Dec. 29, 1970 L. J. BRESLEY ET AL 3,550,240

CAN NECK PLACING APPARATUS

Filed Sept. 4, 1968 4 Sheets-Sheet 1

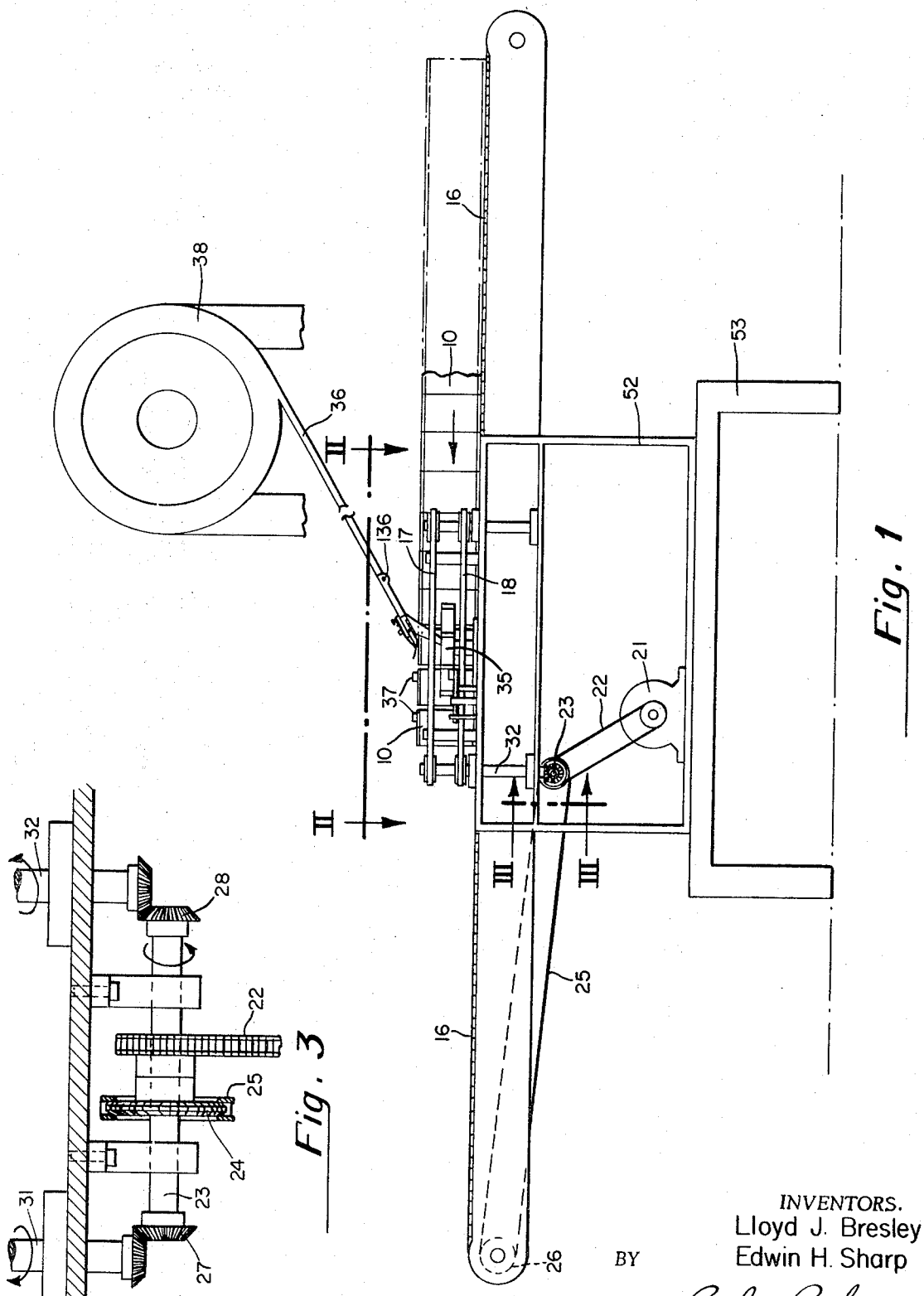


Fig. 1

Fig. 3

