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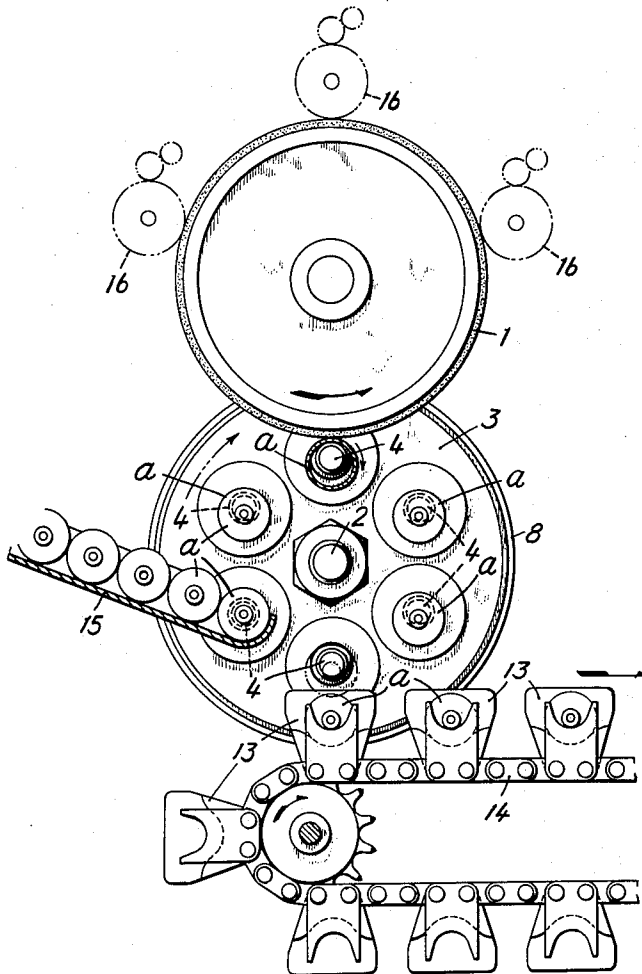
ICHIRO HAKOGI
PRINTING MACHINE

3,115,091

Filed Jan. 30, 1962

2 Sheets-Sheet 1

FIG. 1



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FIG. 2

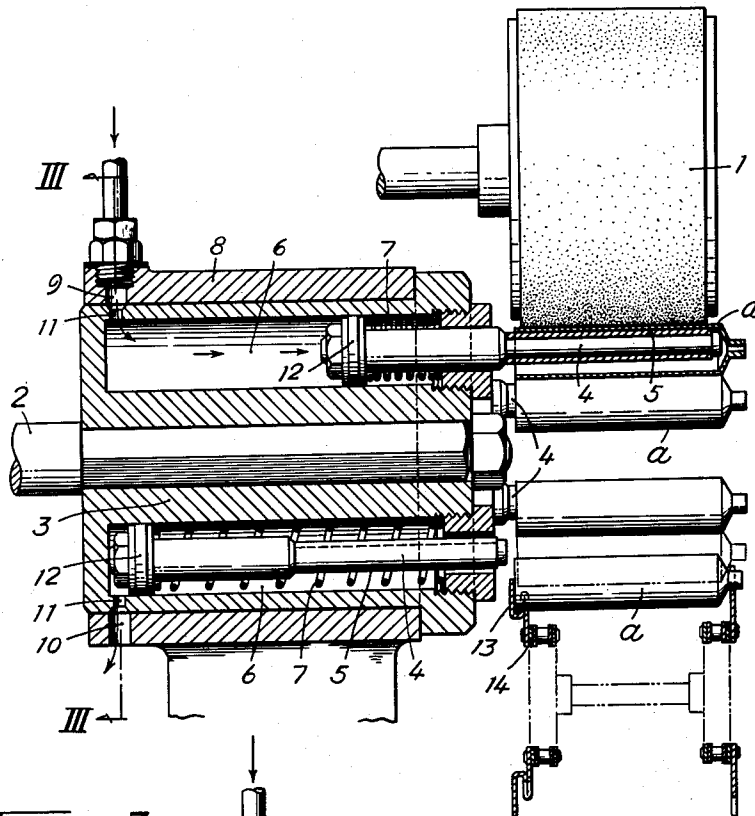
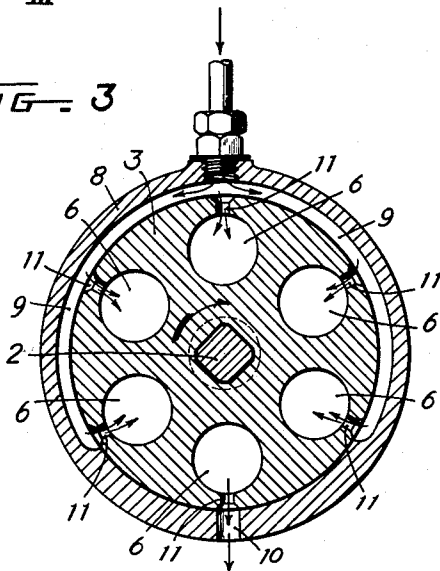


