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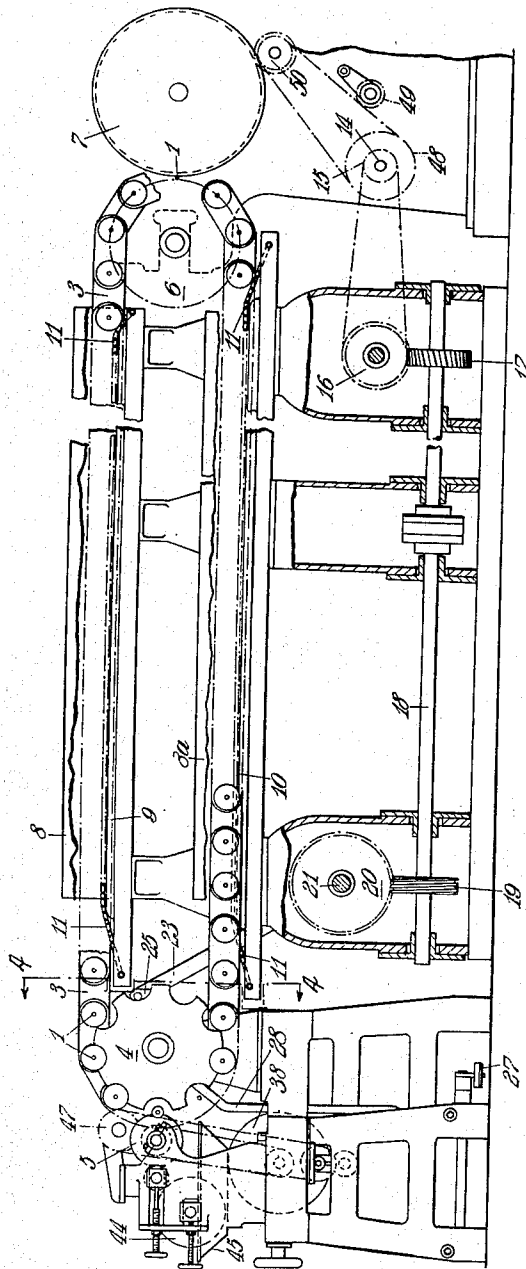
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2,746,421