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CAN NECK PLACING APPARATUS

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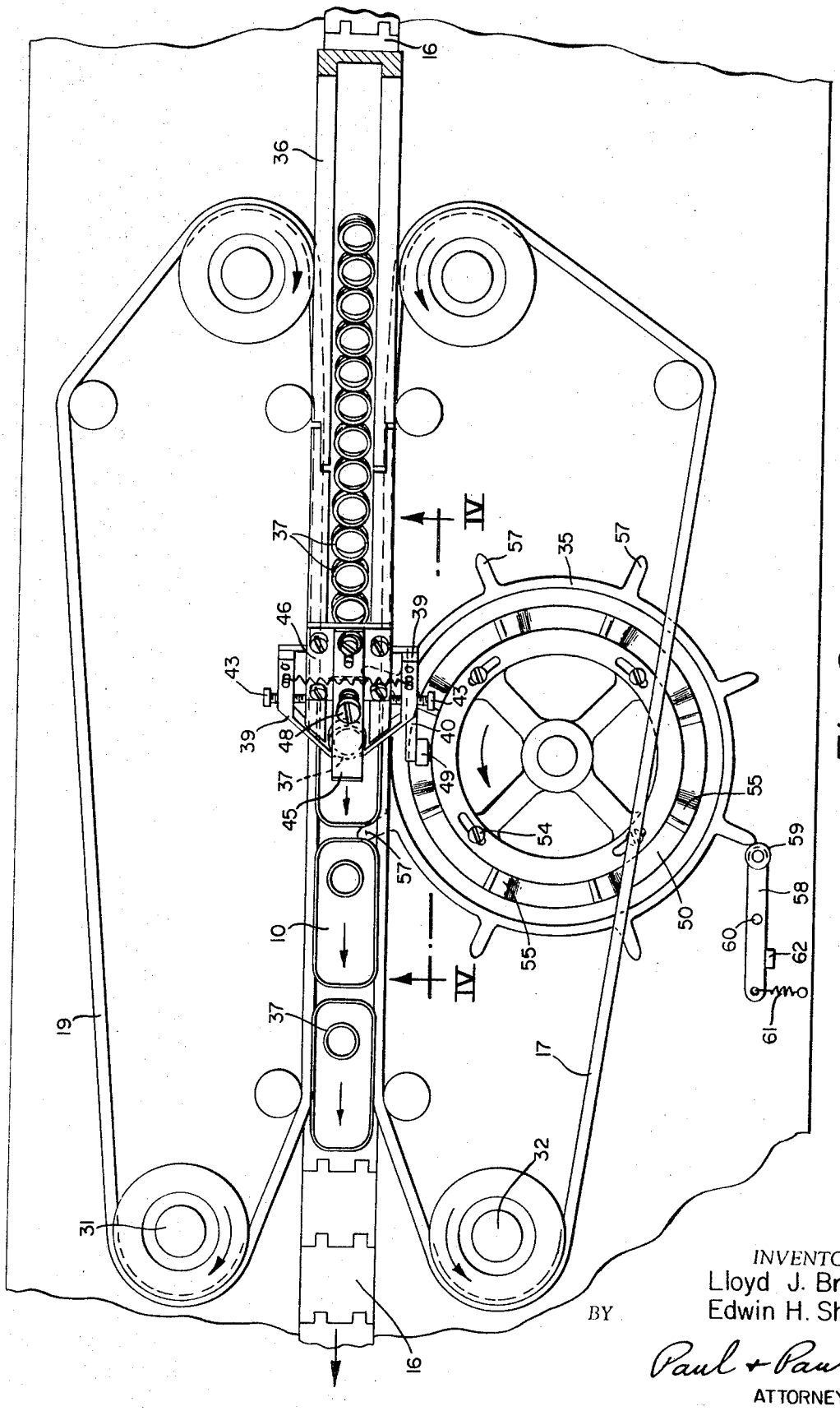


