APPARATUS FOR PRINTING ON THE EXTERIOR OF CAN BODIES

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This invention relates to apparatus for printing on the exterior of circular tubes or cylinders made for example by an impact printing process, or by a drawing process, or by a moulding process.

In apparatus as previously proposed for effecting printing on circular tubes or cylinders, hereinafter for convenience referred to as can bodies, it has been customary to effect printing by a continuously rotatable impression roller provided with rubber offset blankets which pick up ink from inking units, for example from up to four different colour inking units, and apply the impression to a can body. Each can body is supported by a mandrel freely rotatable about its longitudinal axis and carried by an intermittently rotatable carrier by which a can body on a mandrel is pressed into engagement with a blanket on the impression roller. During the printing operation the can body is rotatable about the axis of the mandrel due to friction between the body and the blanket but the carrier must remain stationary for an interval of time which ensures that the body completes one revolution about the axis of the mandrel. This imposes the necessity for intermittent operation of the carrier. Thus with the known machines, because of the dynamics involved in starting, accelerating, decelerating, and stopping of the carrier between each operation, even when the can bodies are automatically placed on and removed from the mandrels, the rate of operation rarely exceeds forty printed bodies per minute.

It is a main object of the present invention to increase the rate of output of a machine for printing on the exterior of can bodies by eliminating the need for the body carrier to be stationary during printing.

According to the invention there is provided apparatus for printing on the exterior of circular can bodies, comprising an impression member adapted for continuous movement in one direction, and a can body carrying device operable in timed relation with said member to cause a can body to be pressed into engagement with the impression imparting surface of the member and to follow the path of said surface during said engagement while permitting rotation of the body about its longitudinal axis.

In order that the invention may be clearly understood, one embodiment thereof will now be described, by way of example, with reference to the accompanying diagrammatic drawings, in which:

Fig. 1 is an elevation illustrating apparatus according to the invention, and
Fig. 2 is a section along the line 2—2 of Figure 1, to an enlarged scale, of a part of the apparatus shown in Fig. 1.

Referring to the drawings, the apparatus comprises an impression member 1 such as is usually employed in machines for printing on the exterior of can bodies, the impression member consisting of a roller provided with rubber offset blankets which pick up ink from inking units, not shown, for example from up to four different colour inking units. The roller is continuously rotated in one direction as indicated by arrow 2, Fig. 1.

The can bodies on which printing is to be effected are supported by a can body-carrying device which is operable in timed relation with the impression member 1 to cause a can body, indicated diagrammatically as at 3, Fig. 1, to be pressed into engagement with the impression imparting surface of the member 1 and to follow the path of the surface during such engagement, while permitting rotation of the body about its longitudinal axis. The can body-carrying device comprises a plurality of arms 4 supported for movement with a carrier 5 which is rotatable about an axis 6 parallel with the axis of roller 1 and in timed relation with the roller 1. Each arm 4 is rockable about a pivot 7 the axis 8 of which is parallel with the axis 6, Fig. 1, of rotation of the carrier. The axes 8 are equispaced one from the other and the carrier may be provided with, for example, six arms 4. Each arm supports a can body-receiving mandrel 9 which is mounted in bearings 10, Fig. 2, in the arm 4 so as to be freely rotatable about its axis 11, which axis is parallel with the axis 6 of rotation of the carrier.

A track-type cam 12 is adapted to constrain the axis 11 of each mandrel to follow a path a portion 13 of which is parallel with the surface of the impression member 1, and a spring 14 is provided to maintain the arm 4 in operative relation with the cam 12 and to press a can 3 against the impression imparting surface of the impression member 1, the spring 14 being mounted on a pivotedly mounted rod 14'. The cam 12 is a stationary cam and the portion 15 of the cam contour is located, as shown in Fig. 1, in the plane of that part of the surface of the impression member 1 which is engaged by a can body during a printing operation. Each arm 4 is provided with a cam follower 16, Fig. 2, the diameter of which is equal to that of the can body to be carried by the mandrel 9. As can be seen from Fig. 2 the cam follower 16 is a roller carried by an extension 17 of the mandrel and the roller 16 is freely rotatable about the extension 17. By this arrangement, when the apparatus is to be employed for printing on a can body of a diameter different from that for which the apparatus is conditioned at a given time, the apparatus can be conditioned to accommodate the can bodies of different diameter by the replacement of the mandrels by a different set of mandrels and of one set of cam followers 16 by a set of cam followers of different diameter, as indicated diagrammatically at 16a, Fig. 1. By this means the apparatus can be conditioned to accommodate cans of different sizes without the necessity of altering the linear speed of the impression roller 1.

