Nov. 19, 1968 H. A. MOES ET AL 3,411,439

PRINTING OR DECORATING MACHINE

Filed April 3, 1967 5 Sheets-Sheet 1

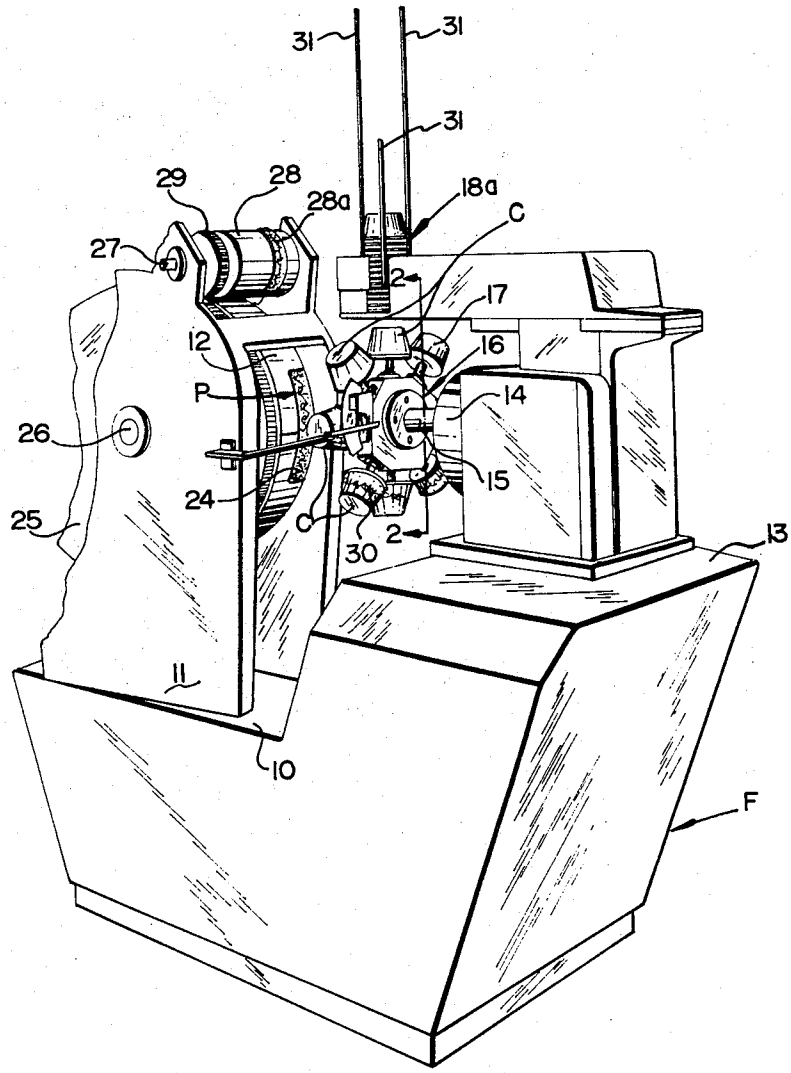


FIG 1

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PRINTING OR DECORATING MACHINE

