April 28, 1959 H. M. HAYWARD 2,883,928

MACHINE FOR PRINTING FLEXIBLE PLASTIC CONTAINERS

Filed May 21, 1956 5 Sheets-Sheet 1

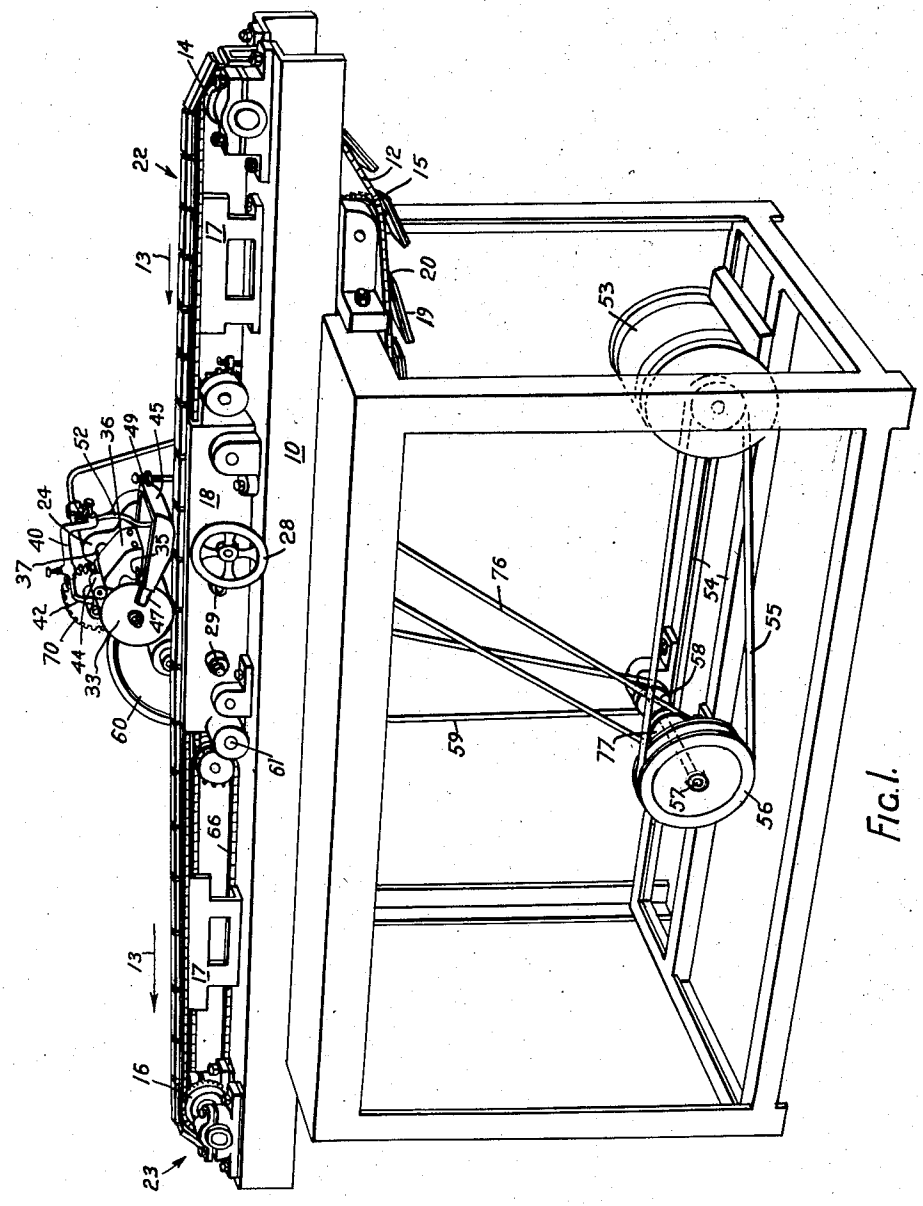


FIG. 1.