Fig. 2

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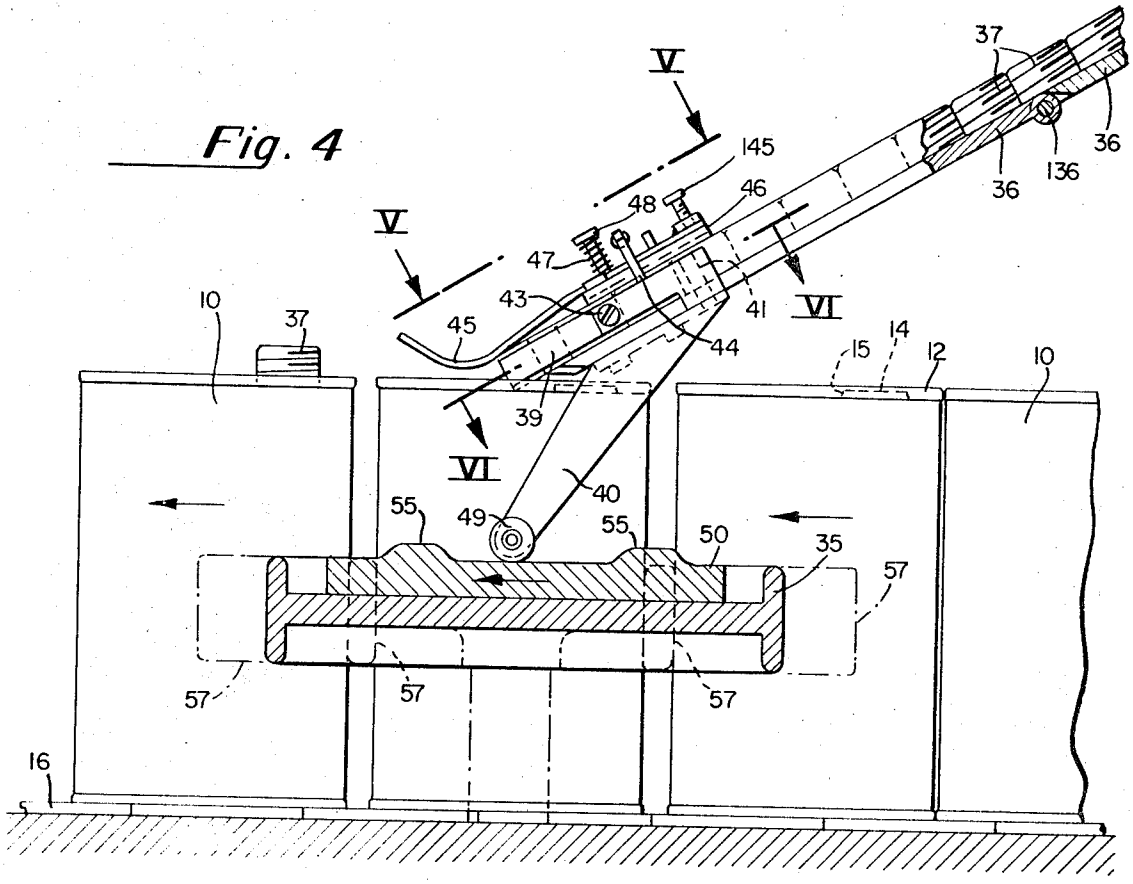
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CAN NECK PLACING APPARATUS