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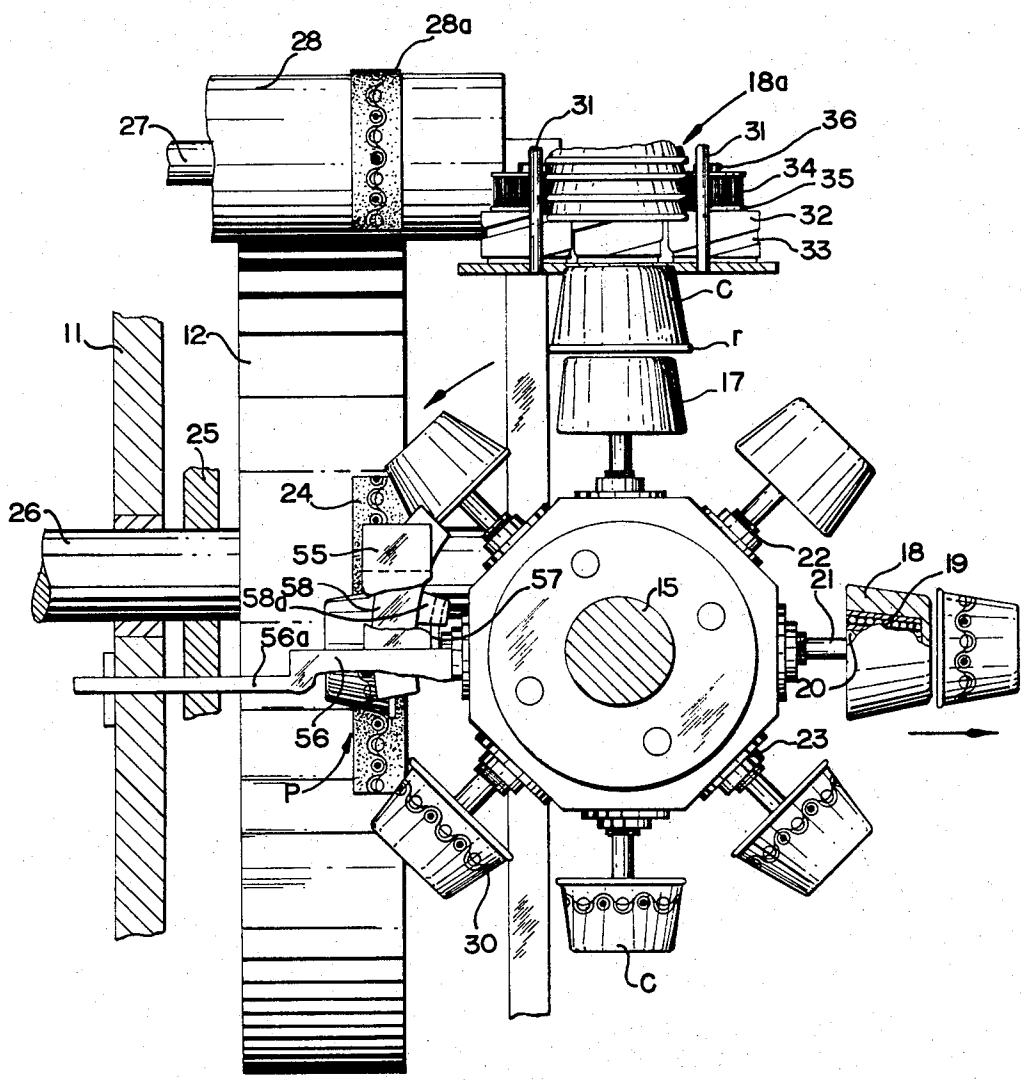


FIG 2

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PRINTING OR DECORATING MACHINE

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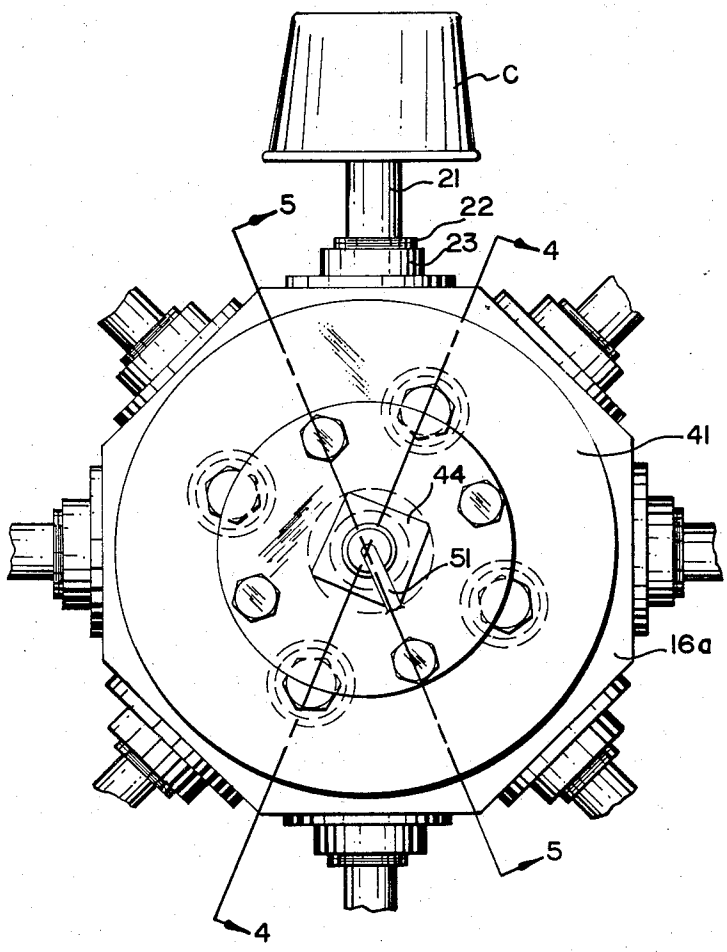