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MACHINE FOR PRINTING FLEXIBLE PLASTIC CONTAINERS

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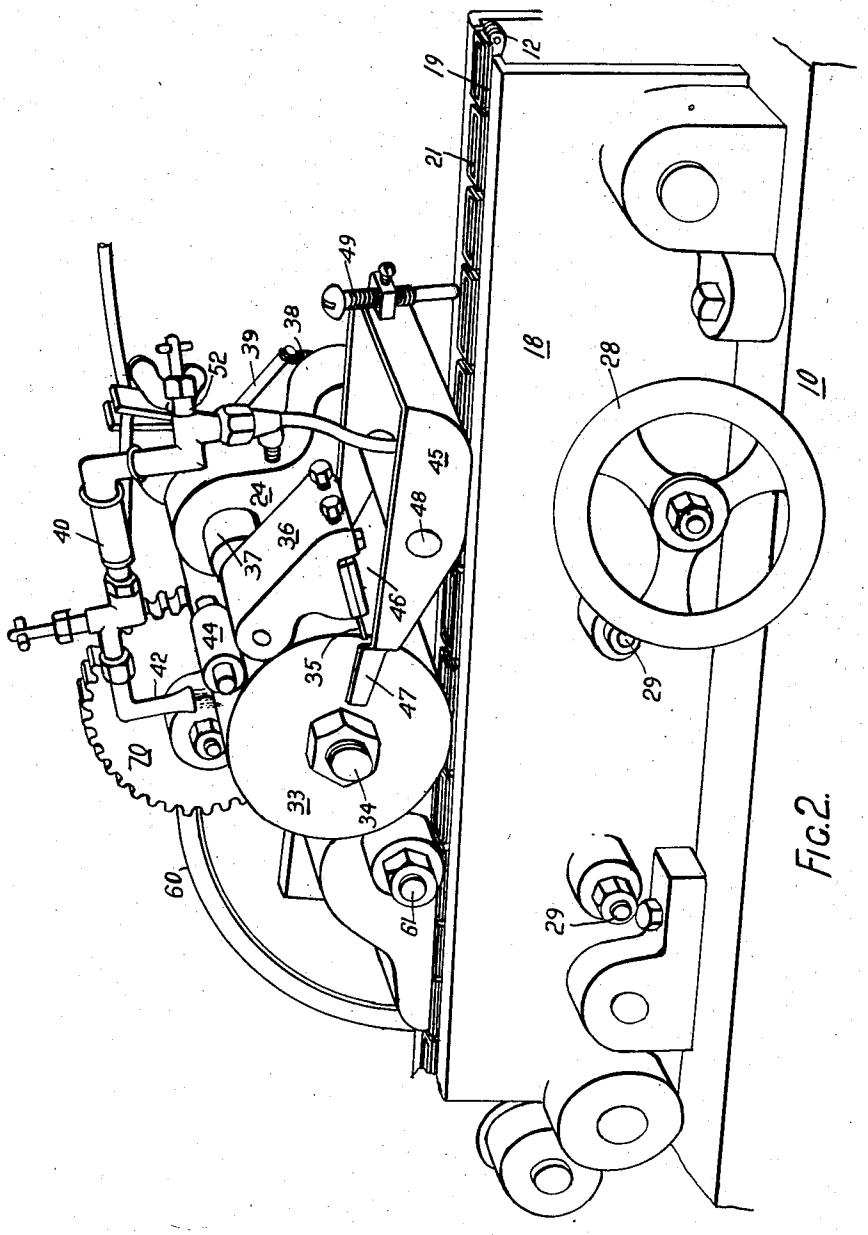


FIG. 2.

