

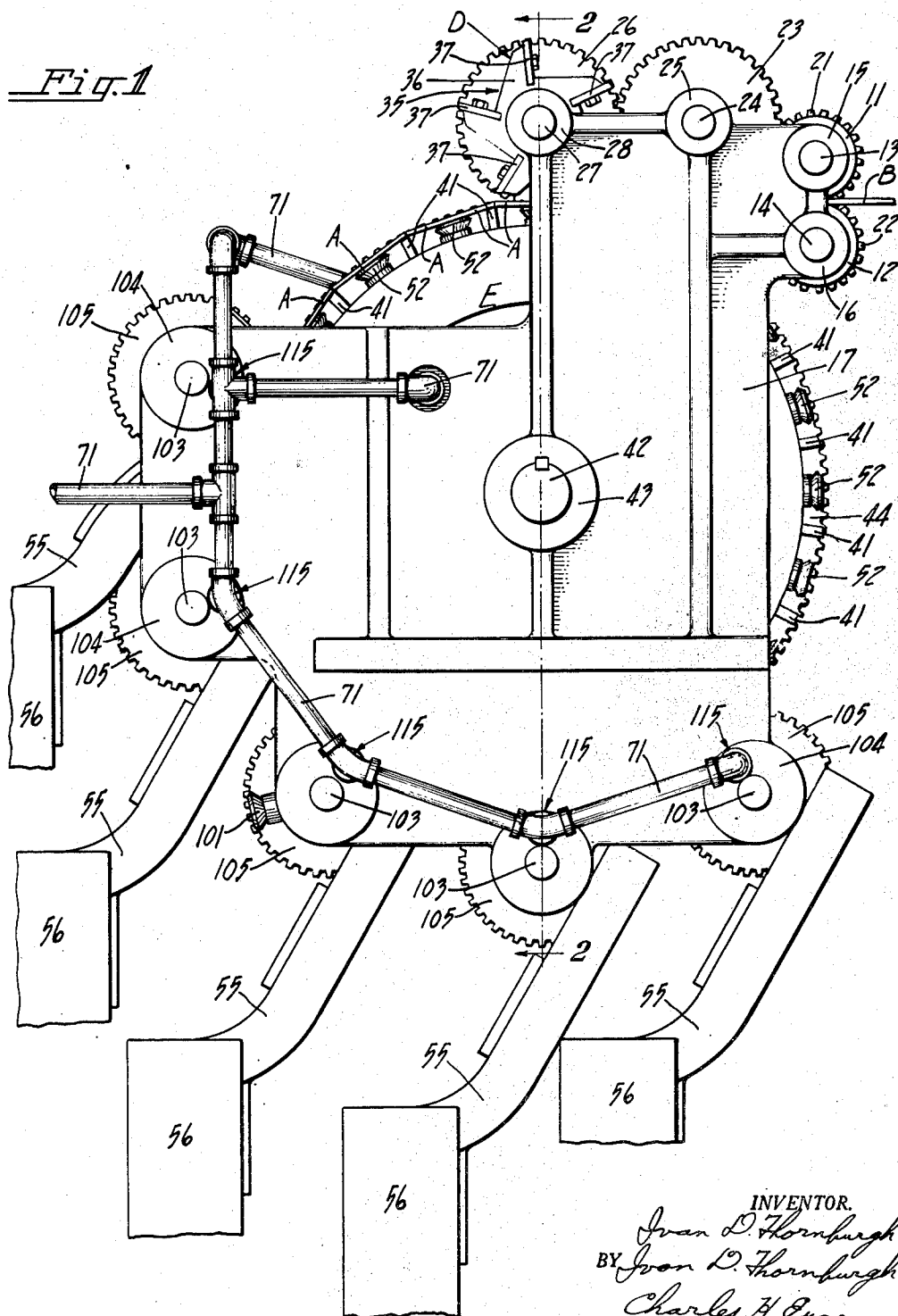
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FLATTENED CAN BODY MANUFACTURING MACHINE