FIG 3

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PRINTING OR DECORATING MACHINE

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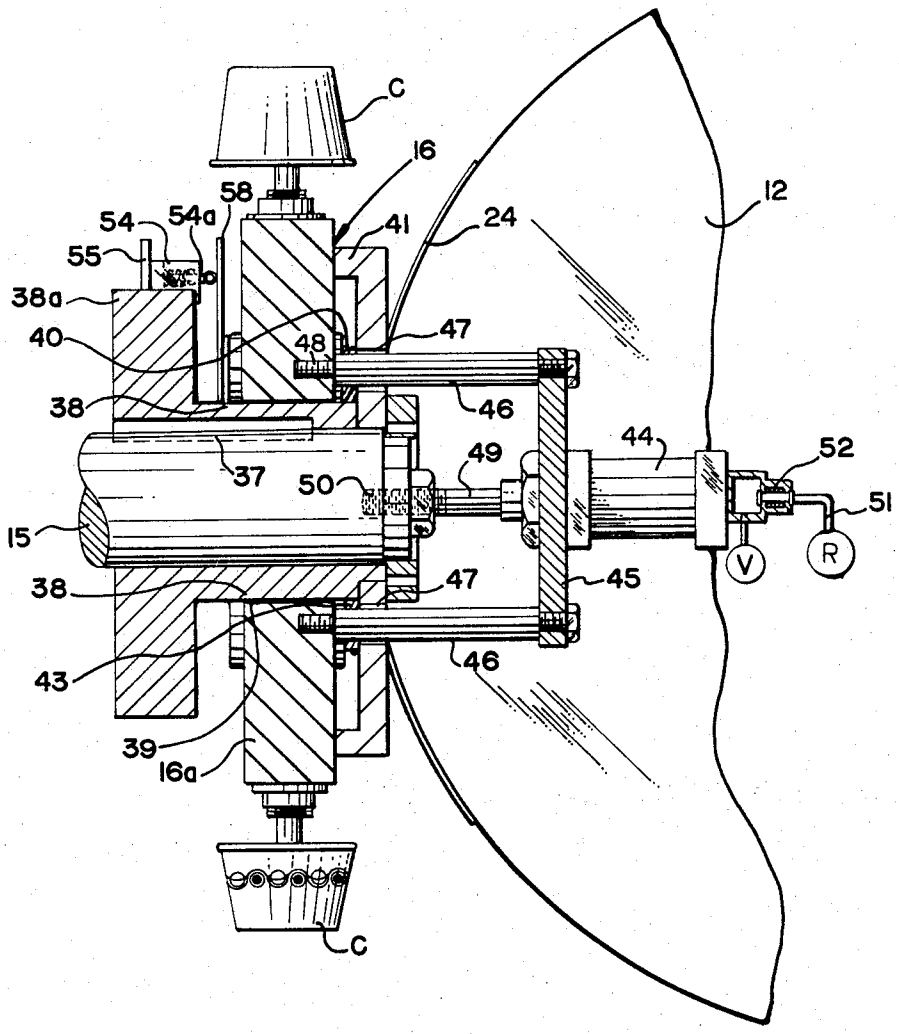


FIG 4

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PRINTING OR DECORATING MACHINE