FIG. 3



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3,115,091

PRINTING MACHINE

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2 Claims. (Cl. 101—40)

The present invention relates to a printing machine for applying print or paint to the outer surface of a hollow article such as a tube, and is more particularly directed to a mandrel arrangement for supporting articles to be printed in such a printing machine as above.

In the hitherto known turret type of printing machine wherein a turning plate which has on its front surface a number of circumferentially disposed and forwardly projecting mandrels is provided and, by turning said turning plate intermittently, articles to be printed which are supported by the mandrels are one after another brought into contact with a blanket cylinder for being printed thereby, it has been the usual way in its operation that the articles are put on and pulled off from the mandrels by manual operation by an operator when the turning plate stops.

The principal object of the present invention is to provide a mandrel arrangement which enables to perform automatically such putting-on and taking-off of the articles for heightening the printing efficiency.

Another object of the present invention is to provide a concrete construction for accomplishing the above-mentioned principal object completely.

According to the present invention, there is provided a printing machine for hollow articles wherein a turning body which is driven to turn intermittently at regular angles has a number of projecting mandrels disposed circumferentially at regular intervals on a circle around the axis of the turning body so that articles to be printed may be put on said mandrels and be one after another brought into contact with a blanket cylinder for being printed thereby, the mandrel arrangement being such that the mandrels are slidable in the axial direction and are forced to advance and retract periodically with a relation to the turning movement of said turning body.

Other and further objects and features of the present invention will be made clear from the following explanation of the embodiment shown on the accompanying drawings, wherein:

FIG. 1 is a front view of a printing machine to which is applied the present invention,

FIG. 2 is a side view, partly in section, of the same, and

FIG. 3 is a sectional view taken along the line III—III in FIG. 2.

Referring to the drawings, numeral 1 denotes a blanket cylinder and a driving shaft 2 parallel with the axis of the cylinder 1 has a turning body 3 attached thereto. The turning body 3 has on its front surface a number of axially and forwardly projecting mandrels 4 disposed at regular intervals circumferentially on a circle around the axis of the turning body so that when hollow cylindrical articles *a* to be printed such as tubes are put on the mandrels 4 and the turning body 3 is driven through the driving shaft 2 by a source of power to move the mandrels 4 intermittently at regular angles, the articles *a* are one after another brought into contact with the blanket cylinder 1 for being printed thereby while being given self-rotation. Accordingly, it is desirable that each mandrel 4 is rotatable with the article *a* or is provided at its article supporting portion with a rotatable tubular roller 5 as shown on the drawings.