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Fig. 4



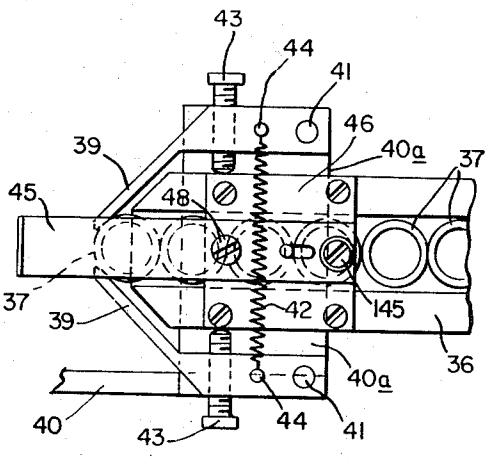


Fig. 5

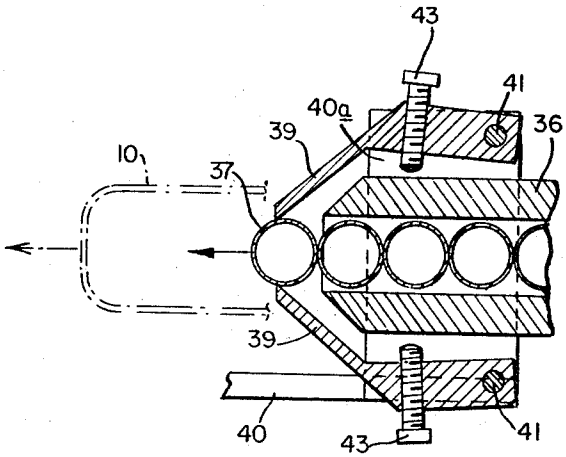


Fig. 6

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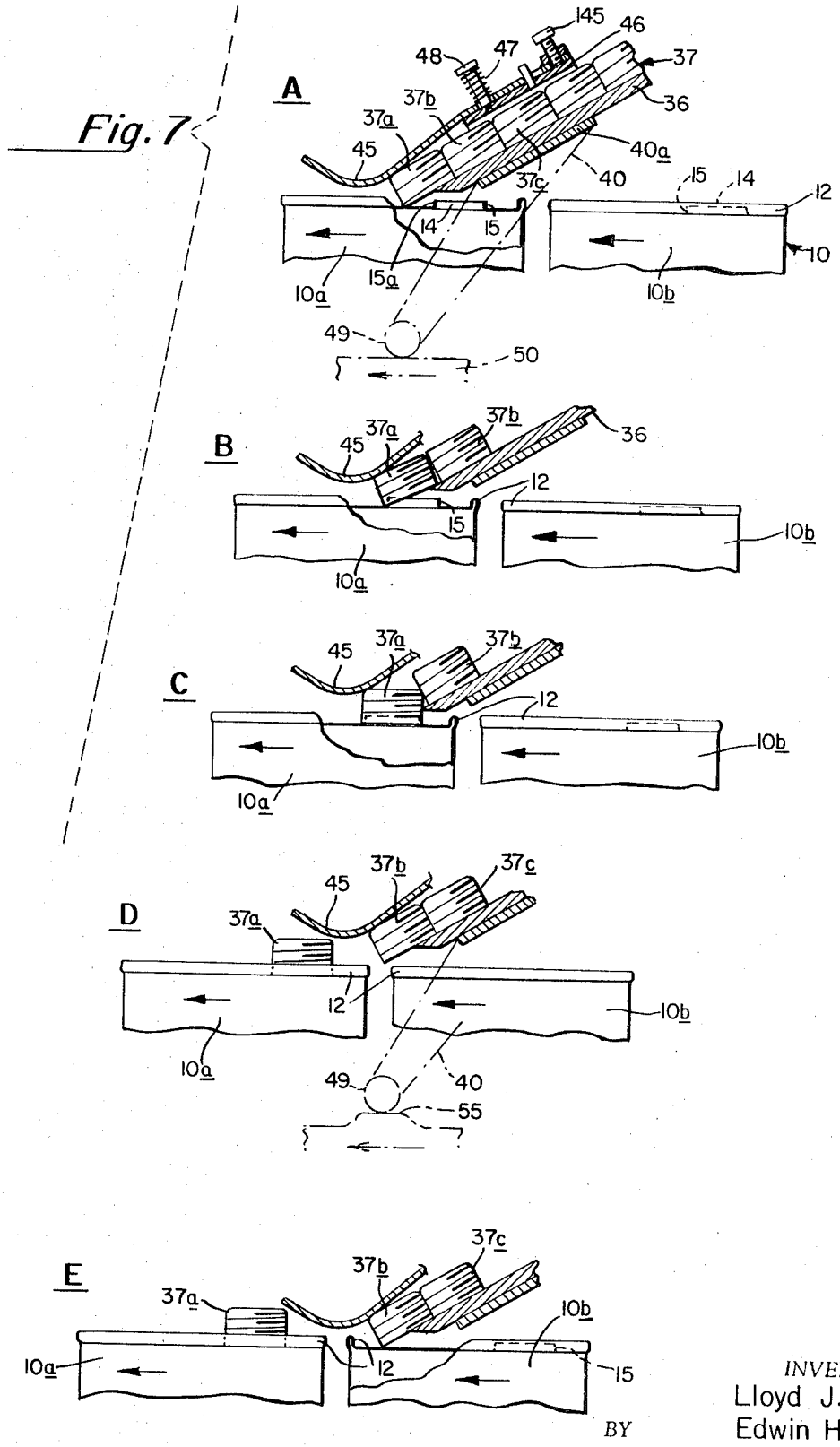
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CAN NECK PLACING APPARATUS