Filed April 3, 1967 5 Sheets-Sheet 5

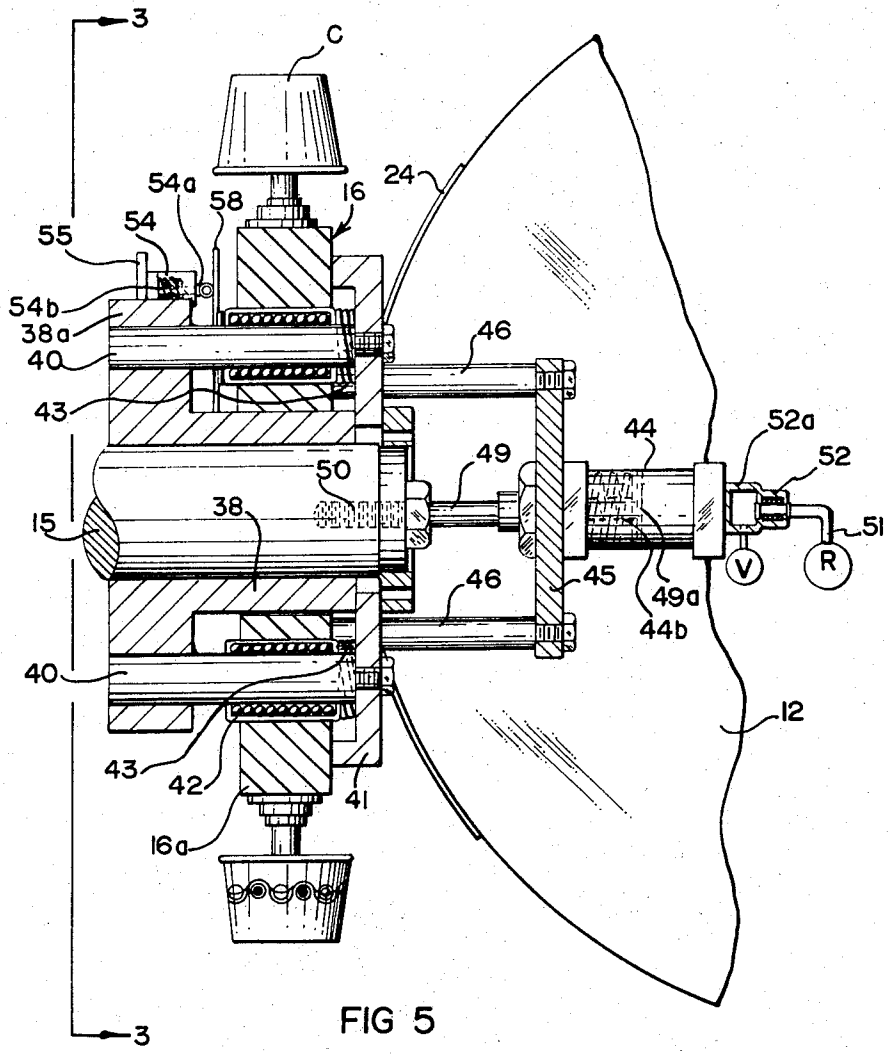


FIG 5

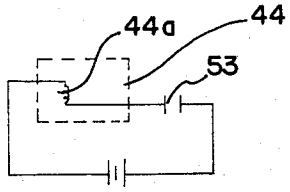


FIG 6

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United States Patent Office 3,411,439 Patented Nov. 19, 1968

3,411,439

PRINTING OR DECORATING MACHINE

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Filed Apr. 3, 1967, Ser. No. 627,929
11 Claims. (Cl. 101—38)

ABSTRACT OF THE DISCLOSURE

A printing or decorating machine having an orbiting, indexing turret with a plurality of circumferentially spaced, container-receiving arbors thereon which are movable in a path of travel to a continuously revolving decorating or printing drum to present a side wall portion of a container to the drum at a decorating station, the machine having sensing means conditioned to determine whether an arbor proceeding to the decorating station has a container thereon, and mechanism controlled by the sensing means for moving the entire turret and all of the arbors thereon axially away from the printing drum if no container is on the particular arbor approaching the printing station.

Background of the invention

This invention relates to a decorating or printing machine of the general character disclosed in the Hovekamp and Russell United States Patent No. 3,195,451, wherein an indexing turret of the same character is employed and wherein each of the radically extending, container-mounting arbors is itself withdrawable if, for some reason, no container is received on the arbor. The present invention is concerned with much simpler and more reliable mechanism employing another concept in which the entire turret is withdrawn axially if no container is provided on an arbor which is to be moved to the decorating or printing station.

One of the prime objects of the invention is to provide arbor withdrawing mechanism for sensing when a container is not in position on an arbor as it approaches the printing station, which is far easier and more economical to manufacture and maintain in good operating condition.

Summary of the invention

Briefly, the invention includes an axially reciprocable turret for supporting the circumferentially spaced arbors on an orbiting shaft and a sensing means disposed so as to be simultaneously engaged by containers on two successive arbors for withdrawing the turret from the decorating or printing member if one of the arbors has no container thereon.

