Nov. 28, 1944. F. SHURLEY 2,363,698

AUTOMATIC HANDLING MEANS FOR USE UPON AND IN CONJUNCTION WITH PRINTING AND LABELING MACHINES

Filed Dec. 17, 1942 4 Sheets-Sheet 1

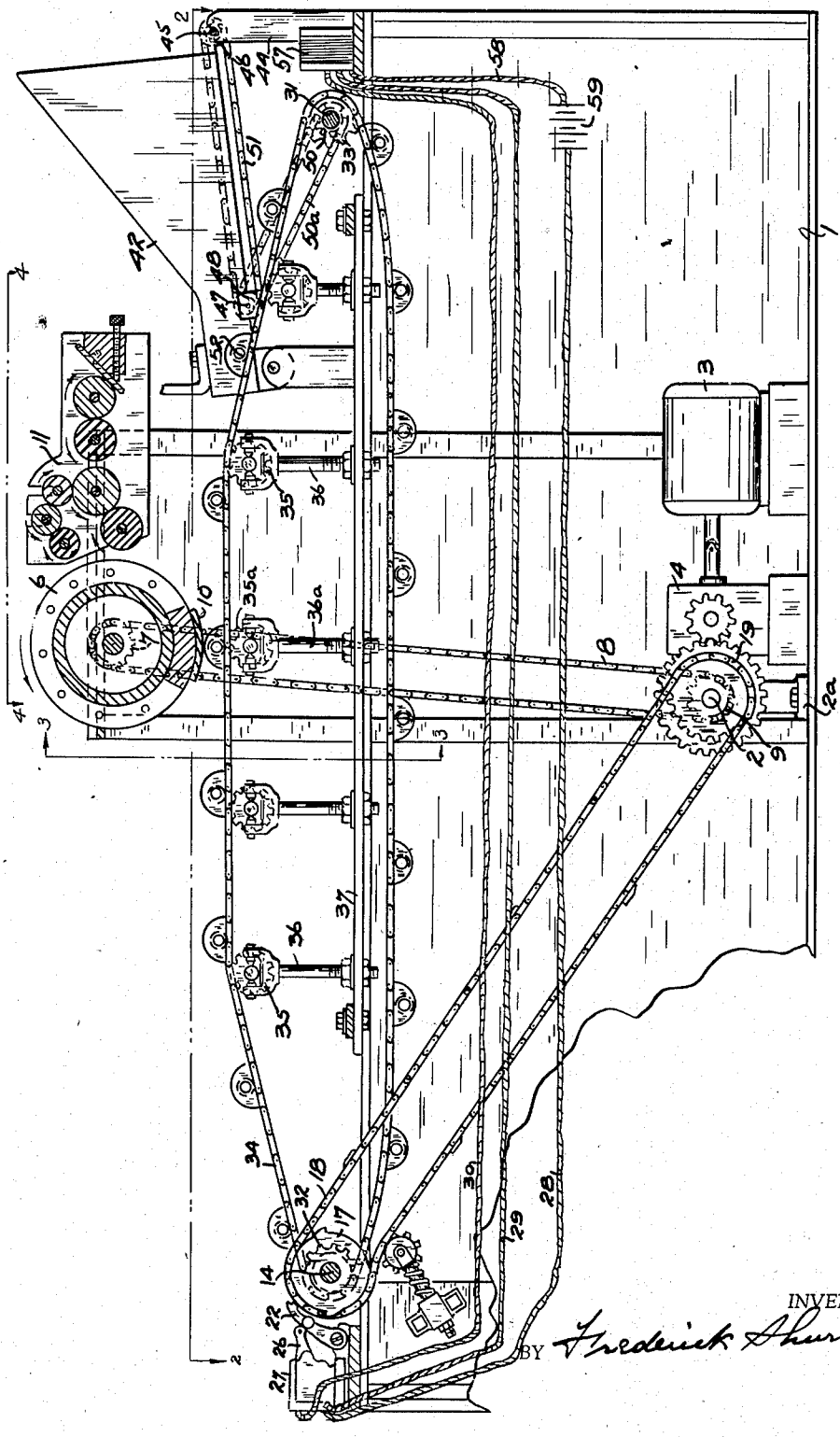

Fig 1.