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Fig. 7



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3,550,240

CAN NECK PLACING APPARATUS

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Int. Cl. B23g 7/10; B23p 19/04
U.S. Cl. 29—208 9 Claims

ABSTRACT OF THE DISCLOSURE

In a can-making line, means are disclosed for automatically placing fitments (such as screw necks, beaded necks, and other fitments of this general type) on the flanged open throat of the partially completed can. The necks (or other fitments) are supplied to the placing position by gravity feed down an inclined chute, the lowermost neck being retained at the mouth of the chute in suspended over-hanging inclined position by spring-loaded retaining fingers. Cam means operative in timed relation with the movement of the cans in the conveyor line are provided for raising the mouth or discharge end of the chute to raise the suspended over-hanging inclined neck above the upstanding rim at the leading edge of the can and for then lowering the chute to allow the suspended neck to be engaged and pulled out from the chute by the leading edge of the throat flange. Thereafter, the mouth of the chute is again raised to allow the next neck (which has now dropped into over-hanging suspended position) to clear the rim at the trailing edge of the can and also the rim at the leading edge of the next can in the line.

FIELD OF THE INVENTION

This invention relates to automatic can making machinery, and in particular to automatic machinery for making cans having a screw top, or in making cans (such as lighter fluid cans) having a beaded neck which receives a fitment.

DESCRIPTION OF THE PRIOR ART

A search of the prior art revealed such prior art patents as Resina 2,434,053 and 2,625,313; Schweizer 2,658,654; De Bastos et al. 2,732,991 and 2,839,882, and Weller 3,043,416. These prior art patents relate to cap feeding machines or capping machines. No patent was found which discloses means for automatically placing screw necks, beaded necks, or other fitments on the open throats of a partially completed can.

Applicants are familiar with prior art automatic can lines, that is, with automatic lines of can making apparatus. In such lines, the majority of the operations in the making of the cans is performed automatically, but the placement of the screw tops on screw top type cans, and the placement of the beaded necks on lighter fluid cans, has been performed manually by a crew of operators who manually placed the necks on the open throats of the cans. Following such manual placement, the necks are soldered in place by automatic soldering apparatus.

SUMMARY OF THE INVENTION

In a preferred form of the present invention, the placement of screw necks or other fitments on the open throats of the cans is performed automatically. As the cans, which are transported in front-to-back series relation by the conveyor, approach the neck placing position, both sides of the cans are engaged by travelling belts which travel in the same direction and at the same speed as the conveyor. The function of the belts is to positively carry

the cans on the conveyor at conveyor speed. As the leading edge of the can reaches the mouth of a neck supply chute which is mounted in inclined position above the conveyor of the neck placing station, the mouth end of the chute is cam-elevated to allow the lowermost neck (which is being held in overhanging suspended position by a pair of retaining fingers) to clear the upstanding rim at the leading edge of the can. The chute is then lowered to its lowermost position, and the inside of the forward edge of the suspended overhanging neck is engaged by the upstanding front portion of the flange of the open throat of the can. As the can moves along, carried by the belts, the over-hanging neck is withdrawn from the supply chute, and a resilient hold-down presses the neck into position on the throat. The next succeeding neck now slides forward into over-hanging suspended position and is held by the pair of spring loaded retaining fingers. The mouth end of the supply chute is again cam-elevated to lift the next neck above the trail-edge of the can and also above the leading edge of the following cam. The cycle then repeats.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a diagrammatic side elevational view of the neck placing apparatus;

FIG. 2 is an enlarged plan view of the neck placing apparatus looking down along the line II—II of FIG. 1;

FIG. 3 is an elevational view looking along the line III—III of FIG. 1, showing the drive for the chain conveyor and for the conveying belts;

FIG. 4 is a side elevational view, partly in section, of the neck placing station looking along the line IV—IV of FIG. 2;

FIG. 5 is a plan view looking down along the line V—V of FIG. 4 showing the spring retaining fingers and the hold-down;

FIG. 6 is a view in section along the line VI—VI of FIG. 4;

FIG. 7 is a series of five diagrams in side elevation showing in successive action diagrams how the over-hanging suspended neck (retained at the mouth of the supply chute by the spring-loaded retaining fingers not shown) is withdrawn by the throat of the can as the can is carried forwardly by the conveying belts and chain conveyor.