Other objects and advantages of the invention will be pointed out specifically or will become apparent from the following description when it is considered in conjunction with the appended claims and the accompanying drawings, in which:

FIGURE 1 is a fragmentary, perspective, side elevational view of the machine with cups being shown in position on the transport arbors or mandrels;

FIGURE 2 is an enlarged, transverse sectional view of the arbor indexing turret taken on the line 2—2 of FIGURE 1;

FIGURE 3 is an opposite end elevational view of the turret taken on the line 3—3 of FIGURE 5;

FIGURE 4 is a fragmentary, sectional, side elevational view taken on the line 4—4 of FIGURE 3;

FIGURE 5 is a similar view taken on the line 5—5 of FIGURE 3 and showing the turret assembly in printing position;

FIGURE 6 is a schematic view of an electrical circuit which may be used.

Referring now more particularly to the accompanying drawings, a letter F generally indicates the frame of the decorating or printing machine (FIGURE 1), which includes a bed surface 10 mounting spaced apart supports 11 on which a printing wheel or drum 12 is journaled on a shaft 26. A pedestal surface 13 supports an indexing drive unit 14 from which extends a drive shaft 15 on which a turret assembly or mandrel carrier generally designated 16 is fixed for rotation. The unit 14 may comprise conventional geneva mechanism or cam mechanism of the character shown in U.S. Patent No. 3,228,086 connected to a suitable electric motor and, as shown in FIGURE 1, is provided to revolve the turret 16 in counterclockwise increments to dispose mandrels or arbors 17 successively opposite the periphery of drum 12 at a printing or decorating station P. The turret shown moves successively through 45° arcs of revolution and has a short period of dwell between each revolving movement.

The container supporting arbors 17 receive the plastic containers C to be printed from an overhead supply source generally designated 18*a* in a manner which will be described. Each of the mandrels 17 comprises a frustoconical outer sleeve 18 (FIGURE 2) rotatably mounted by a ball bearing assembly 19 on a tubular support 20 fixed to a tubular rod 21 having an enlarged threaded portion 22 which is received by a mounting block 23. As FIGURE 2 indicates, a container C is received upon a mandrel 17 in the twelve o'clock position, when the indexing turret assembly 16 is momentarily halted. From the twelve o'clock position, each mandrel 17 is rotated in a counterclockwise direction in FIGURE 2, to engage an image transferring blanket 24 mounted on the printing drum 12. Each container C is then discharged as indicated in FIGURE 2 when the mandrel 17 which supports it pauses at the three o'clock position.

The printing mechanism

Because the containers C have inclined side walls, the printing drum support members 11 are parallelly mounted on the bed surface 10 in a skewed position in order that there may be a continuous or overall contact of the tapering container side wall with the blanket 24 on drum 12. The drum 12, which may have four circumferentially spaced blankets 24, is driven at a predetermined low speed in the neighborhood of about 50 r.p.m. by a gear 25 mounted on the shaft 26. The gear 25 may be driven by a suitable electric motor (not shown) through conventional shafting and gearing in any convenient manner.

For the sake of convenience, it may be assumed that the offset printing mechanism shown and described in the Hovekamp and Russell, United States Patent No. 3,195,451 is used in the present machine and accordingly the printing mechanism will not be described in detail. Only the parts shown in FIGURE 1 will be identified. Mounted on a shaft 27 journaled between supports 11 is a roll 28 incorporating a gear 29 in mesh with the gear 25. The roll 28 also incorporates a plate 28*a* for transferring images to the blankets 24. The usual mechanism is provided for supplying ink to the plate cylinder 28. The circumferential spacing between blankets 24 is such, and the speeds of printing drum 12 and the indexing turret assembly 16 are so correlated, that a radially protruding blanket 24 does not engage a container C until the container C has been indexed to the nine o'clock position (FIGURE 2) and has paused for an interval during which time the leading end of the blanket engages the side wall of the container C at the nine o'clock position and causes the mandrel sleeve 18 to revolve to transfer the image from the blanket 24 to the container side wall as at 30.

The container feed mechanism

The container source, generally designated **18***a*, incorporates feed mechanism for moving containers one at a time to each mandrel **17** in the manner shown in FIGURE 2. Again for the sake of convenience, it may be assumed that this feed mechanism is identical to that described in the aforementioned United States patent and accordingly only the portions of the feed mechanism shown in FIGURES 1 and 2 will be identified. The stack of containers C to be decorated or printed are supplied between a plurality of circumferentially arranged and spaced, vertically extending guide rods **31**. Surrounding the guide rods **31** are a plurality of circumferentially arranged screw feed cylinders **32** having helical grooves **33** for engaging the rims *r* of the containers and moving them downwardly from the guide rods **31**. The feed cylinders **32** may be driven in unison by a common drive belt **34** trained around a drive pulley **35** mounted on each feed cylinder drive shaft **36**. As in the aforementioned patent, the belt **34** may be driven by a suitable drive pulley which in turn is driven by suitable drive means (not shown) and, of course, the rotation of feed screw members **32** is correlated with the speed of rotation of drum **12** and the indexing of the turret assembly **16** so that only a single container at a time is delivered to each mandrel **17** in properly timed relation.