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5 Sheets--Sheet 1

Fig. 1



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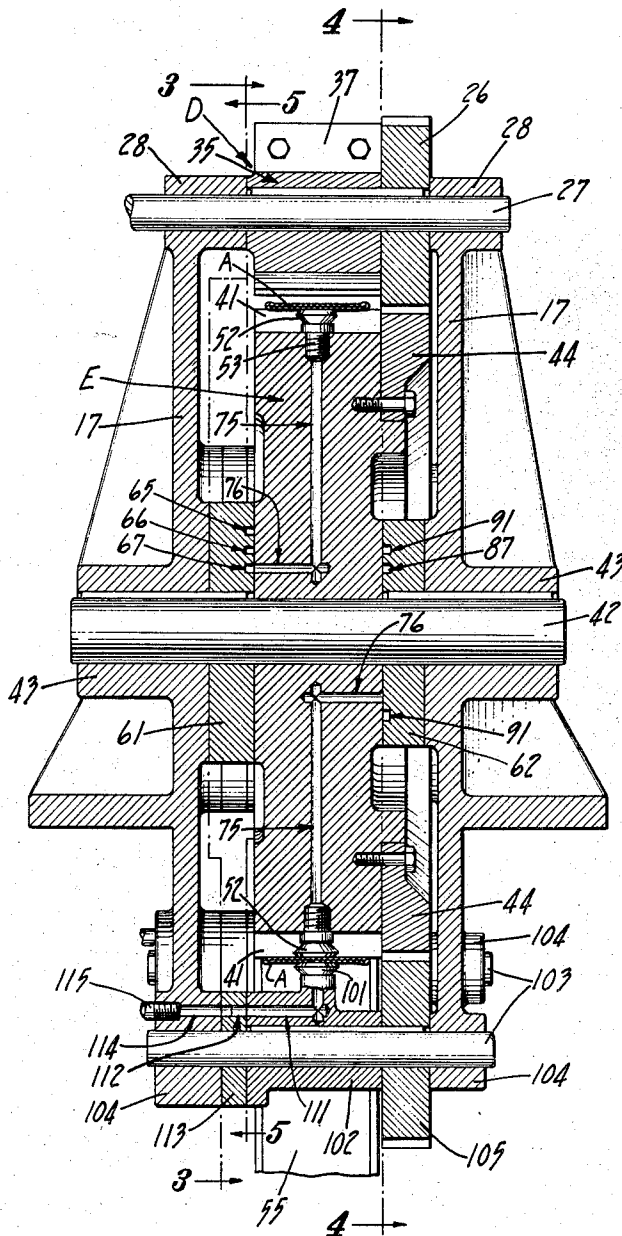
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FLATTENED CAN BODY MANUFACTURING MACHINE