DESCRIPTION OF THE PREFERRED EMBODIMENT

While the invention has broader applications, it will be convenient to describe the invention as applied to the placement of screw necks on a screw top can.

FIG. 1 is a diagrammatic side elevational view of screw neck placing apparatus according to the present invention. The apparatus illustrated in FIG. 1 is placed at an appropriate position in a line of automatic equipments arranged in series and through which a continual conveyor runs, and from the discharge end of which a steady ouput of finished cans may be delivered.

While the invention may be used in the production line of various shapes of cans having screw tops, it will be convenient to describe the invention in connection with the production of rectangular cans having the screw top located to one side of the top center. This is a well-known form of can, sometimes referred to as a flit can.

As shown in the drawings, the semi-finished products arriving in series succession at the in-line station occupied by the screw neck placing apparatus of the present invention are semi-finished cans **10** having a bottom, four sides and a top **12** having an open throat **14** located rearward of the center of the top. An upstanding rim **15** surrounds the opening.

In accordance with the present invention, belt drive means are provided at the screw neck placing station for conveying the cans positively forwardly in the same direction as the chain conveyor **16** and at the same speed as the conveyor **16**. This belt drive is shown to comprise four endless V-belts **17–20**, two on each side of the conveyor **16**, one upper and the other lower.

One suitable means for driving the V-belts **17–20** at the same speed as the conveyor **16** is illustrated in FIGS. 1, 2, and 3. In these figures, a motor **21** drives a chain **22** which drives a cross shaft **23** on which is mounted a sprocket **24** which drives a second chain **25** which in turn drives the sprocket **26** of the Rex chain conveyor **16**.

Mounted at opposite ends of the cross shaft **23** are beveled gears **27** and **28** which, as seen in FIG. 3, drive a pair of vertical drive shafts **31** and **32** on each of which are mounted upper and lower pulleys for driving the upper and lower V-belts **17–20**, one pair on each side of the conveyor **16**. Suitable idler pulleys are provided as shown in the drawing to so define the path of travel of the V-belts that the belt frictionally engage both sides of the cans **10** as the cans enter the screw neck placing station. These belts **17–20** "carry" the cans through the station, but the bottoms of the cans continue to rest on and travel with the chain conveyor. The function of the V-belt drive is to prevent the cans from being slowed down relative to the conveyor, or brought to a stop, when they engage the star wheel **35** and/or the lowermost screw neck in the supply chute **36**.

Located at the screw neck placing station above and in the vertical plane of the chain conveyor **16** is an inclined chute **36** which is supplied with screw necks **37** from a screw neck supply magazine **38**. The chute **36** is so inclined as to tend to cause the screw necks **37** to slide down the chute toward the conveyor **16**, the direction of movement of the screw necks being the same as that of the conveyor. A pair of opposing spring-biased retaining fingers **39** retains the lowermost screw neck at the mouth of the chute in over-hanging suspended inclined position. This position is best seen in FIG. 7 but the retaining fingers have been omitted from FIG. 7 in order to avoid obscuring the action there depicted.

As seen best in FIGS. 2, 4, 5, and 6, the retaining fingers **39** are pivotally supported on a cam-follower lifter arm **40** which has a lateral extension **40***a* which extends across the lower end portion of the chute **36** and is secured to the undersurface thereof. Lifter arm **40** and its lateral extension **40***a* carry a pair of vertical pivot pins **41**, one on each side of the chute **36**, about which pins the retaining fingers **39** are pivotally movable, as seen in FIGS. 5 and 6. The retaining fingers **39** are normally held in closed screw-neck-retaining position by a common biasing spring **42** which extends between the fingers **39** and is supported on a pair of pins **44**. A pair of adjusting studs **43**, one on each side, are threaded through tapped holes in the fingers **39** and abut against the side rails of the chute **36**. These studs allow the retaining fingers **39** to be set to the desired positions and spacing for best results during high speed continual operation of the can-making apparatus.

A resilient hold-down strip **45** is mounted on a plate **46** secured to the upper edges of the side walls of the chute **36** at the discharge end thereof. The hold-down strip **45** is normally held down by a biasing spring **47** carried on a stud **48**. Adjustment of the hold-down strip **45** is provided, as by an adjusting screw **145** threaded into a tapped hole at the rearward end of the hold-down strip.

