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Perret

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[54] **APPARATUS FOR PRINTING ON CYLINDRICAL ARTICLES**

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[51] **Int. Cl.** **B41f 17/22**

[58] **Field of Search** 101/38–40, 376

[56] **References Cited**

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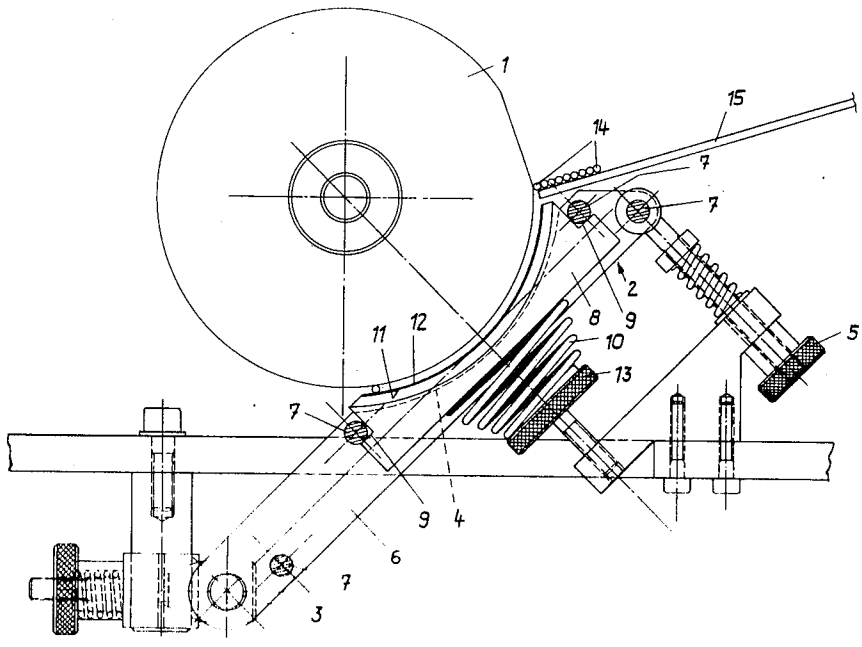
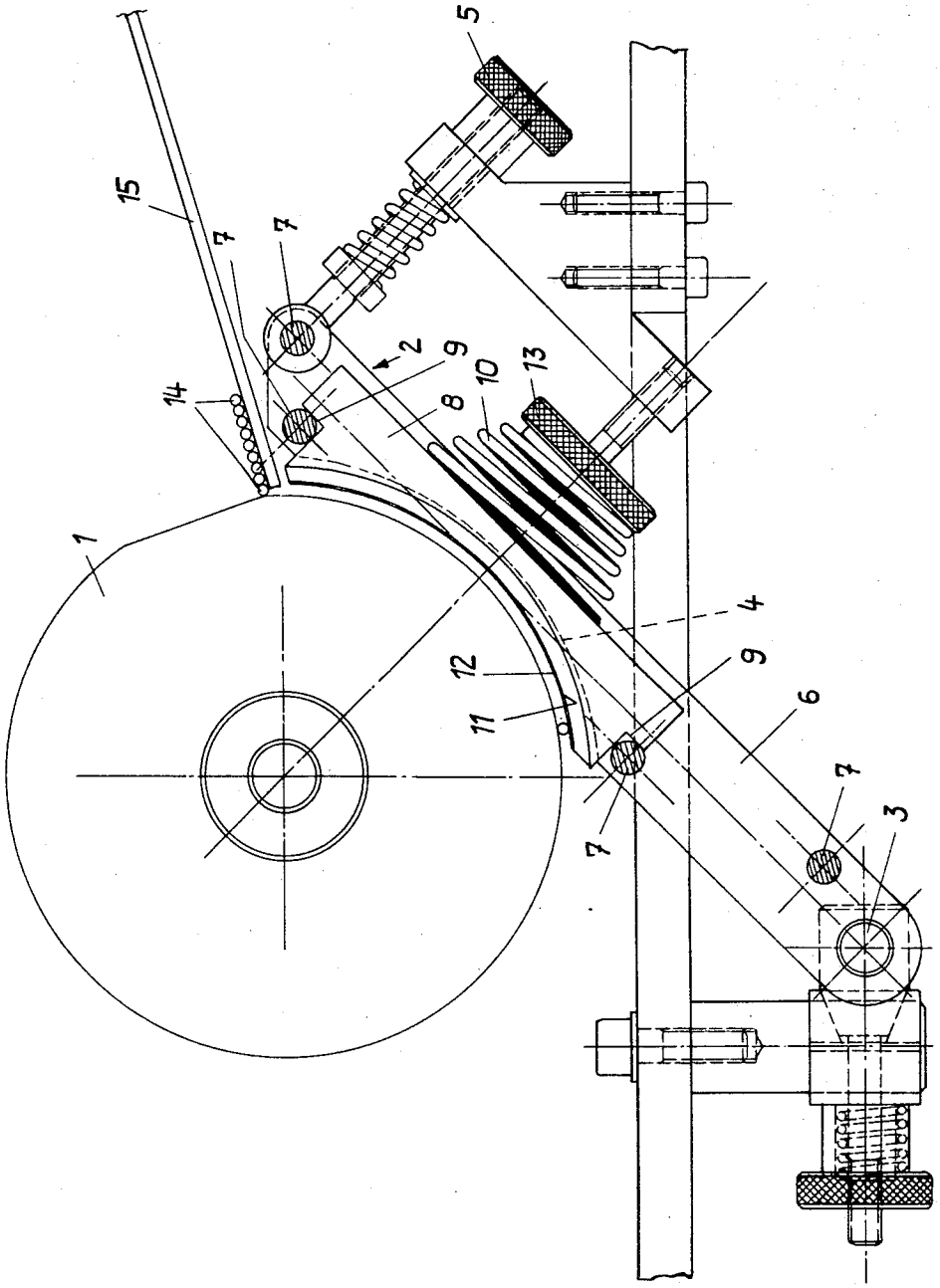
[57] **ABSTRACT**