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Fig. 2



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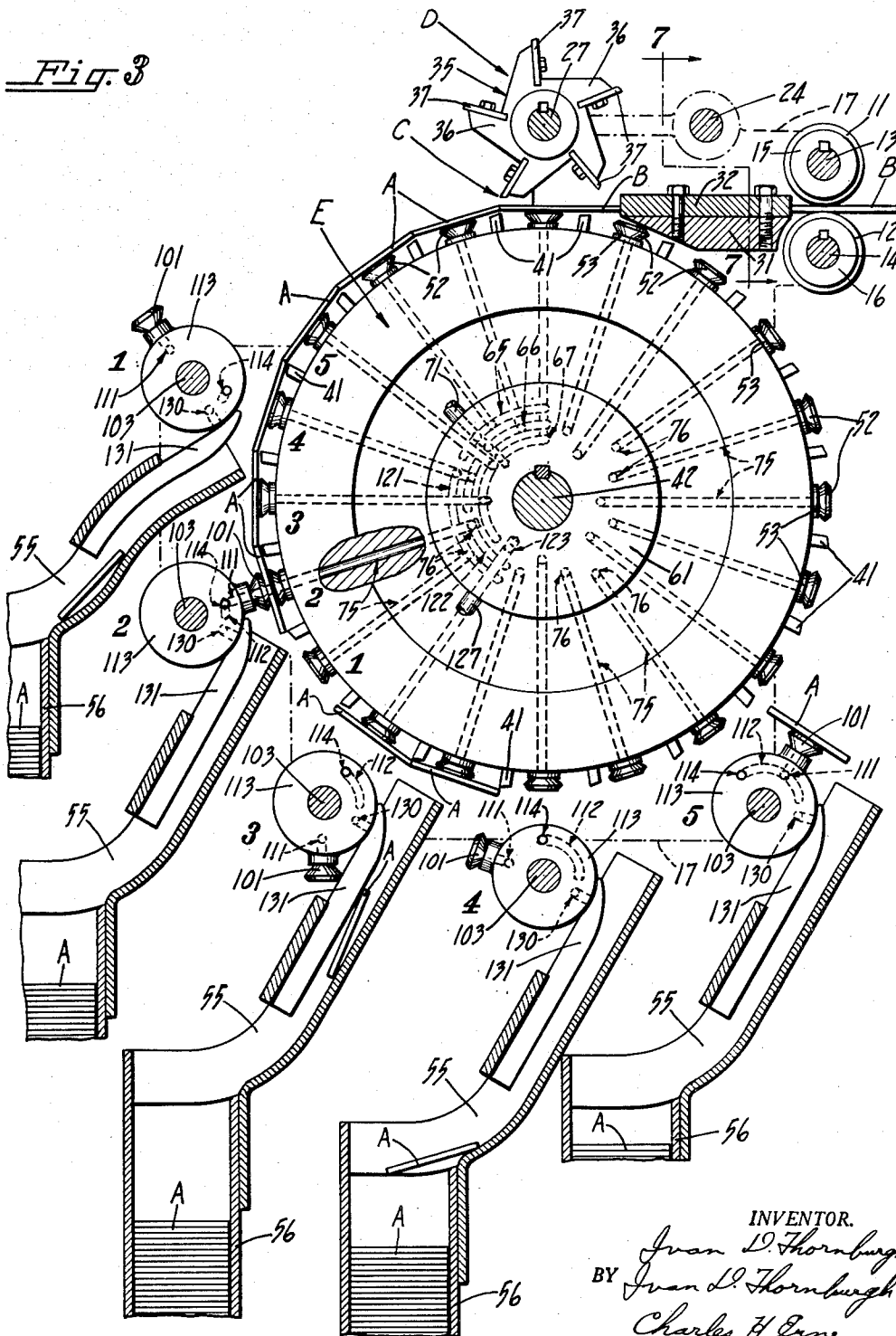
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5 Sheets-Sheet 3