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MACHINE FOR PRINTING FLEXIBLE PLASTIC CONTAINERS

Filed May 21, 1956 5 Sheets-Sheet 3

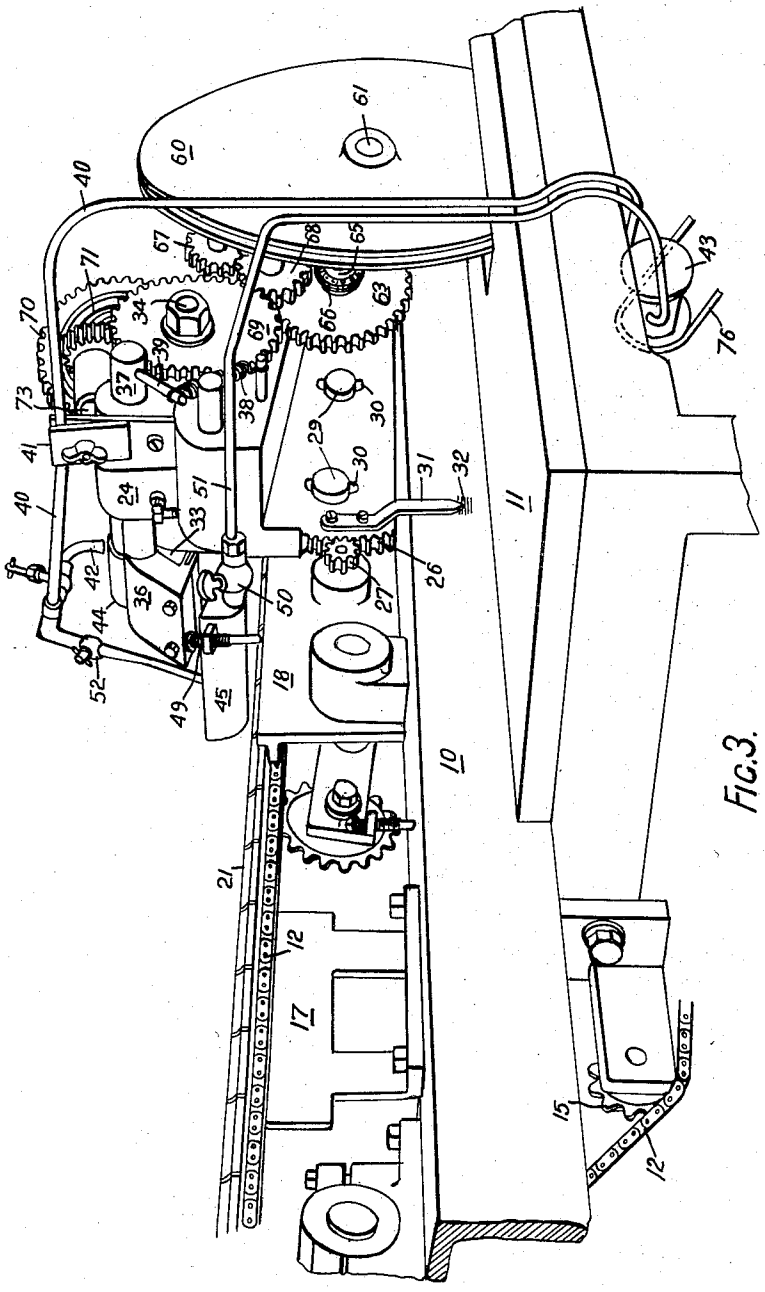


FIG. 3.

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April 28, 1959 H. M. HAYWARD 2,883,928