The container sensing and turret withdrawing mechanism

As previously indicated, mechanism is provided for insuring that the blankets **24** will not print the mandrel sleeves **18** when no containers C are actually in place on the mandrel **17**. This mechanism is particularly shown in FIGURES 4 and 5 and will now be described in detail.

Keyed on the outboard end of shaft **15** as at **37** is a guide sleeve **38** which rotates with the shaft **15** but is axially fixed thereon. The turret assembly **16**, which includes a plate **16***a*, is bored as at **39** and is mounted on the sleeve **38** for axial sliding movement on guide rods **40** anchored between a hub portion **38***a* of sleeve **38** and a stop plate **41** which is fixed to the sleeve **38**. To assure smooth axial sliding movement of the turret plate **16***a*, roller bearing assemblies **42** are provided on the turret plate **16***a* surrounding rods **40** as shown. Coil **43** mounted on the guide rods **40** normally urge the turret plate **16***a* in a direction away from the printing drum **12**, and a single-acting, fluid pressure operated cylinder **44** is provided to move the turret plate **16***a* toward the drum **12** when sensing means to be later described indicates a container C is in position on a mandrel **17** at the printing station P. When fluid under pressure is admitted to the right end of the cylinder **44** in FIGURE 5, the springs **43** are overcome and the container C on the mandrel **17** at the printing station P is held in printing engagement with a blanket **24** on drum **12**. Cylinder **44** may be a conventional single-acting, solenoid-operated, spring-returned air cylinder, having the usual valve operating cylinder advanve solenoid **44***a* (see FIGURE 6), and may be mounted on a plate **45** supported by rods **46** which extend freely through openings **47** in plate **41** and are threaded as at **48** in openings provided in the turret plate **16***a*. The piston rod **49** of the cylinder **44** is threaded at its outboard end and is received in a threaded opening **50** provided in shaft **15**. A return spring **44***b* is provided in cylinder **44** to bear against the ram **49***a* on rod **49** and return the cylinder **44** when air is permitted to bleed from cylinder **44**.

To permit the cylinder **44** to rotate with the turret assembly **16**, the line **51** for supplying air to operate spring-returned cylinder **44** is received in a rotary coupling **52** concentrically disposed with the axis of rotation of shaft **15** and connecting with air chamber **52***a*. The normally open contacts **53** (see FIGURE 6) of a limit switch **54** (see FIGURE 4) are provided to operate the cylinder **44**, the switch **54** being supported on a

bracket **55** mounted on a support **56** having a transversely extending arm **56***a* (see FIGURE 2). Also mounted on the arm **56***a*, as shown in FIGURE 2, is a rod **57** on which an arcuate sensing plate **58** is mounted for pivotal movement on pin **58***a* (FIGURE 2) toward and away from drum **12**.

The operation

It is important to note that the arcuate plate **58** is of sufficient length and is so located that a container C on one mandrel has not passed beyond it before a container C on another mandrel engages its leading edge. Thus, if containers C are provided on all of the mandrels, the plate **58** will remain in a leftward position in FIGURE 5 to maintain the limit switch actuator roller **54***a* in actuated position and keep the contacts **53** closed. If, however, no container C is in position on a mandrel **17** as it passes to the leading edge of sensing plate **58** and the preceding container C has moved beyond plate **58**, the spring loaded limit switch arm **54***a* is free to move outwardly under the influence of the switch spring **54***b* and contacts **53** accordingly open to deenergize the solenoid **44***a* and permit the return springs **43** to move turret assembly **16** outwardly a fraction of an inch away from the printing drum **12**. Thus, ink is never transferred from the printing drum to the surface of an arbor head and no ink is ever transferred to the interior surface of cups received on a decorated arbor head. In operation, it is the protruding rims *r* of the container C which engage the plate **58** and when no container appears on a given mandrel **17** movement of the turret assembly **16** outwardly need only be a matter of, for example, 40 thousandths of an inch, which is less than the width of the protruding lip or rim *r*. When two containers appear on a single mandrel **17** at the printing station P the blanket will not be injured because the cylinder **44** will "give." A regulating valve V may be provided to permit air to escape when a predetermined overpressure is reached in cylinder **44**. At the three o'clock discharge station the containers C could be removed manually but it is preferred that they be stripped from the mandrel **17** by a jet of air which is delivered through the tubular arbor support rods **21** and through suitable openings in the end of sleeve **18** to blow a container C to a suitable take-away conveyor (not shown).