Fig. 3



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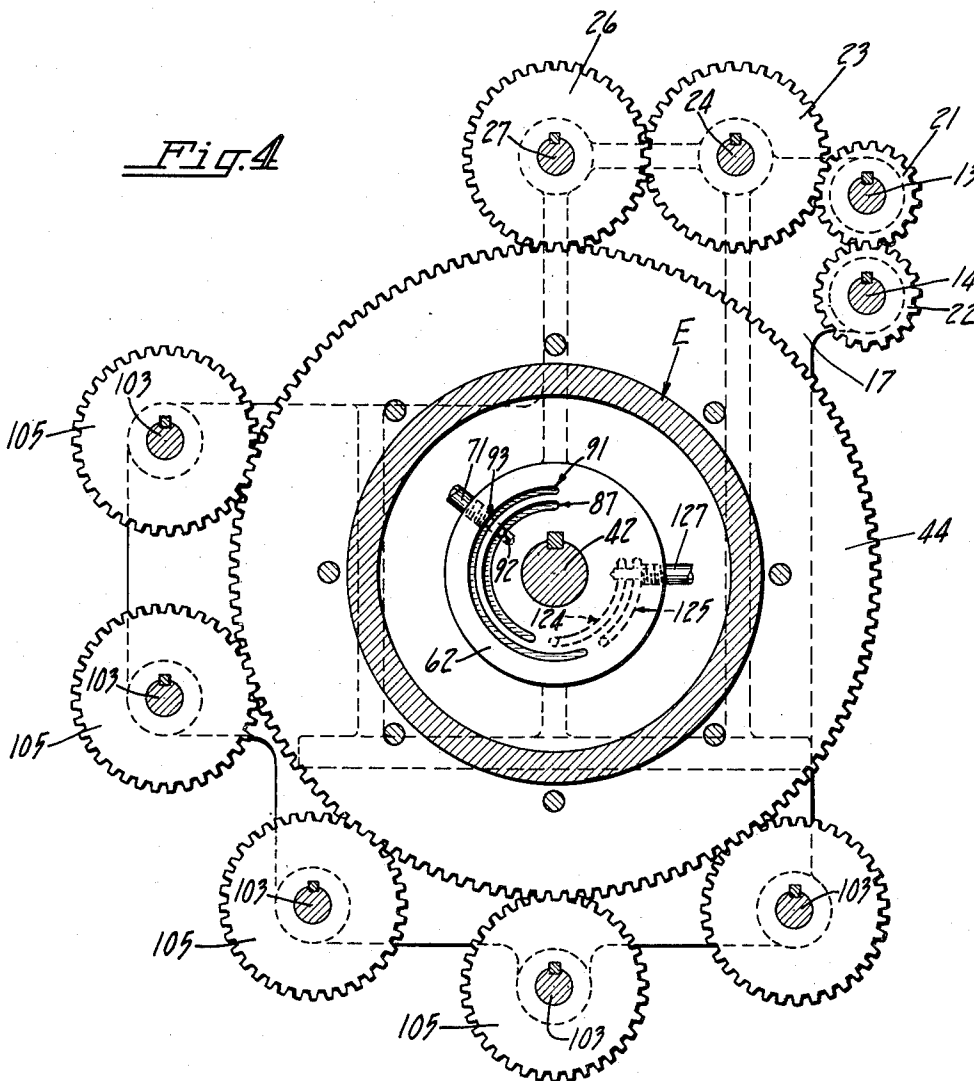
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FLATTENED CAN BODY MANUFACTURING MACHINE