MACHINE FOR PRINTING FLEXIBLE PLASTIC CONTAINERS

Filed May 21, 1956 5 Sheets-Sheet 4

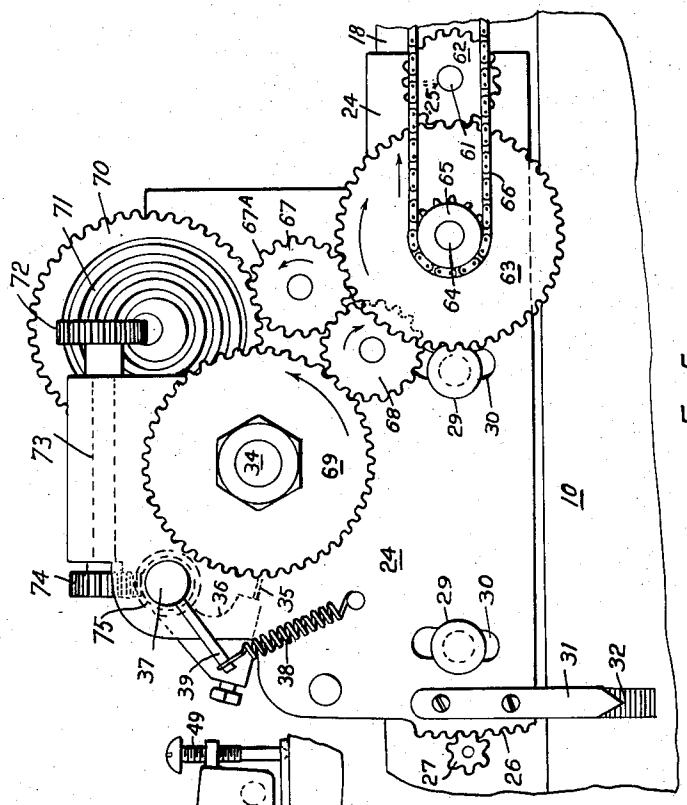


FIG. 5

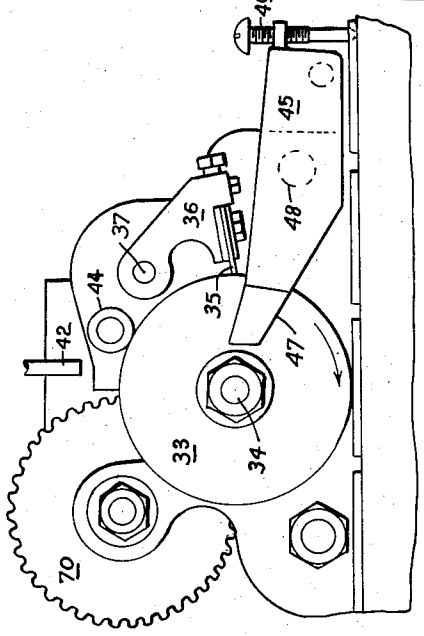


FIG. 4

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MACHINE FOR PRINTING FLEXIBLE PLASTIC CONTAINERS

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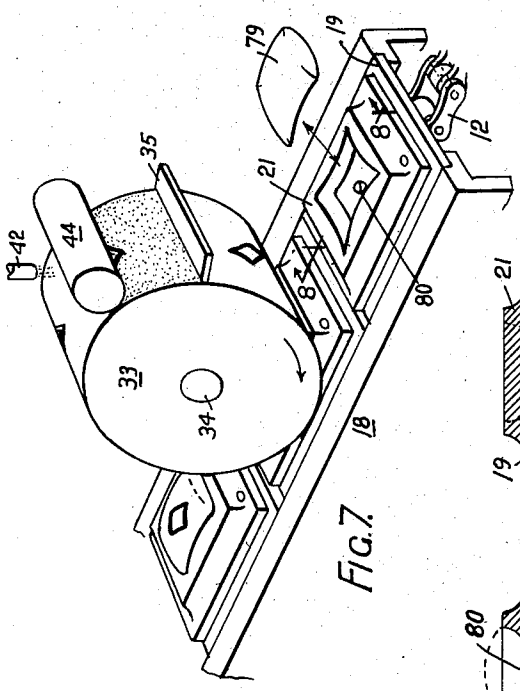


FIG. 7.

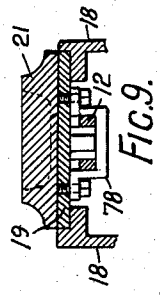


FIG. 9.