For purposes which will become clear, the discharge end of the chute **36** is pivotal up and down about the pivot pin **136** by the lifter arm **40**. Carried at the lower end of lifter arm **40** is a cam follower **49** which rides on an annular cam member **50** adjustably mounted on star wheel **35** for free rotation about a vertical shaft **51**. Shaft **51** is supported in a bearing in frame **52** mounted on the base **53**. Annular cam member **50** is provided with a plurality of elevated cam surfaces **55** at spaced intervals. For example, eight such elevated cam surfaces **55** are shown in the drawing, at 45° spacings. The land portion of the star wheel **35** is provided with tapped holes for receiving adjustment screws **54** which are inserted into slots **56** in the annular cam member **50**.

The star wheel **35** is provided with radially extending fingers **57**. The fingers **57** are spaced apart a distance approximately equal to the length of one of the cans **10**. Thus, when one of the fingers **57** is engaged by the leading edge of one of the cans **10** being transported by the belts **17–20** through the screw-neck placing station, the star wheel **35** is rotated on its shaft **51** by the push of the can against the finger **57**, and as the star wheel is thus rotated, the next finger **57** moves into the can path between the trailing edge of the can which is pushing the star wheel and the leading edge of the next succeeding can.

In the particular machine illustrated in the drawing, the star wheel **35** is given such diameter (exclusive of the fingers **57**) as to allow for eight fingers **57** at spacings approximately equal to the length of a can **10**, and the cam ring **50** is provided with a corresponding eight elevated cam surfaces **55**. It will be understood that for different size cans the star wheel and cam ring may have a different number of fingers and cams than eight. The cam ring **50** is carried on the star wheel **35** for rotation therewith. The angular positions of the cam surfaces **55** relative to the fingers **57** is adjustable by means of the screws **54**. During periods of interrupted or random can feed, or when the conveyor is shut down, the star wheel **35** is maintained in position by a spring-loaded lever **58**, as later described.

The action of the screw-neck placing mechanism of the present invention is illustrated in a series of diagrams in FIGS. 7A, 7B, 7C, 7D, and 7E. In each of these figures, the cans **10** are moving from right to left, being carried by the belt drive **17–20** on the conveyor **16**. In FIG. 7A, the left most can **10***a* has pushed against one of the fingers **57** of the star wheel **35** and the succeeding finger **57** has entered between the leftmost can **10***a* and the next succeeding can **10***b*, forming a space between the cans as shown.

In FIG. 7A, the cam follower **49** is on the lower or land portion of the ring cam **50**, and the discharge end or mouth of the chute **36** is at its lower position. The overhanging suspended screw neck **37***a* is retained by the retaining fingers **39** in such inclined position that its forward inner surface will become engaged by the leading edge **15***a* of the upstanding rim **15** of the throat **14** of the can **10***a*, and pulled from between the retaining fingers **39**. Such action is shown in FIG. 7B. To simplify the drawing, the retaining fingers **39** have been omitted.

In FIG. 7C, the first screw neck **37***a* is shown deposited on the throat **14** of the can **10***a* about to be pressed down by the hold-down **45**.

In FIG. 7D, the placement of the screw neck **37***a* on the can **10***a* has been completed, and the second of the screw necks **37***b* has slipped down to the overhanging suspended position where it is now retained by the retaining fingers **39** (not shown). By comparing FIGS. 7C, 7D, and 7E, it will be apparent that unless something were done about it, the second screw neck **37***b* which in FIG. 7D is now in first position, would be engaged by the upstanding rim **12** at the leading edge of the next succeeding can **10***b* (or possibly even by the rim **12** at the trailing edge of the first can **10***a* which has just been provided with a screw neck). To avoid such happening, the discharge or mouth end of the chute **36** is, in accordance with the present invention, elevated at this time, pivoting about pivot point **136** (FIG. 4) by the action of the lifter arm **40** passing over the elevated cam surface **55**. As soon as the rim **12** at the leading edge of the succeeding can **10***b* has passed beyond the overhanging screw neck **37***b*, the lifter arm **40** drops down to the land level of the cam ring **50** and thereby lowers the discharge end of the chute **36**,

and thereby lowering the neck 37*b* to the position shown in FIG. 7E. The cycle just described then repeats.