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Filed Dec. 17, 1942 4 Sheets-Sheet 2

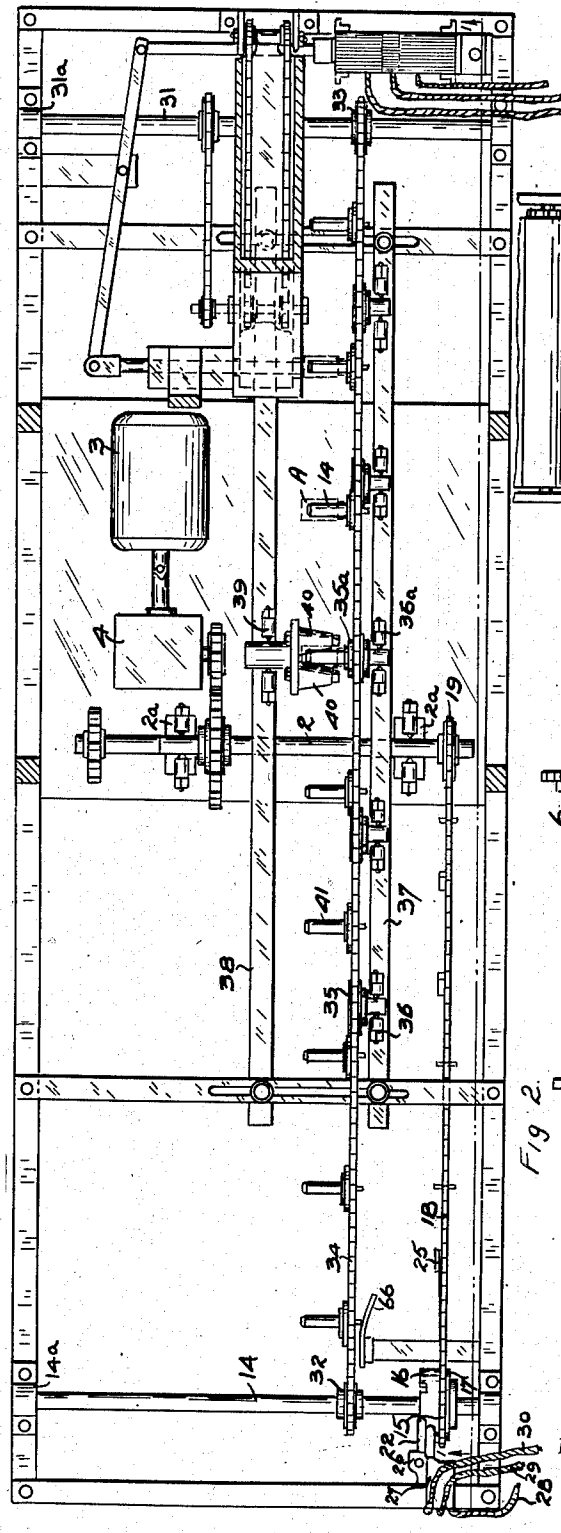

Fig 2.

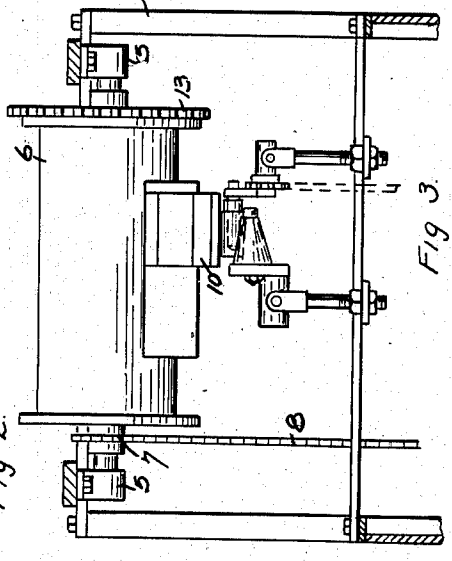

Fig 3.

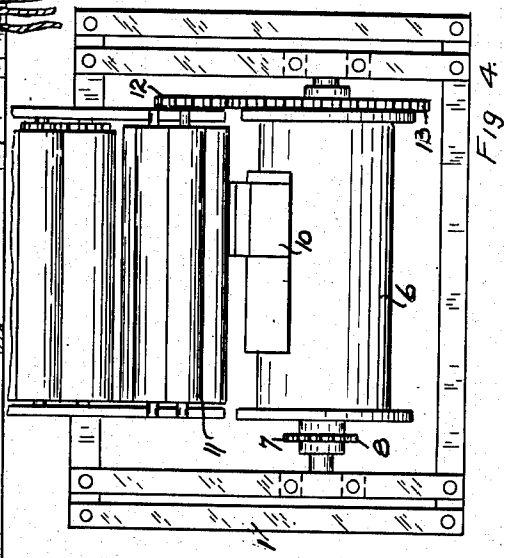

Fig 4.