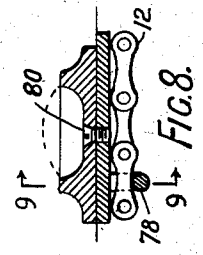


FIG. 8.

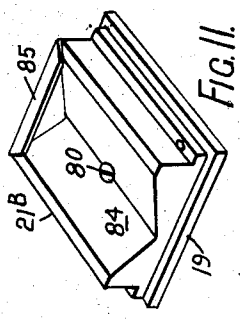


FIG. 11.

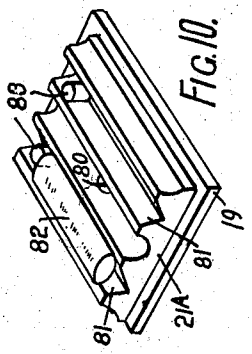


FIG. 10.

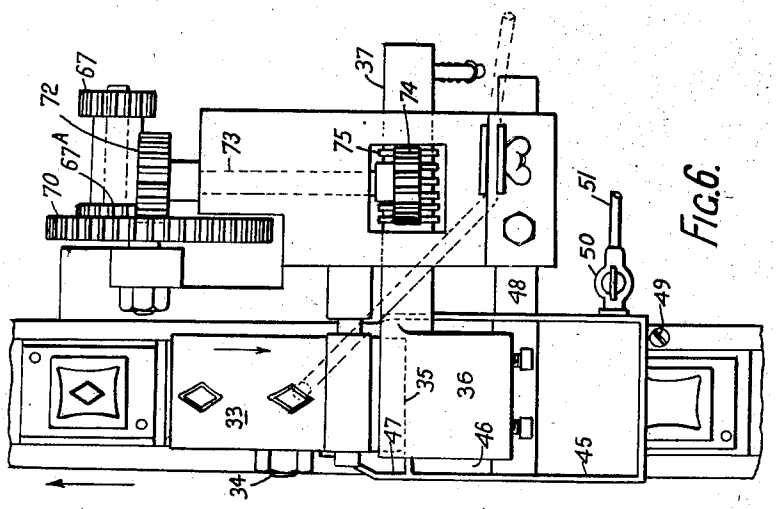


FIG. 6.

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United States Patent Office 2,883,928 Patented Apr. 28, 1959

2,883,928

MACHINE FOR PRINTING FLEXIBLE PLASTIC CONTAINERS

Henry Milton Hayward, Eastwood, near Sydney, New South Wales, Australia

Application May 21, 1956, Serial No. 586,307

Claims priority, application Australia May 24, 1955

1 Claim. (Cl. 101—35)

In my co-pending application for patent No. 450,705, now U.S. Patent No. 2,818,799, there is described means for printing plastic containers made of tube, which, when filled is divided into separate compartments by fusing a seam in the wall of the tube.

In such means difficulty has been experienced in assuring a satisfactory print on the end containers of a tube. It is not suitable for printing individual containers when severed from the tube and it is not suitable for printing individual containers of shapes other than as described above.

This invention has been devised to provide a machine for printing filled flexible plastic containers severed from a tube and for printing filled flexible plastic containers of other shapes. It will also print flexible plastic containers which are held resiliently against the printing means.

The machine of the invention consists of an endless conveyor mounted on a horizontal table. The conveyor has separate pallets pivotally mounted thereon in uniform spaced relationship. The pallets have means thereon, such as removable cradles, to accommodate plastic containers in aligned and uniformly spaced position and projecting above the pallets. A printing head frame is pivotally mounted on the table for movement in a vertical plane. Means are provided to move the printing head frame and means are provided to clamp the printing head in a selected position. An etched metal printing cylinder on a shaft is rotatably mounted on a horizontal axis on the printing head frame. The printing cylinder is located over the track of the pallets. A doctor blade is mounted on a shaft which is part rotatably and reciprocatably mounted on the printing head frame in juxtaposition to the printing cylinder. A spring is provided to hold the doctor blade in contact with the printing cylinder. Means are provided to deliver ink to the printing cylinder and to collect surplus ink. Synchronised means are incorporated to actuate the conveyor, the printing cylinder and the doctor blade.