It is to be understood that the drawings and descriptive matter are in all cases to be interpreted as merely illustrative of the principles of the invention rather than as limiting the same in any way, since it is contemplated that various changes may be made in the various elements to achieve like results without departing from the spirit of the invention or the scope of the appended claims.

What is claimed is:

1. In a machine for decorating workpieces such as container side walls: frame means; decorating member means; orbiting turret means having a plurality of radial container receiving arbors thereon movable in a path of travel past said decorating member means to present a side wall portion of a container to said decorating member means at a decorating station; switch means disposed adjacent said decorating station; sensing plate means disposed between the path of the arbors and the switch means and mounted for movement toward the switch means when engaged by a container on an arbor, and for return movement; and means controlled by said switch means for moving said turret means and decorating member means relatively apart if the said arbor has no container thereon, and in a direction toward one another to engage the container on the arbor with the decorating member means if the next consecutive arbor has a container thereon.

2. The combination defined in claim **1** in which said means controlled by the switch means includes a fluid pressure operated cylinder.

3. The combination defined in claim **2** in which the fluid pressure operated cylinder urges the turret means toward the decorating member means.

4. In a machine for decorating workpieces such as container side walls; frame means; decorating member means; means for rotating said decorating member means about an axis; shaft means extending generally perpendicularly to said axis; orbiting turret means mounted on said shaft means for rotation therewith and axial movement thereon and having a plurality of radial container receiving arbors thereon movable in a path of travel past said decorating member means to present a side wall portion of a container to said decorating member means at a decorating station; means for moving said turret means axially on said shaft means in a direction toward said decorating member means; sensing means positioned to determine whether an arbor to be moved to said decorating member means has a container thereon; and means controlled by said sensing means for moving said turret means and said arbors axially on said shaft means away from said decorating member means when no container is on an arbor to be moved to said decorating member means.

5. The combination defined in claim 4 in which said decorating member means comprises a printing drum having a peripheral surface with circumferentially spaced apart image transferring offset printing blanket means thereon; and means is provided for driving said drum in timed relation with said turret means.

6. The combination defined in claim 4 in which switch means is controlled by said sensing means; and said means for moving said turret means toward said decorating member means comprises fluid pressure operated cylinder means, axially aligned with said shaft means, and operated by said switch means.

7. The combination defined in claim 4 in which said sensing means comprises an arcuate plate, having a leading end engaged by a first container on an arbor shortly before it arrives at said decorating station, and disposed to be in engagement with a container on the preceding arbor at the time said first container has engaged the plate.

8. The combination defined in claim 4 in which spring means normally urges said turret means in a direction away from said decorating member means.

9. The combination defined in claim 5 in which said turret means is indexed and each arbor has a dwell period at a time when it is in confronting relation with a blanket means, rotation of said drum causing rotation of a container in such a confronting relation and rolling transfer of an image thereto.

10. The combination defined in claim 6 in which said cylinder means is mounted by said shaft means to rotate therewith and has pressure fluid supply line means coupled to the cylinder means in a manner to permit rotation of the cylinder means relative to the supply line means.

11. A machine for decorating or printing workpieces such as container side walls including: frame means; decorating member means; means mounting said decorating member means for operational movement past a decorating station; rotatable means including orbiting turret means mounted thereon for axial movement and for rotation therewith, and having a plurality of radial container receiving arbors thereon movable in a path of travel past said decorating member means to present a side wall portion of a container to the decorating member means at the decorating station; sensing means positioned to determine whether an arbor to be moved to said decorating member means has a container thereon; means provided for moving said turret means axially on the rotatable means in a direction toward the decorating member means; and means controlled by the sensing means for moving the turret means and arbors axially on the rotatable means away from the decorating member means when no container is on an arbor to be presented to the decorating member means.

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