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AUTOMATIC HANDLING MEANS FOR USE UPON AND IN CONJUNCTION WITH PRINTING AND LABELING MACHINES

Filed Dec. 17, 1942 4 Sheets-Sheet 3

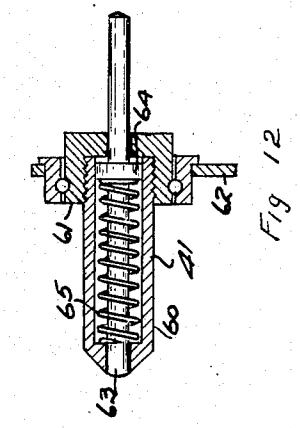

Fig 12

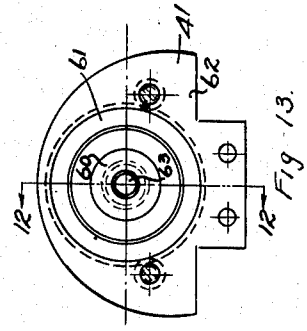

Fig 13.

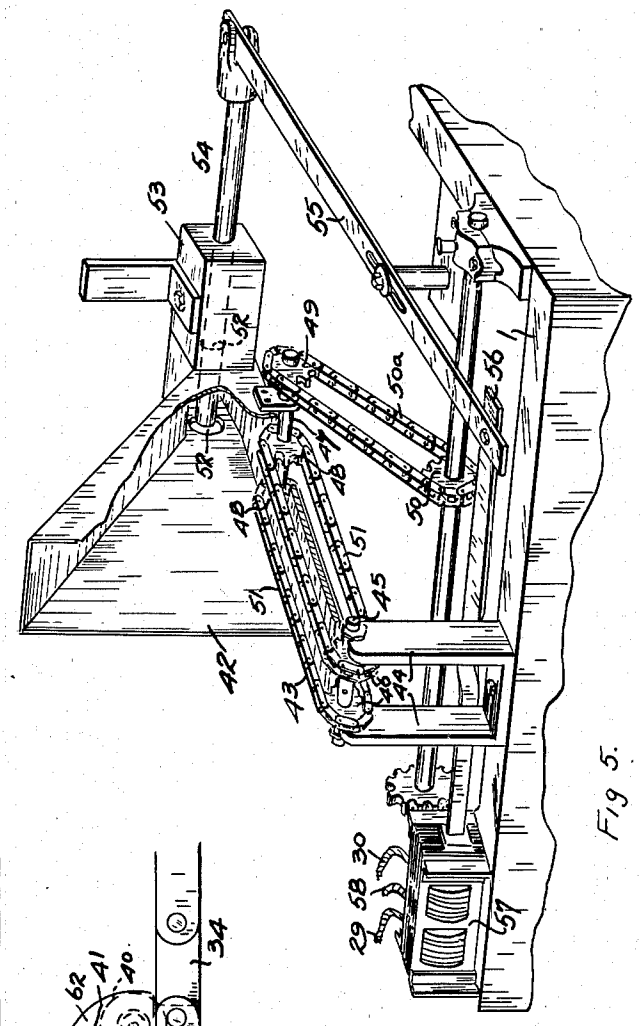

Fig 5.

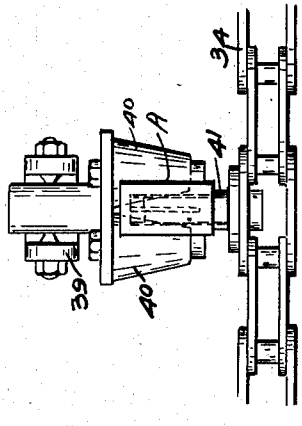

Fig 6.

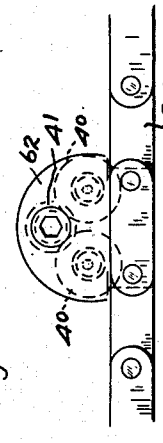

Fig 7.