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Fig. 5

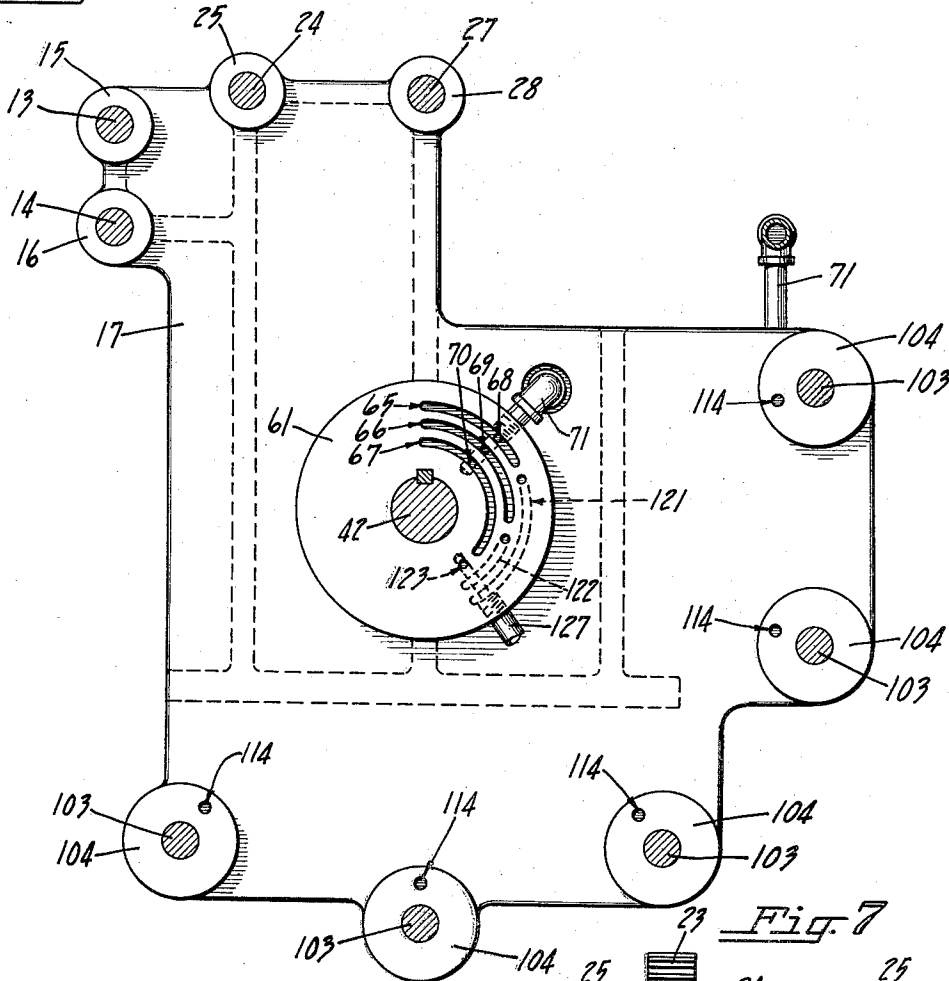


Fig. 6

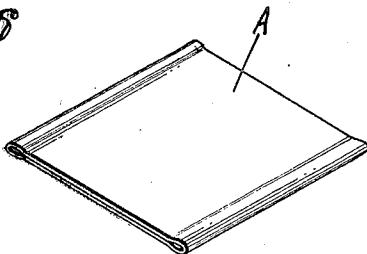
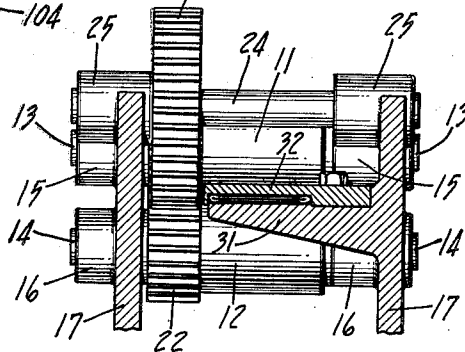


Fig. 7



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2,383,523

FLATTENED CAN BODY MANUFACTURING MACHINE

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Application December 3, 1943, Serial No. 512,832

11 Claims. (Cl. 164—68)

The present invention relates to the manufacture of containers or cans from seamless or seamed tubing that has been flattened into double wall ribbon form and wound onto spools for convenience in shipment and storage and has particular reference to an apparatus for cutting the flattened tubing into can body lengths and for distributing the resulting flattened can bodies to a plurality of machines incident to the manufacture of such bodies into cans.

An object of the invention is the provision of an apparatus for severing can bodies from flattened double wall ribbon form of seamless or seamed tubing wherein the flattened tubing is cut into can body lengths which thereupon are advanced in timed order and are distributed to a plurality of machines such as reforming machines in which the flattened can bodies may be formed into desired can body shape, to the end that production of can bodies will take place at a high rate of speed.

Another object is the provision in such a machine of vacuum devices for holding cut-off flattened or partially formed can bodies under control during their movement through the machine so that the bodies may be properly distributed to a plurality of different places of deposit and in timed order.

Numerous other objects and advantages of the invention will be apparent as it is better understood from the following description, which, taken in connection with the accompanying drawings, discloses a preferred embodiment thereof.

Referring to the drawings:

Figure 1 is a side elevation of a machine embodying the instant invention, with parts broken away;

Fig. 2 is a transverse section taken substantially along the broken line 2—2 in Fig. 1, with parts broken away;

Figs. 3, 4 and 5 are longitudinal vertical sections taken substantially along the lines 3—3, 4—4 and 5—5 in Fig. 2;

Fig. 6 is an enlarged perspective view of a collapsed can body produced and distributed by the machine; and

Fig. 7 is a transverse vertical section taken substantially along the broken line 7—7 in Fig. 3.

As a preferred embodiment of the instant invention the drawings disclose a high speed machine for cutting off collapsed can bodies A (Fig. 6) from a continuously moving metal tube B (Fig. 3) that has been flattened into the form of a double wall ribbon. The machine is also directed to distributing these cut-off collapsed can bodies

to a plurality of subsequent operation machines such as reforming machines or the like as an incident in the manufacture of tubular sheet metal can bodies. The ribbon of tubing is substantially continuous in length and is made preferably from aluminum or aluminum alloy which is well adapted to certain kinds of containers such as beer or other beverage cans.