In operation the carrier 5 is rotated in the direction of arrow 18, Fig. 1, that is in opposite sense to that of roller 1, and as each cam follower 16 moves over the portion 15 of the contour of cam 12 the arm 4 is caused to rock about its axis 8 so that the axis 11 of the mandrel follows the path portion 13, the spring 14 ensuring that the follower 16 is maintained in engagement with the contour of the cam and that at the appropriate time the can body carried by the mandrel 9 is pressed against the surface of the impression member 1. Rotation of the cam about the axis 11 of its mandrel is effected by frictional engagement between the can body and the impression member 1 due to the carrier 5 and impression member 1 being rotated at suitably different linear speeds. The length of the cam contour portion 15 is so selected as to ensure that the can body completes a revolution about the axis 11 before the body is moved out of contact with the impression member 1.

If desired, instead of the can bodies being fractionally rotated during printing they may be rotated positively
by a gear wheel, not shown, rotatable with the impression member 1, the gear wheel being arranged to mesh with pinions, also not shown, rotatable with the mandrels on a pitch line coincident with the impression-imparting surface of member 1.

From the foregoing it will be understood that by the use of apparatus as herein described rotation of the carrier 5 can be continued during the printing of can bodies and by using any suitable known apparatus for continuously rotating the carrier, for feeding the can bodies on to the mandrels, and for removing the bodies from the mandrels after printing, the stationary periods of the carrier can be eliminated. Thus by the use of apparatus as herein described it is possible to effect printing of can bodies at an increased rate as compared with the forms of apparatus known prior to the invention.

I claim:

1. Apparatus for printing on the exterior of circular can bodies, comprising an impression member the impression-imparting surface of which is movable continuously in one direction, a carrier rotatable in timed relation with the movement of said surface, a plurality of arms supported by the carrier for rocking movement about pivots parallel with the axis of rotation of the carrier, a can body-receiving mandrel supported by each said arm for rotation about an axis parallel with the axis of rotation of the carrier, a cam adapted to constrain the axes of the mandrels to follow a path parallel with said impression-imparting surface during engagement between the surface and can bodies carried by the mandrels, cam engaging means carried by said arm, and for each cam engaging means a spring to maintain the arm in operative relation with the cam.

2. Apparatus for printing on the exterior of circular can bodies, comprising an impression member the impression-imparting surface of which is movable continuously in one direction, a carrier rotatable in timed relation with the movement of said surface, a plurality of arms supported by the carrier for rocking movement about pivots parallel with the axis of rotation of the carrier, a can body-receiving mandrel supported by each said arm for rotation about an axis parallel with the axis of rotation of the carrier, a stationary cam adapted to constrain the axis of each mandrel to follow a path parallel with said surface during engagement between the surface and a can body carried by the mandrel, a cam follower carried by an extension to each mandrel and arranged to be freely rotatable about the axis of the mandrel, and for each mandrel a spring acting to maintain the follower carried thereby in operative relation with the cam.

3. Apparatus for printing on the exterior of circular can bodies, comprising an impression member rotatable continuously in one direction, a carrier rotatable continuously in opposite sense to and in timed relation with said member, at least one arm movable with the carrier and supported thereby for pivotal movement relative thereto about an axis parallel with the axis of rotation of the carrier, a can body-receiving mandrel carried by said arm to be rotatable about an axis parallel with the pivotal axis of the arm during the transfer of an impression from the impression-imparting surface of said member to a can body fitted to the mandrel, and a cam means adapted to co-operate with the mandrel and to constrain the axis of the mandrel to follow a path parallel with said surface so that the can body is caused to be pressed into engagement with said surface and to follow the path thereof during the transfer of an impression to the can body.

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