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AUTOMATIC HANDLING MEANS FOR USE UPON AND IN CONJUNCTION WITH PRINTING AND LABELING MACHINES

Filed Dec. 17, 1942 4 Sheets-Sheet 4

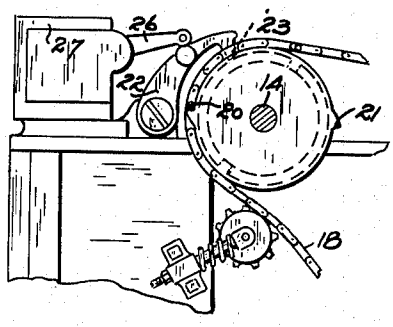

Fig 11.

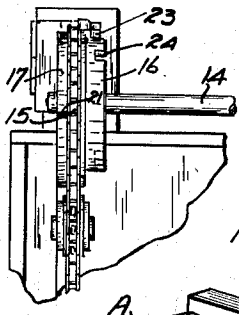

Fig 10.

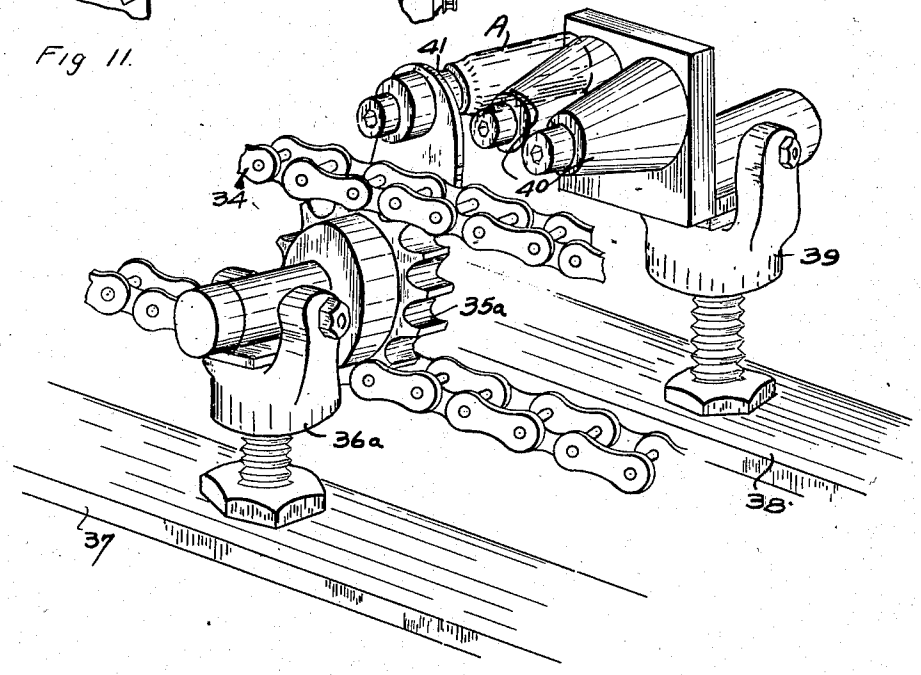

Fig. 14.

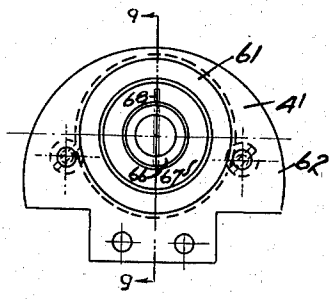

Fig 8.

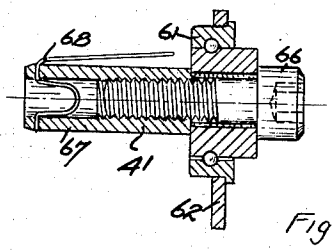

Fig 9.

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Patented Nov. 28, 1944

2,363,698

UNITED STATES PATENT OFFICE

2,363,698

AUTOMATIC HANDLING MEANS FOR USE UPON AND IN CONJUNCTION WITH PRINTING AND LABELING MACHINES

Frederick Shurley, Windsor, Ontario, Canada

Application December 17, 1942, Serial No. 469,356

6 Claims. (Cl. 101—38)

This invention relates to improvements in automatic handling means for use upon and in conjunction with printing or labeling machines.

It is an object of the invention to provide an automatic handling means for feeding cylindrical containers (such as ampoules, tubes, phials, bottles and the like) onto arbors projecting laterally from an intermittently moved conveyor; for supporting the underside of each container still upon its arbor for rotation beneath a printing or labeling mechanism; and for stripping each container from its arbor during subsequent movement of the conveyor as the container is being carried away from its printing or labeling position.