The invention is described in substantial detail with reference to the annexed drawings wherein:

Fig. 1 is a perspective view of the printing machine;

Figs. 2 and 3 are enlarged fragmentary perspective views of the operator's side and off side of the machine respectively.

Figs. 4 and 5 are fragmentary elevations of the printing roller and its appurtenances and the gear drive therefore respectively.

Fig. 6 is a fragmentary plan view of the printing roller and inking means.

Fig. 7 is a fragmentary perspective view illustrating the printing action.

Fig. 8 is a section on plane 8—8 of Fig. 7.

Fig. 9 is a section on line 9—9 of Fig. 8.

Figs. 10 and 11 are perspective views of cradles constructed to accommodate plastic containers of other shapes.

The machine consists of a horizontal conveyor frame 10 on table 11. An endless link conveyor 12 is mounted

to travel over and under the frame 10 in the direction of the arrows 13. The mounting consists of idler sprockets 14 and 15 and driving sprocket 16 and guide rails 17 and 18. The conveyor has pallets 19 pivotally mounted by one end (the leading end) thereon as at 20 in uniform spaced relationship. Each pallet has a cradle 21 removably mounted thereon. The cradles are each shaped to accommodate in an aligned position a filled flexible plastic container. These containers are placed in the cradles at the position indicated at 22 and they fall out of the cradles at the position indicated at 23. Cradles are provided for each shape of container to be printed. It will be understood that only one shape of container will be printed in any one run of printing operations. Further details of the pallets and cradles will be given later.

A printing head frame 24 (Figs. 3 and 5) is pivotally mounted as at 25 on shaft 61 (see Fig. 5) on one end of the guide rail 18 for movement in a vertical plane. Its movement is controlled by rack gear 26, pinion 27 and hand wheel 28 on the pinion shaft. Clamp bolts 29 passing through arcuate slots 30 in the frame 24 and through holes in the guide rail 18 hold the frame in a selected position. A pointer 31 on the frame 24 indicates against markings 32 on the guide rail 18 the position of the frame 24. An etched metal printing cylinder 33 is mounted on horizontal shaft 34 in a bearing in the frame 24. The printing cylinder projects over the cradles 21 on the conveyor pallets 19 and by movement of the frame 24 it can be brought into printing contact with flexible plastic containers accommodated in the cradles.

A scraper blade 35 (called herein a "doctor blade") is adjustably mounted in swinging bracket 36 on shaft 37 which is part rotatably and slidably mounted in the frame 24. The doctor blade 35 reciprocates across the printing cylinder 33 on the forward or lead in side. A helical spring 38 anchored to an arm 39 on the shaft 37 and to the frame 24 holds the doctor blade in engagement with the printing cylinder 33.

A pipe 40 supported above the doctor blade 35 by clamp bracket 41 fixed to the frame 24 has one or more valve controlled jet-like outlets 42 (one only is shown) directed on to the printing cylinder 33. The pipe is connected to the outlet of a pump 43 (see Fig. 3) mounted under the table 11. A spreading roller 44 may be disposed between the jet outlets 42 and the doctor blade 35 in contact with the printing cylinder 33.

Below the doctor blade 35 there is a tray 45. It has a bottom with a part 46 sloping upwardly to and in contact with the printing cylinder 33. It also has side limbs 47 which project across the ends of the printing cylinder. The tray is part rotatably mounted on shaft 48 fixed to the frame 24 and it is located in correct position relative to the printing cylinder 33 by adjusting screw 49 which bears on the side rail 18. There is a valve controlled outlet 50 (Fig. 6) from the tray to pipe 51 which returns surplus ink to the pump 43 or to an ink reservoir (not shown). Pipe 40 has a valve controlled outlet 52 to the tray 45.