The present invention is especially characterized in that, in such a printing machine as described above, the

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mandrels 4 are slidable in their axial direction and are moved to advance and retract periodically with a relation to the intermittent turning movement of the turning body 3. Namely, as illustrated in FIG. 2, each mandrel 4 is inserted slidably in a cylinder chamber 6, which is made in the turning body 3 and is closed at its rear end, and is urged inwardly by a spring 7 to retract in the ordinary condition. Around the turning body 3 is provided a fixed valve casing 8 which has in its inner surface an inlet groove 9 communicated with a source of pressure fluid such as pressed air and also an outlet opening 10 communicated with the air, and each cylinder chamber 6 has at its rear end portion an air port 11 to be communicated with the groove 9 or the opening 10. Any cylinder chamber 6 of which the port 11 is opposed to and communicated with the inlet groove 9 is charged with pressure fluid so that its mandrel 4 is projected forwardly against the spring 7 by being pressed by the fluid at its piston plate 12 attached to the rear end thereof, and any cylinder chamber 6 of which the port 11 is opposed to and communicated with the outlet opening 10 is communicated with the air so that its mandrel 4 is retracted by the spring 7.

In the embodiment shown on the drawings, six mandrels 4 are arranged and the size of the inlet groove 9 and the outlet opening 10 are so designed that out of said six mandrels five are always projected and one is retracted. In other expression, each mandrel is so moved periodically in its every one revolution that it is retracted at one stop position but is in its projecting condition at other five stop positions. It is of course that by changing the size mentioned above any desired mandrel may be at any stop position selectively in either projected or retracted condition. Furthermore, the above is such that the mandrels 4 are periodically advanced and retracted by fluid pressure by operating a valve mechanism with a relation to the movement of the turning body, but it is, needless to say, that cam and lever mechanism can be used instead thereof for accomplishing the same object. Furthermore, it is also possible that the above-mentioned embodiment can be so modified that the mandrels 8 are retracted not by the action of the spring but by that of the fluid pressure applied thereto. Numeral 16 denotes a plate cylinder.

As, in the present invention, the mandrels 4 are movable forwardly and backwardly as described above, there may be such characteristics that to convey articles *a* to be printed to the printing position by putting the same on the mandrels which are in their projecting condition and to then take off the articles *a* after printed from the mandrels 4 at the position left from the printing position by the retraction of the mandrels can be performed very simply and conveniently, and to then put new articles *a* on the mandrels 4 can be facilitated by utilizing the next projecting action of the mandrels 4. If, for example, a chain conveyor 14 having receivers 13 is provided below the position where the mandrels 4 are retracted and is moved in one direction, articles *a* removed from the mandrels 4 by the retraction thereof may be immediately accepted by the receivers 13 for being carried away or conveyed to the next drying apparatus. If, furthermore, an inclined trough form of feeding table 15 is provided in front of the position where the mandrels 4 are projected, articles *a* to be printed which are placed in order on said table 15 may be inserted by the mandrels by the projection thereof for being conveyed one after another to the printing position, thus being carried out the feeding or charging action of the articles *a* automatically.

As, in the present invention, the mandrels are slidable in the axial direction and are moved to advance and retract periodically with a relation to the turning movements of the turning body as described above, advantages

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are such that automatic charging and discharging operation of articles can be extremely facilitated and there may be obtained a printing machine of high efficiency and of simple construction.

What I claim is:

1. A printing machine for hollow articles comprising a driving shaft, a body fixedly mounted on said shaft for rotation therewith and having a series of recesses therein positioned at regular intervals on a circle around said shaft, a plurality of mandrels each slideably positioned in one of said body recesses, means tending to retain said mandrels in their body recess, means for extending each mandrel from its body recess at desired positions around said shaft, a support for a plurality of the hollow articles positioned for feeding said hollow articles one at a time in front of said body recesses to receive a mandrel therein, a rotatably mounted and driven printing blanket positioned for engaging each hollow article on a mandrel as said body is rotated thereby, a conveyor for receiving each hollow body when its supporting mandrel is withdrawn into said body and means for driving said shaft intermittently.

2. A printing machine for hollow articles as claimed in

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claim 1 wherein said body is of a cylindrical configuration and has radial ports leading to said body recesses and said mandrel extending means consists of a fixed casing surrounding the periphery of said body having an inner groove partially surrounding said body and communicating with some of said body ports and an exhaust port communicating with at least one of said body ports when in line therewith, a source of compressed air leading to said casing groove and pistons connected to said mandrels for being moved by compressed air entering said body recesses.

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