Another object of the invention is to provide such an automatic handling means including an intermittently moved conveyor having a plurality of uniformly spaced arbors projecting laterally from one side thereof, a transversely apertured magazine for the containers, and means for ejecting a container from the magazine onto an arbor one of which is positioned in alignment with the magazine aperture each time the conveyor stops, and to synchronize this arbor loading movement with the other functions performed by the handling means and the printing or labeling machine of which it forms a part.

Another object of the invention is to provide such an automatic handling means including freely rotatable arbors to permit ready rotation of the containers, and axially parallel rollers to support the outer extremity of each container for rotation about the axis of its supporting arbor when the conveyor has stopped with that arbor in printing position. Moreover since in many instances it is desirable, on account of the printing upon the containers, to make only a narrow contact between the rollers and each container, I usually make the rollers tapered.

A further object of the invention is to provide such an automatic handling means wherein the arbors, in one preferred form, each include a stripper rod for removing the containers after the printing or labeling machine has printed or labeled them; and a plow for actuating the stripper rods as the arbors travel away from printing or labeling position.

Having thus briefly and broadly stated some of the objects and advantages of the machine I will now proceed to describe it more fully with the aid of the accompanying drawings, in which:

Figure 1 illustrates a sectional view of a printing machine equipped with the invention, and taken on the line 1—1 of Figure 2.

Figure 2 is a section on the line 2—2 of Figure 1.

Figure 3 is a section on the line 3—3 of Figure 1.

Figure 4 is a partial plan view on the line 4—4 of Figure 1.

Figure 5 is an enlarged perspective view showing a portion of the magazine and the ejector means for loading containers therein onto one of the arbors.

Figure 6 is an enlarged detail showing a portion of the conveyor chain with one type of arbor thereon supporting a container and the outer extremity of the latter supported by the rollers.

Figure 7 is an end view of Figure 6 showing the chain and arbor.

Figure 8 is an end view of the arbor alone, and

Figure 9 is a section on the line 9—9 of Figure 8.

Figure 10 is a detail showing the Geneva movement and the switch operated thereby, and

Figure 11 is a side view thereof.

Figure 12 is a section on the line 12—12 of Figure 13, and

Figure 13 is an end view of a preferred, modified form of construction of one arbor.

Figure 14 is an enlarged perspective view showing a portion of the conveyor chain supported at printing position, an arbor thereon carrying a container and the latter also supported by the rollers.

I will first describe one preferred form of printing machine with which my automatic handling means may be associated, 1 designates a frame on which a transverse drive shaft 2 operated by an electric motor 3 through a gear box 4 is suitably supported in bearings 2a. Mounted also transversely of the frame in bearings 5 is a printing cylinder 6 having a sprocket wheel 7 secured thereto which is constantly driven by a chain 8 which also passes around a sprocket wheel 9 fixed on the drive shaft 2. An arcuate printing plate 10 secured upon the cylinder 6 in any preferred manner is inked by a conventional inking set indicated at 11 which includes a gear 12 upon one inking roller which meshes with a gear 13 upon the said printing cylinder.

Rotatably supported across one extremity of the frame 1 in bearings 14a is a head shaft 14 to which intermittent rotation is imparted through a known type of Geneva movement. A sprocket wheel 15 freely mounted upon the shaft 14 between discs 16 and 17 fixed upon the latter.

Around the sprocket wheel 15 and also around a second sprocket wheel 19 fixed on the drive shaft 2 a drive chain 18 extends. Pins 20 projecting laterally at spaced intervals from the chain 18 engage projecting lands 21 on the disc 17 and cause partial rotation of the shaft 14. Pivoted on the frame 1 is a lever 22 having a projection 23 to engage one of a plurality of radial apertures 24 formed in the disc 16 whereupon the shaft 14 is held against rotation. Spaced lugs 25 on the opposite side of the chain 18 from the pins 20 contact the lever 22 and move it pivotally so that the projection 23 becomes disengaged from the aperture 24 it engaged just prior to the time one of the pins 20 engages a land 21 and again rotates the shaft 14; and upon completion of each intermittent rotary movement imparted to the said shaft and its discs 16 and 17 the disc 16 is so positioned that one of its apertures 24 is in position to be engaged by the lever projection 23. Whereupon a spring urged arm 26 of an electric switch 27 forces the lever 22 forward so that its projection 23 moves into engagement with that aperture. Consequently not only is the head shaft 14 intermittently rotated but the switch 27 which is of a known double-acting type is intermittently moved by its arm 26 that a live lead 28 is alternately connected to a wire 29 or 30.