MACHINE FOR COATING, PRINTING AND DRYING TUBULAR CONTAINERS

Filed Aug. 7, 1952

3 Sheets-Sheet 1



*Fig. 1.*

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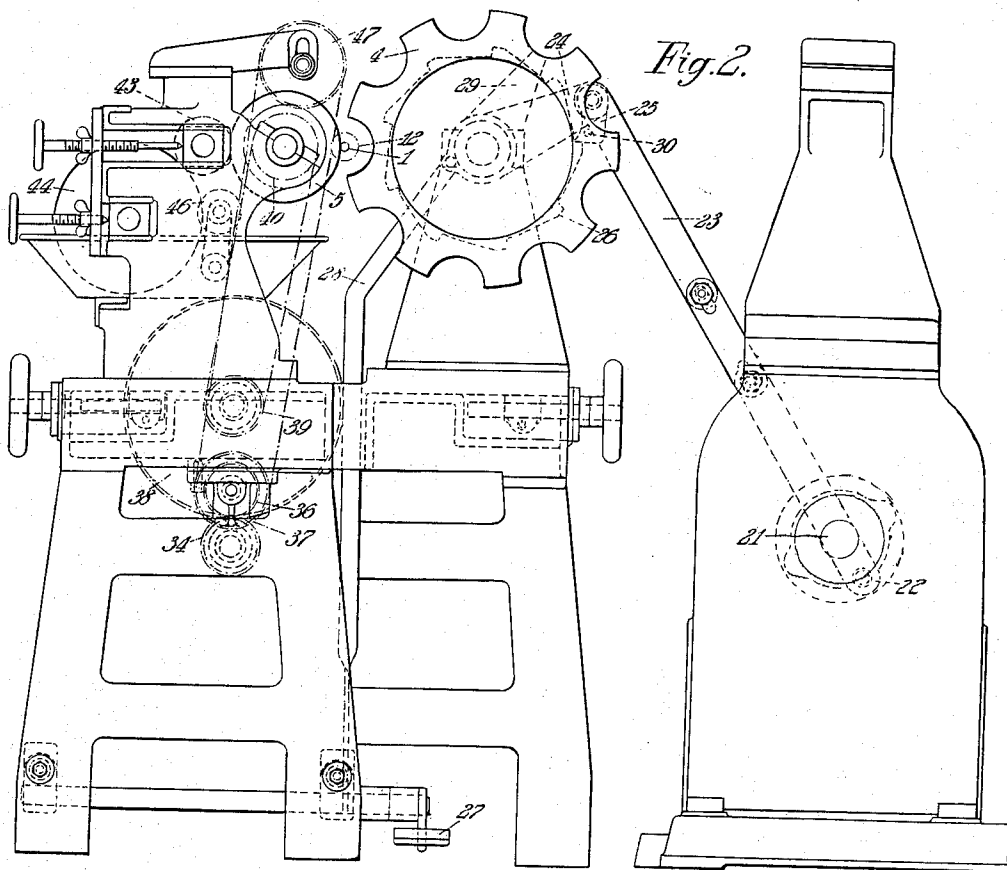
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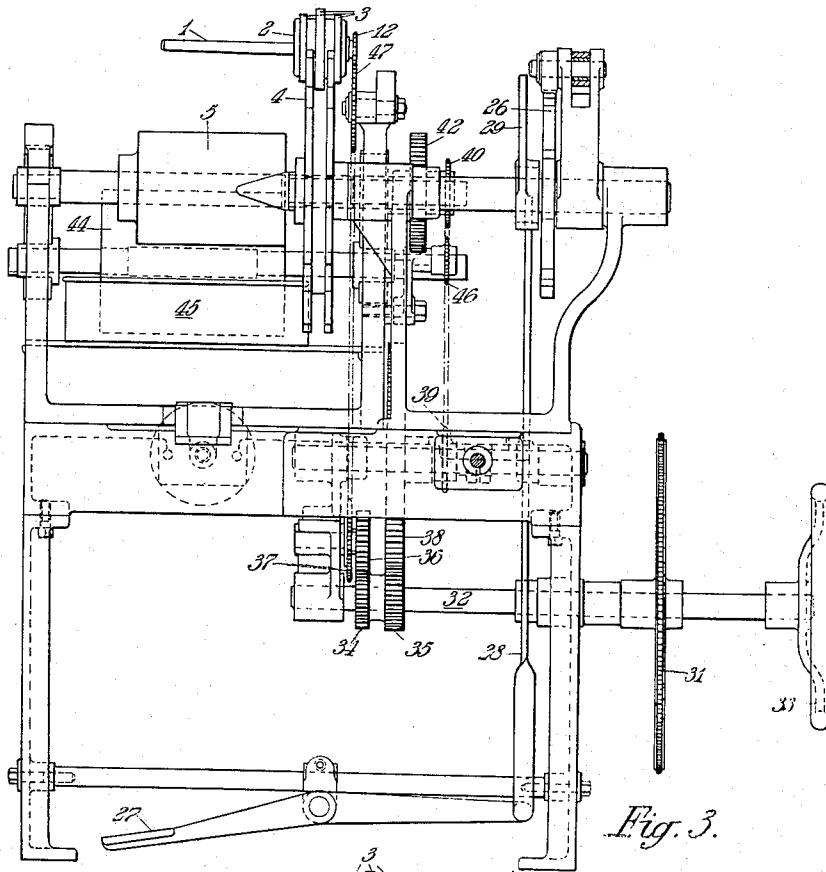


Fig. 3.

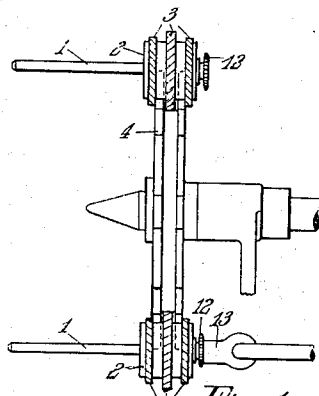


Fig. 4.

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## MACHINE FOR COATING, PRINTING, AND DRYING TUBULAR CONTAINERS

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3 Claims. (Cl. 118—46)

This invention relates to the manufacture of tubular containers, particularly containers such as collapsible tubes where several operations are required to be performed on the container after it has been formed or extruded.

In the case of collapsible tubes the operations consist of trimming, enamelling, drying, printing, drying again and the application of the cap, and it is the usual practice in the trade to have a separate machine for each of these operations. All the above operations are performed on the tube whilst it is held on a mandrel and it will be readily seen that in order to finish the tube completely it is necessary to feed it and remove it from a mandrel up to 6 times.

It is the object of the present invention to provide a simplified but effective means for carrying out all or several of the above operations.

According to the invention, a series of operations are performed on a tube while it is mounted on a mandrel, on which it is moved and presented to the various operations in turn.

This may be achieved by joining together a series of arbors, which are designed to hold the necessary mandrels, in the form of a continuous chain and mounting this chain so as to travel, preferably horizontally, between a printing machine and an enamelling machine. The horizontal portions of the chain, both on the top and bottom strands can be fitted with devices to carry out operations on a tube as required and by allowing the chain to run through an oven which may be heated by means of infra-red equipment and making the chain a suitable length, it is possible to dry the tube after enamelling to a suitable condition for printing on one strand of the chain and after printing to fully dry the tube upon its return on the other strand.