A printing machine for automatically printing cylindrical articles, such as tubes, has a stereotype on the cylindrical surface of a rotatable drum. A member having a surface in the form of a sector of a cylinder is floatably mounted on a rigid orientable cradle. Spring means urge the member towards the drum and stop means on the cradle cooperate with the member to define a rest position in which the said surface is concentric to the drum and separated therefrom by a gap smaller than the diameter of the articles. During printing, the articles roll one by one over the surface of the member which, by displacement, accomadates for irregularities in the shape of the articles.

3 Claims, 1 Drawing Figure





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APPARATUS FOR PRINTING ON CYLINDRICAL ARTICLES

BACKGROUND OF THE INVENTION

This invention concerns the printing of generally cylindrically shaped articles such as, for example, tubes of glass or synthetic material of very small diameter.

It is often necessary to print mass produced cylindrical articles of small diameter, for example plastic tubes, empty or containing a biological product, to indicate a date, identification data, or any other useful inscription.

A known machine for printing such articles comprises a rotary central drum carrying a printing stereotype, the members to be printed passing between the drum and a guide coaxial therewith through a free space of a length corresponding to that of the articles. The drum, by rotating, causes rolling of the articles about their axis and their delivery along the said space whilst being applied against the printing stereotype. During this delivery friction is caused due to geometrical faults of the articles to be printed and the difference of circumference between the surface of the drum and the corresponding outer surface of the guide. It is difficult to obtain an equilibrium of the points of friction in order to ensure that the delivery of the articles takes place parallel to the axis of the drum.

SUMMARY OF THE INVENTION

It is an object of the invention to provide a machine for printing generally cylindrical shaped articles which is free of the above-mentioned drawbacks.

The invention therefore provides, in a printing machine for automatically printing generally cylindrical shaped articles, comprising printing means on a cylindrical surface of a drum rotatable about a central axis, the improvement comprising a member floatably mounted on a rigid orientable cradle. Said member has a surface in the form of a sector of a cylinder located outside of and, when the member is in a rest position, concentric with said drum so as to define a delivery surface for articles to be printed. Spring means urge the member towards the drum, and stop means on the cradle cooperate with the member to define said rest position in which the separation between delivery surface of the member and the cylindrical surface of the drum has a minimum value less than the diameter of an article to be printed.

In operation, a generally cylindrical shaped article rolled along said delivery surface by rotation of the drum is evenly pressed against the printing means by displacement of the floating member against the action of the spring, so as to enable compensation for any irregularity of shape of the generally cylindrical shaped articles.

DESCRIPTION OF A PREFERRED EMBODIMENT

The single FIGURE of the accompanying drawings schematically shows, by way of example, an embodiment of the invention.

