capsule is carried by the pair of rollers until the tires 28 engage the track 30 whereupon the rollers start to roll counterclockwise inasmuch as the chain is traveling from right to left in Figures 1 and 3, and this rolls the capsule clockwise, all as shown by arrows in Figure 3. The speed of the upper surface of the capsule is such that substantially a rolling contact is had with the lower edge of the inking bars 55 and their closure plates 60, thus avoiding any sliding action of the capsule surface relative to the inking mechanisms that might tend to cut or abrade the surface of the capsule as the capsule is moved relative to the inking mechanisms. The ink that finds its way through the capillary space (hereinbefore referred to) to the inking edges of the mechanisms is deposited on the capsule in an obvious manner.

About the time the capsule begins to rotate as a result of the tires 28 engaging the track 30, the ends of the capsule come between the bars 78 which slightly spreads them whereupon the bars effect proper centering of the capsule relative to its supporting rollers 26 so that the inked lines are in a predetermined position as determined, of course, by the position of the inking edges of the bars 56 in relation to the centering bars 78. The slight incline of the bars 78 from the vertical tends to produce a downward component of pres-

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sure on the capsule ends to insure good contact thereof with the tires 28 so that the capsules are properly rotated and encircled as indicated at 35.

After the capsule has been revolved two or three revolutions, it leaves the inking mechanisms and soon thereafter the tires 28 disengage the track 30 so that the capsules are free to drop off the rollers when they reach a position adjacent the discharge chute 76. The encircling operations are performed out of alignment with the tires 28 as shown in Figure 2 so that the inked circles 35 are not smeared by the tires.

The mechanism shown is comparatively simple yet effectively performs the encircling operation so that the finished product may appear somewhat as shown in Figure 4. Any color of ink contrasting with the color of the capsule may be used and serves to instantly identify the contents of one capsule from another of similar color. Thus different colored circles may be used for content identification purposes. In some instances they may be used for identifying the manufacturer's product or the origin thereof and while two circles have been illustrated, it is obvious that the number may be increased or decreased as desired for providing a further range of identification. The mechanism is comparatively simple and capable of relatively great speed of operation so as to encircle capsules or other cylindrical objects in a minimum of time.

Some changes may be made in the construction and arrangement of the parts of our encircling machine without departing from the real spirit and purpose of our invention, and it is our intention to cover by our claims any modified forms of structure or use of mechanical equivalents which may be reasonably included within their scope.

We claim as our invention:

1. In an encircling machine for cylindrical objects, a conveyor for the objects, an inking element above said conveyor and having an elongated inking edge, spaced pairs of rollers carried by said conveyor wherein the rollers are adjacent and parallel to each other, each pair being adapted to have an object rest thereon, and a stationary track for said rollers to travel for imparting rotation thereto and thereby to the object carried thereby with the object rotating in an opposite direction relative to the rollers that rotate whereby its upper surface may have rolling contact with said elongated inking edge.

2. In an encircling machine for cylindrical objects, a conveyor for the objects, an inking element adjacent said conveyor having an elongated inking edge, a pair of side-by-side rollers carried by said conveyor and adapted to have an object rest in the trough formed between them, and a stationary track for said rollers to travel for imparting rotation thereto and thereby to the object carried thereby.

3. In an encircling machine, a conveyor for cylindrical objects, an inking element having an elongated inking edge, spaced pairs of rollers carried by said conveyor, each pair being adapted to have an object rest thereon, a stationary track for said rollers to travel for imparting rotation thereto and thereby to the objects carried thereby, said stationary track being substantially parallel to said inking edge and so spaced in relation thereto as to cooperate with said conveyor to carry said objects in rolling contact with said elongated inking edge.

4. In an encircling machine for cylindrical objects, a conveyor for the objects, an inking

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element above said conveyor and having an elongated inking edge, spaced pairs of rollers carried by said conveyor, each pair being adapted to have an object rest thereon, means for delivering a cylindrical object to each of said pair of rollers, said means comprising a chute for the objects and an escapement mechanism operable in timed sequence with the movement of said conveyor to release the objects one at a time as said pairs of rollers pass said chute, and a stationary track for said rollers to travel for imparting rotation thereto and thereby to the object carried thereby with the object rotating in an opposite direction relative to the rollers that rotate it, whereby its upper surface may have rolling contact with said elongated inking edge.

5. In an encircling machine of the character disclosed, a conveyor for cylindrical objects, an inking element having an elongated inking edge, spaced pairs of rollers carried by said conveyor wherein the rollers are adjacent and parallel to each other, each pair being adapted to have an object rest thereon, means for delivering an object to each of said pair of rollers, and a stationary track for said rollers to travel for imparting rotation thereto and thereby to the object carried thereby, said track being substantially parallel to said inking edge and spaced therefrom a distance which provides contact of said objects supported on said pairs of rollers with said elongated inking edge.

6. In an encircling machine, a conveyor for cylindrical objects, an inking element above said conveyor, spaced pairs of rollers carried by said conveyor wherein the rollers are adjacent and parallel to each other, each pair being adapted to have an object rest in the trough formed between them, means for delivering a cylindrical object to each of said pair of rollers, said means comprising a chute for the objects and an escapement mechanism operable in timed sequence with the movement of said conveyor to release the objects one at a time to said pairs of rollers, a stationary track for said rollers to travel for imparting rotation thereto and thereby to the object carried thereby with the object in ink receiving contact with said inking element.