A motor 53 on a platform 54 fixed to and under the table 11 has a belt drive 55 to pulley 56 on counter shaft 57 mounted on bearings on the platform 54. A second pulley 58 on the counter shaft has a belt drive 59 to pulley 60 on base shaft 61 mounted on bearings in a frame on the table 11. A pinion 62 on the shaft 61 drives through gear wheel 63 a second base shaft 64. This shaft 64 has a sprocket 65 thereon with a chain drive 66 to the conveyor driving sprocket 16. A pinion 67 is engagement with the gear wheel 63 drives through jockey pinion 68 a gear wheel 69 on the printing cylinder shaft 34. Connected to the pinion 67 is an additional pinion 67*a* (see Fig. 6) which drives gear wheel 70. This gear wheel 70 has an off-centre scroll gear 71 on one

side thereof. The scroll gear is engaged by pinion 72 on shaft 73 mounted on the frame 24. A second pinion 74 on the shaft 73 engages rack teeth 75 on shaft 37 whereby the doctor blade 35 is reciprocated.

The pump 43 is driven by belt 76 and driving pulley 77 on the shaft 57.

The first mounting of each pallet 19 on the conveyor 12 consists of a U shaped bracket 78 (see Figs. 8 and 9) which permits one end of the pallet to drop when passing under the frame 10 and so eject the plastic container 79 from a cradle 21 mounted on the pallet.

Each cradle 21 is shaped to accommodate a filled plastic container 79 and the cradle is held on its pallet by a screw 80. The cradle 21*a* (Fig. 10) has a plurality of longitudinal recesses 81 to accommodate longated plastic containers 82. Aligning stops 83 are fitted in the recesses. The cradle 21*b* (Fig. 11) has a V shaped recess 84 to accommodate a plastic container of another shape. This cradle has an end aligning stop 85.

In a modification pads of flexible material, for example rubber, are mounted on or substituted for the cradles. Means are provided to hold the containers on the pads. This construction is useful for printing flat containers prior to filling.

Where multi-coloured printing is required several printing heads and associated equipment are mounted on one table.

I claim:

Machine for printing flexible plastic containers, said machine consisting of an endless conveyor mounted on a horizontal table and having separate pallets pivotally mounted thereon in uniform spaced relationship, said pallets having means thereon to accommodate plastic containers in aligned and uniformly spaced position and projecting above said pallets, a printing head frame pivotally mounted on the table for movement in a vertical plane, means to move said printing head frame consisting of a rack gear, a pinion in engagement with said rack gear and a hand wheel to actuate said pinion, means

to lock said printing head frame in a selected position, an etched metal printing cylinder on a shaft rotatably mounted on a horizontal axis on the printing head frame, said printing cylinder being located over the track of said pallets, a doctor blade adjustably mounted in a bracket, said bracket being mounted on a shaft part rotatably and reciprocatably mounted on the printing head frame in juxtaposition to the printing cylinder, a spring to hold said doctor blade in contact with said printing cylinder, means to deliver ink to the printing cylinder, a spreading roller in engagement with the printing cylinder, a tray to collect surplus ink, said tray being part rotatably mounted on a shaft fixed to the printing head frame, an adjusting screw to hold the tray in ink receiving position, synchronised means to actuate said conveyor, said printing cylinder and said doctor blade, said synchronised means consisting of a motor having belt drives through a counter shaft to a first base shaft having a gear and pinion drive to a second base shaft, a sprocket and chain drive from said second base shaft to the conveyor, a pinion and gear drive including a jockey gear from said second base shaft to the printing cylinder shaft, a pinion and gear drive from said second base shaft including an off-centre scroll gear with a pinion drive to a rack on the doctor blade shaft.

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