The printing machine shown comprises a rotary drum **1** which can be rotated about a horizontal axis by conventional driving means (not shown), the drum **1** carrying a printing stereotype, for example in plastic material. A cradle **2** is pivotally mounted about a positionally adjustable horizontal axle **3** fixed to the frame of the printing machine. This cradle is formed of two flat bars **6** (only one being visible in the drawing) connected together by four cylindrical cross-bars **7**. Each bar **6** has an arcuate cut-away **4** arranged coaxial to the drum, the separation of the cut-aways from the stereotype being adjustable by adjustment of the position of axle **3** and corresponding adjustment of a regulating screw **5** connected to the frame. A floating member **8** having a surface **11** in the shape of a cylindrical sector is freely mounted in the cradle **2**, shoulders **9** of this member being urged against the two inner cross-bars **7** by means of a conical compression spring **10**. The surface **11** is, in its normal position, concentric to the drum surface and is covered by a rolling layer **12** in synthetic rubber having two ribs tangential to the drum, thereby forming a delivery surface along which cylindrical articles to be printed can be rolled. A regulating screw **13** on the frame enables adjustment of the force of the spring **10** urging the member **8** towards the corresponding surface of the stereotype. The spring **10** allows slight movement of the member **8** in all directions.

Generally cylindrically shaped articles to be printed, namely tubes **14**, are fed to the drum **1** by means of a feed slope **15**, and pass one by one into the space comprised between the delivery surface of the member **8** and the printing stereotype on the drum **1**. During this passage, the tube **14** rolls about its axis and is pressed against the printing stereotype by means of the spring **10** and thus is printed with the impression of the stereotype. The unavoidable irregularities of shape of the tubes **14** are thus absorbed by the spring **10**, which ensures perfect printing.

The member **8** urged by the spring **10** is held in place by the two inner cross-bars **7** of the cradle **2**. The latter is positionally adjusted so that the free space between the delivery surface of the member **8** and the surface of the stereotype is normally, i.e., when the shoulders **9** bear against the cross-bars **7**, equal to three fifths of the mean diameter of the tubes **14**, this space being accurately constant all along the delivery surface. When a tube is fed to the upper part of the member **8** from slope **15**, the member **8** is displaced away from the stops formed by the two cross-bars **7**, and the pressure of spring **10** is transmitted to the tube **14** which rolls in contact with the stereotype.

Irregularities, consisting of an ovalisation or conicity of the tubes **14**, or caused by friction or by protrusion of the stereotype above the working surface of the drum, are absorbed by the mobility of the member **8** which floats between the bars **6** of cradle **2** and is held solely by its spring **10**, which avoids any pivoting of the tube **14** away from its position parallel to the axis of the drum.

Two stop members (not shown) in supple rubber, aligned with one another, place the tube **14** at the moment of feed into the delivery space in a position exactly parallel to the drum axis before the tube is urged against the stereotype by the friction bands of the rolling surface.

The described device has several advantages over known devices. The use of known printing machines is difficult in as much as adjustment of the delivery surface is difficult. It is always found that several tubes become skewed, which leads to defective printing. This

fault is eliminated with the described device. The mobility of the member **8** additionally enables an appreciable diminution of the spring pressure, which avoids streaks of ink upon printing the first line of the stereotype caused by a slight sliding of the article being printed at the moment when it overlaps the stereotype. The quality of the printing is thus greatly improved. Dismantleing of the member **8** for cleaning takes place easily by removing it from the stop-forming cross-bars after having reduced the pressure of the spring as much as possible. The suppleness afforded by the described device enables printing of generally cylindrically shaped articles, such as tubes in supple plastic material, tubes in fragile glass, or rods of graphite, which are very difficult to print with known machines.

What is claimed is:

1. In a printing machine for automatically printing generally cylindrical shaped articles, comprising printing means on a cylindrical surface of a drum rotatable about a central axis, a rigid orientable cradle mounted adjacent said drum, a member floatably mounted on

said cradle in a manner to allow slight movement of said member in all directions, said member having a surface in the form of a sector of a cylinder located outside of and, when the member is in a rest position, concentric with said drum so as to define a delivery surface for articles to be printed, spring means urging said member towards said drum, and stop means on said cradle cooperating with said member to define said rest position in which the separation between the delivery surface of said member and said cylindrical surface of said drum has a minimum value, said minimum value being less than the diameter of an article to be printed.

2. A printing machine according to claim **1**, and additionally means for pivotally mounting said cradle about an axis parallel to the axis of rotation of said drum, to adjust for the radial separation between said cradle and said drum.

3. A printing machine according to claim **1**, comprising means for adjusting said spring means.

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