7. In an encircling machine for cylindrical objects, a conveyor for the objects, an inking element above said conveyor and having an elongated inking edge, spaced pairs of rollers carried by said conveyor wherein the rollers are adjacent and parallel to each other, each pair being adapted to have an object rest thereon, means for delivering a cylindrical object to each of said pair of rollers, said means comprising a chute for the objects and an escapement mechanism operable in timed sequence with the movement of said conveyor to release the objects one at a time to said pairs of rollers, a track for said rollers to travel for imparting rotation thereto and thereby to the objects carried thereby with the objects rotating in an opposite direction relative to the rollers that rotate them, whereby their upper surfaces have rolling contact with said elongated inking edge, and means engaging the ends of the objects on said conveyor and rollers as they travel said track to center them on the rollers and retain them seated thereagainst, said means comprising elongated bars extending along the conveyor, pivot means for supporting said bars and permitting them to swing toward each other, means to bias said bars toward each other, and link connections to insure equal move-

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ment of the bars toward each other under the action of said biasing means and away from each other under the spreading action of objects on said conveyor rollers between them.

8. In an encircling machine for cylindrical objects, a conveyor for the objects, an inking element above said conveyor and having an elongated inking edge, spaced pairs of rollers carried by said conveyor wherein the rollers are adjacent and parallel to each other, each pair being adapted to have an object rest thereon, means for delivering a cylindrical object to each of said pair of rollers, said means comprising a chute for the objects and an escapement mechanism operable in timed sequence with the movement of said conveyor to release the objects one at a time to said pairs of rollers, a track for said rollers to travel for imparting rotation thereto and thereby to the objects carried thereby with the objects rotating in an opposite direction relative to the rollers that rotate them, whereby their upper surfaces have rolling contact with said elongated inking edge, and means engaging the ends of the objects on said conveyor and rollers as they travel said track to center them on the rollers, said means being inclined from the vertical to exert a downward force on the objects to retain them seated against said rollers.

9. In an encircling machine of the character disclosed, a conveyor for cylindrical objects, an inking element having an elongated inking edge, spaced pairs of rollers carried by said conveyor wherein the rollers are adjacent and parallel to each other, each pair being adapted to have an object rest thereon, means for delivering an object to each of said pair of rollers, a track for said rollers to travel for imparting rotation thereto and thereby to the object carried thereby, said track being substantially parallel to said inking edge and spaced therefrom a distance which provides contact of said objects supported on said pairs of rollers with said elongated inking edge, and means engaging the ends of the objects on said conveyor and rollers as they travel said track to center them on the rollers and retain them seated thereagainst, said means comprising bars extending along the conveyor, means to bias said bars toward each other, and link connections to insure equal movement of the bars toward each other under the action of said biasing means and away from each other under the spreading action of objects between them.

10. In an encircling machine for cylindrical objects, a conveyor for the objects, an inking element, spaced pairs of rollers carried by said conveyor, each pair being adapted to have an object rest thereon, means for delivering a cylindrical object to each of said pair of rollers, said means comprising a chute for the objects and an escapement mechanism operable in timed sequence with the movement of said conveyor to release the objects one at a time as said pairs of rollers pass said chute, a track for said rollers to travel for imparting rotation thereto and thereby to the object carried thereby, and means engaging the ends of the objects on said conveyor and rollers as they travel said track to center them on the rollers, said means being inclined from the vertical to exert a downward force on the objects to retain them seated against said rollers.

11. In an encircling machine, a conveyor for objects, an inking element above said conveyor and having an elongated inking edge, spaced pairs of rollers carried by said conveyor, each pair

being adapted to have an object rest thereon, a track for said rollers to travel for imparting rotation thereto with the objects in rolling contact with said inking element, and means engaging the ends of the objects on said conveyor and rollers as they travel said track to center them on the rollers and retain them seated thereagainst, said means comprising bars extending along the conveyor, pivot means for supporting said bars, and means to bias said bars toward each other.

12. In an encircling machine, a conveyor for objects, an inking element above said conveyor and having an elongated inking edge, spaced pairs of rollers carried by said conveyor, each pair being adapted to have an object rest thereon, a track for said rollers to travel for imparting rotation thereto with the objects in rolling contact with said inking element, and means engaging the ends of the objects on said conveyor and rollers as they travel said track to center them on the rollers and retain them seated thereagainst, said means comprising bars extending along the conveyor, pivot means for supporting said bars, means to bias said bars toward each other, and means to insure equal movement of the bars toward each other under the action of said biasing means and away from each other under the spreading action of objects on said conveyor rollers between the bars.

13. In an encircling machine for cylindrical objects, a conveyor for the objects, an inking element adjacent said conveyor having an elongated inking edge, a pair of side-by-side rollers carried by said conveyor and adapted to have an object rest in the trough formed between them for carrying the object below said inking edge

and in contacting engagement therewith, each of said rollers comprising a spaced pair of tire elements, and a stationary track for said rollers to travel for imparting rotation thereto and thereby to the object carried thereby.

14. In an encircling machine, a conveyor for cylindrical objects, an inking element having an elongated inking edge, said inking element being pivotally mounted above said conveyor, counterbalancing means to retain said inking element in substantially light contact with the objects, spaced pairs of rollers carried by said conveyor, each pair being adapted to have an object rest thereon, a track for said rollers to travel for imparting rotation thereto and thereby to the objects carried thereby, said track being substantially parallel to said inking edge and so spaced in relation thereto as to cooperate with said conveyor to carry said objects in substantially light rolling contact with said elongated inking edge.

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