Extending across the opposite extremity of the frame 1 is a tail shaft 31 suitably supported in bearings 31*a*, and mounted on the shafts 14 and 31 are sprockets 32 and 33 respectively around both of which a conveyor chain 34 extends. The upper portion of the chain 34 is preferably raised intermediately of its length by idler sprockets 35 rotatably supported by vertically adjustable brackets 36 mounted on a plate 37 supported from the frame 1, and in vertical alignment with the axis of the printing cylinder 6 beneath the latter a central idler sprocket 35*a* is supported by a vertically adjustable bracket 36*a* also mounted on the plate 37.

Supported also by the frame 1 is a plate 38 having a vertically adjustable bracket 39 thereon which is also mounted substantially in vertical alignment with the cylinder 6 and has two axially parallel tapered rollers 40 projecting therefrom toward the chain 34. Extending from the latter at uniformly spaced intervals toward the rollers 40 are arbors 41 upon each of which a cylindrical workpiece A is placed in a manner hereinafter described. The rollers 40 are positioned to receive and support the outer extremity of the periphery of each cylindrical workpiece or container A when the latter is in printing position beneath the cylinder 6 at which time the adjacent portion of the chain 34 from which the arbor 41 projects that carries that workpiece or container is supported by the central idler sprocket 35*a* so that the workpiece is positively held in correct printing position during its contact with the printing plate 10. The purpose of making the rollers 40 tapered is so that they provide a narrow line contact for supporting the periphery of the workpiece at its outer extremity only and thus cannot smear any fresh printing thereon. The adjustability of the brackets 36, 36*a* and 38 is to permit vertical movement of the idler sprockets 35 and 35*a* and of the rollers 40 as their height must be varied to suit the diameter of the containers or workpieces.

Supported upon the frame 1 towards its extremity across which the tail shaft 31 extends is a magazine 42 having its sides parallel with the chain 34. The closed end of the magazine downwardly toward which its underside slopes is disposed toward the center of the machine, and the width of the magazine is such as to freely receive the cylindrical workpieces longitudinally so that their axes extend at right angles to the path of travel of the conveyor chain 34.

In order to feed the workpieces to the closed end of the magazine 42 a carrier 43 is provided. This carrier in the present instance includes a split bearing 44 mounted on the frame 1 beyond the open outer end of the magazine. The bearing supports a shaft 45 having spaced sprockets 46 thereon, and supported transversely of the magazine by opposite sides thereof through which it extends is a second shaft 47 having sprocket wheels 48 thereon within the magazine and another sprocket wheel 49 thereon outwardly of the latter. Mounted on the tail shaft 31 is a sprocket wheel 50 around which and the sprocket wheel 49 a drive chain 50*a* passes which turns the shaft 47, and around each pair of sprocket wheels 46 and 48 another chain 51 extends. These chains 51 feed the workpieces toward the closed extremity of the magazine and thus bring them one at a time opposite aligned apertures 52 formed through the magazine sides.

The intermittent movement of the chain 34 is so arranged that each time it stops one of the arbors 41 is in alignment with the apertures 52. Axially movable through the latter and projecting from the magazine on its side remote from the chain 34 through a bearing 53 is an ejector rod 54. Pivoted intermediately of its length upon the frame 1 is a lever 55 one extremity of which is connected to the ejector rod 54 while its opposite extremity is connected to a plunger rod 56 extending from a conventional double-acting solenoid 57. The wires 29 and 30 are connected to opposite ends of the solenoid 57 and a third wire 58 from the latter is connected to a source of power 59 to which the lead 28 also extends. Thus as the switch 27 is intermittently operated opposite ends of the solenoid 57 are energized so that the plunger rod is alternately moved back and forth.

Each time the conveyor stops the switch 27 is operated and the ejector rod, through the solenoid 57, is moved toward the chain 34 and toward an arbor 40 thereon which is then in alignment with the apertures 52. The ejector rod then pushes one of the cylindrical workpieces laterally through the aperture 52 adjacent the chain 34 and onto one of the arbors. Immediately upon resumption of movement of the chain 34 the switch 27 is again operated so that the ejector rod is then moved in the opposite direction whereupon another workpiece moves into position for ejection. It is of course also understood that upon subsequent stoppage of the conveyor chain 34 each arbor 40 in turn is halted in printing position.