The present invention eliminates a costly prior art manual operation by providing simple but fully automatic means in a can-making line for placing screw necks, or other necks or fitments, on cans. The automatic means provided by the invention do not require indexing means. The cans themselves function to index the chute-lifting mechanism, and also function to extract the screw necks or other fitments from the chute.

Since the star wheel **35** carrying the cam ring **50** is to be moved rotationally by the cans **10**, the star wheel is mounted for easy substantially friction-free rotation. There will be times when there is no feed of cans, such as when the can feed is random, or when the machine is shut down. It is desired, under these conditions, that the position of the star wheel **35** be not inadvertently disturbed, and to make sure that a finger **37** will be properly positioned to be pushed by the next can when it comes along, a spring-loaded positioner lever **58** may be provided having a nylon roller **59** located to be engaged by a finger **57** of the star wheel **35** as the star wheel is rotated counterclockwise by the cans, in the direction shown by the arrow in FIG. 2. When the finger **57** engages the nylon roller **59**, the lever **58** pivots about the pivot point **60**, thereby extending the tension spring **61** which, after the finger **57** has passed, returns the lever **58** to the stop position controlled by the stop **62**. The star wheel **35** is thus prevented from inadvertent clockwise rotation beyond the position controlled by the positioning lever **58**, and it is prevented from inadvertent counterclockwise rotation by a cam rise **55**. Thus, the substantially friction-free star wheel **35** is maintained within narrow angular limits during periods of no can feed, and in such position that a finger **57** will become engaged by the next can to come along.

While the preferred embodiment of this invention has been described in some detail, it will be obvious to one skilled in the art that various modifications may be made without departing from the invention as hereinafter claimed.

What is claimed is:

1. In apparatus for making cans having an upstanding peripheral rim in which a conveyor moves partially finished cans along, each can having at its top within its peripheral rim an open throat having an upstanding flange for receiving a screw neck or other fitment;

(a) a supply chute mounted above said conveyor for supplying fitments to the cans, the mouth of said chute terminating in the plane of the path of movement of said cans on said conveyor;

(b) means for retaining the lowermost fitment in the chute in over-hanging position partially suspended at the mouth of said chute;

(c) means connected to said chute and operative in timed coordinated relation with the movement of cans on said conveyor for raising the mouth of said chute to raise the over-hanging suspended fitment above the rim at the leading edge of the can and

for then lowering the mouth of said chute to allow the interior surface of the overhanging fitment to be engaged and the fitment extracted from the retaining means by the leading edge of the flange of the throat of the same can.

2. Apparatus according to claim **1** characterized in that the mouth end of said chute is pivotable up and down, and in that the means for raising and lowering the mouth end of the chute includes a lifter arm having a cam follower, a cam surface engaged by said cam follower, and means for moving said cam surface in timed coordinated relation with the movement of cans on said conveyor.

3. Apparatus according to claim **2** characterized in that said cam surface includes a rotatable cam ring having thereon a series of elevated cam surfaces disposed in a circular path.

4. Apparatus according to claim **3** characterized in that a star wheel is provided on which said cam ring is mounted for rotation therewith, said star wheel being mounted for free rotation on a vertical axis and having radially projecting fingers at least one of which at any one time projects into the path of said cans on said conveyor to be engaged and pushed by said cans moving on said conveyor.

5. Apparatus according to claim **4** characterized in that means are provided for preventing slippage of cans on the conveyor in the vicinity of said chute, said means comprising drive belts frictionally engaging the cans on each side thereof and drive means for moving said belts at the same speed as the conveyor.

6. Apparatus according to claim **5** characterized in that the means for retaining the fitment in over-hanging suspended position at the mouth of said chute comprises a pair of spring-loaded retaining fingers.

7. Apparatus according to claim **6** characterized in that resilient hold-down means are provided at the mouth of said chute for pressing the extracted fitment on to the throat of the can.

8. Apparatus according to claim **7** characterized in that the radially projecting fingers of said star wheel are spaced apart a distance corresponding approximately to the length of one can.

9. Apparatus according to claim **8** characterized in that yieldable positioning means are provided for maintaining the star wheel in an approximate position in which a projecting finger projects into the path of the cans on said conveyor while awaiting the next can.

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U.S. Cl. X.R.

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