Referring to the accompanying explanatory drawings:

Figure 1 is a side elevation of a machine according to the invention for coating, printing and stoving collapsible tubes.

Figure 2 is a side elevation showing the arrangement of the tube coating means.

Figure 3 is an end view of the coating means.

Figure 4 shows a fragmentary section taken at 4—4 of Figure 1.

The tubes to be operated upon are placed over hollow mandrels 1 carried by hollow arbors 2 which are joined together by links 3 to form a continuous chain. This chain travels round an intermittently rotating chain wheel 4 at one end of the machine whereby the tubes on the mandrels are brought into contact with a roller 5 for applying enamel or other coating material, and round a chain wheel 6 at the other end of the machine which brings the tubes into contact with a printing roller 7 for printing whatever is required on to the coated tube. Between the wheels 4 and 6 the chain travels in both directions inside casings 8, 8a in which there are infra-red heating means, which partially dry the coating on a tube before it reaches the printing roller 7, and completes the

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drying of the coating and printing on the return journey through the casing 8a.

There are upper and lower guides 9, 10 for the chain inside the oven casings 8, 8a and alongside each guide there is a chain 11 which engages sprockets 12 on the arbors 2 so as to cause the mandrels 1 carrying the tubes to rotate while travelling through the casings, in order to ensure uniform drying. As a finished tube emerges from the casing 8a, the chain stops with the arbor opposite a compressed air nozzle 13 as seen in Fig. 4 of the drawing, and the means for driving the chain wheel 4 opens a valve to admit a jet of air which blows the tube off the hollow mandrel. Another tube is then placed on the mandrel.

The machine is driven by a motor which turns a shaft 14 which drives the printing mechanism and carries a sprocket 15 for driving a helical gear 16 meshing with a gear 17 on a shaft 18 which extends to the other end of the machine where it has a helical gear 19 driving a gear 20. The gear 20 is fixed on a shaft 21 which carries a crank 22 imparting reciprocatory motion to a connecting rod 23 pivoted at its other end to an arm 24 mounted to turn about the axis of the chain wheel 4 and carrying a pawl 25 engaging a ratchet wheel 26 connected to the wheel 4, whereby the latter is driven intermittently to index the mandrels for the various operations of the machine. In order that the movement of the chain may be interrupted if necessary, a pedal 27 is provided which raises a rod 28 and turns an arm 29 to lift the pawl 25 clear of the ratchet teeth by means of a pin 30 on the pawl.

The coating mechanism, as shown in Figure 3, is separately driven by a chain drive to a sprocket 31 on a shaft 32, which if necessary may be rotated by a hand wheel 33. The shaft 32 carries gear wheels 34, 35 of which 34 meshes with a gear wheel 36 to drive a sprocket 37, while the other meshes with a wheel 38 to drive a sprocket 39. The latter drives a sprocket 40 on the shaft of the coating roller 5 and a gear wheel 42 on the same shaft drives an intermediate roller 43, from which a roller 44 dipping in an enamel bath 45 is driven in a similar manner. A sprocket 46 is provided for tensioning the chain between sprockets 39 and 40.

From the sprocket 37 a chain runs over an idler sprocket 47 and engages the sprockets 12 on the chain carrying the tubes so as to rotate the tubes. The positions of the various rollers are adjusted by hand wheels so that the coating roller 5 touches the tubes as they are carried round the chain wheel 4, and coats them with enamel.

The printing mechanism is indicated diagrammatically in Figure 1 being mainly of known type. It is driven by a chain from a sprocket 48 on the shaft 14, which is tensioned by a sprocket 49 and drives a sprocket 50 which is geared to the printing roller 7. Locking means are provided to ensure that the chain wheel 6 does not turn while printing is taking place.

What I claim is:

1. A machine for performing printing and coating operations on collapsible tubes, comprising tube coating means, tube printing means, a drying oven casing, a series of horizontal mandrels, a series of horizontal arbors arranged to hold the mandrels and said arbors being joined together in the form of a continuous chain, and indexing means for the chain to bring tubes mounted on the mandrels into contact with the coating and printing means and to carry the tubes through the drying oven casing.

2. A machine as claimed in claim 1, in which the arbors or mandrels carry sprockets which engage moving chains to rotate the mandrels during the coating and stationary chains during the drying operation.

3. A machine as claimed in claim 1, in which the arbors and mandrels are hollow, and after a tube has

been dried its arbor is indexed to a position opposite a nozzle which directs a jet of compressed air into the mandrel to blow the tube off.

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