Figures 12 and 13 show the preferred construction of the arbor 41 which is also illustrated in Figure 2. In this instance the arbor consists of a sleeve 60 the bore of which is of reduced diameter at one extremity and at its opposite end it is in threaded engagement with the inner race of a ball bearing 61 the outer race of which is pressed into or otherwise suitably secured to a supporting plate 62 which is secured to the chain 34. Axially movable through the sleeve 60 is a rod 63 which normally projects through and beyond the inner race of the bearing 61 and also through the end of the sleeve 60 of reduced diam-

eter. Intermediately of its length this rod **63** is provided with a portion **64** of enlarged diameter between which and the end of the sleeve of reduced bore a coil spring **65** is provided. It will thus be seen that the sleeve **60** is freely rotatable with the inner race of the ball bearing **61** so that a workpiece thereon may be readily rotated by contact with the moving printing plate.

Suitably mounted on the frame **1** is a plow **66** consisting of a plate longitudinally inclined to the path of the conveyor chain **34** toward the head shaft **14**, so that as the conveyor travels the plow gradually moves the rod **63** to the left—Figure 12—and exerts pressure against the closed extremity of the cylindrical workpiece and removes it from the arbor.

If the cylindrical workpieces or containers are open at both ends the stripper arrangement above described would not be operative and in such case the arbor may be made as shown in the modification illustrated in Figures 6 to 9, wherein a screw **66'** projects through the inner race of the ball bearing **61** the outer race of which is again supported by a plate **62**, and this screw is in threaded engagement with a sleeve **67**. Mounted in the latter and projecting longitudinally adjacent the sleeve periphery is a spring **68** which frictionally engages the bore of a cylindrical workpiece to insure the latter remaining upon the sleeve during movement of the conveyor chain **34**.

While in the foregoing the preferred embodiments of the invention have been described and shown, it is understood that further alterations and modifications may be made thereto provided the said alterations and modifications fall within the scope of the appended claims.

What I claim is:

1. In a machine of the character described comprising an intermittently moved conveyor chain on a machine including a movable printing plate beneath which the chain extends, spaced arbors projecting from one side of the chain for receiving cylindrical work pieces, the work pieces upon the arbors being successively positioned beneath the printing place for contact therewith upon stoppage of the chain, means under the printing plate cooperating with each arbor for having line contact with the work piece thereon and supporting the same for rotation against the plate as the latter moves in contact with the work piece, and vertically adustable supporting means for that portion of the chain from which one of the arbors projects when the work piece thereon is in plate contacting position.

2. In a machine of the character described comprising an intermittently moved endless conveyor chain on a machine including a movable printing plate beneath which the chain extends, spaced arbors projecting from one side of the chain for receiving cylindrical work pieces, the work pieces upon the arbors being successively positioned beneath the printing plate for contact therewith upon stoppage of the chain, and vertically adjustable means for cooperating with the arbors for supporting the work pieces thereon in position for rotation against the printing plate as the latter moves in contact with the work pieces.

3. In a machine of the character described including an operating station, an intermittently moved conveyor extending beneath the operating station, spaced arbors projecting from one side of the conveyor for receiving cylindrical work pieces, the work pieces upon the arbors being successively moved into position beneath the operating station upon subsequent stoppage of the conveyor, and bearing means positioned beneath the work station for supporting only the periphery of each work piece when in place between the bearing means and the operating station.

4. In a machine of the character described including an operating station, an intermittently moved conveyor extending beneath the operating station, spaced arbors projecting from one side of the conveyor, and axially parallel tapered rollers positioned beneath the operating station for engaging and supporting only the outer extremity of the periphery of each work piece when in position under the operating station.

5. In a machine of the character described, an intermittently moved conveyor chain having upper and lower flights, spaced arbors projecting from one side of the chain adapted to receive cylindrical work pieces for rotation thereon, means supporting the upper flight of the chain, and means on the machine for supporting only the periphery of a work piece.

6. In a machine of the character described, a frame, an endless conveyor chain, mountings carried by said chain, mandrels rotatably carried by said mountings and projecting laterally from a side of the chain, and tapered rollers rotatably mounted in side by side relation to each other and extending toward the conveyor chain for engaging under an article upon a mandrel for line contact with the outer end thereof to rotatably support the article while over the rollers without touching the article for the remainder of the length.

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