The ribbon of tubing B may be fed from a supply of tubing which has been reeled in a compact coil on a spool or the like (not shown) and is continuously advanced into the machine, preferably in a horizontal position. This feeding or advancing of the ribbon of tubing is brought about by a pair of horizontally disposed feed rollers 11, 12 (Fig. 3) between which the flattened tubing passes. These rollers are mounted one above the other on short drive shafts 13, 14, journaled in bearings 15, 16 (see also Figs. 1 and 2) formed in a pair of spaced and parallel side frames 17 which constitute the main frame of the machine.

The feed rollers 11, 12 are continuously rotated in synchronism by a pair of meshing spur gears 21, 22 (Figs. 1 and 4) which are mounted on the roller drive shafts 13, 14. The upper gear 21 is driven by an idler gear 23 which is mounted on a cross shaft 24 journaled in bearings 25 formed in the side frames. Gear 23 also meshes with and is driven by a gear 26 keyed to a drive shaft 27 journaled in bearings 28 formed in the side frames. The drive shaft may be rotated in any suitable manner.

The ribbon of tubing B advanced into the machine by the feed rollers 11, 12 is received on a horizontal table 31 (Figs. 3 and 7) formed on and located between the spaced side frames 17. During its advancement across the table, the tubing is maintained in place by a recessed side guide and hold-down plate 32 which is secured to the top of the table.

As the advancing ribbon of tubing travels across the table 31, its leading end extends out into space beyond the inner edge of the table and comes into a cutting off station C (Fig. 3). At this station the leading end of the tubing is in tangential relation to a rotating cut-off head D which cuts the tubing into can body lengths.

The cut-off head D is located between the side frames 17 and includes a star shaped head member 35 (Figs. 2 and 3) which is mounted on and rotates, in a clockwise direction as viewed in Fig. 3, with the main drive shaft 27. The head member is formed with a plurality of wide flat-sided,

transverse fingers 36 which carry cutter blades 37.

Severing of the tubing B into can body lengths by the cutter blades 37 of the head D is brought about in cooperation with auxiliary cut-off blades 41 which back up the tubing during the cutting operation. These blades are arranged in spaced order around the outer peripheral face of a rotatable carrier turret E. The turret is located directly below the cut-off head D, between the side frames 17 and at the top is in tangential relation to the path of travel of the tubing through the cut-off station C.

The turret E is rotatably mounted on a stationary turret shaft 42 (Figs. 2 and 3) keyed in place in bearings 43 formed in the side frames 17. This turret is continuously rotated in time with the cut-off head D and in a counterclockwise direction, as viewed in Fig. 3, by a spur gear 44 (see also Fig. 4) which is bolted to one side of the turret. The gear meshes with and is driven by the main driving gear 26 on the drive shaft 21.

Hence as the flattened tubing B advances into the cutting-off station C, between the rotating cut-off head D and the rotating carrier turret E, the blades 37 of the head and the auxiliary blades 41 of the turret cooperate in engaging opposite sides of the tubing and sever can body lengths therefrom. This action continues uninterruptedly and collapsed can bodies A are produced in rapid succession.

During this cutting off operation just prior to the can body A being severed from the ribbon of tubing, and also just after cutting, it is held under complete control by suction or vacuum cups 52 (Figs. 2 and 3). These cups are carried on the turret E, there being a cup adjacent each auxiliary cut-off blade 41. Each cup is fastened in a coupling 53 which is threaded into the outer peripheral face of the turret. When a vacuum cup 52 is first brought into engagement with the free end of the ribbon A, a vacuum is established. The cup thereupon grips the tubing and holds it fast so that the severing which immediately follows is done in a precise manner.

After being cut off, the cups 52 continue to hold the body while the rotating turret E carries the body around to a place of deposit. In the instant machine the desired place of deposit for a particular can body is selected from a plurality of chutes 55 (Fig. 3). These chutes lead to magazines 56 of subsequent operation machines, such as body reforming machines. The drawings show five of these chutes 55 arranged around the periphery of the turret although it will be obvious that the invention is equally well adapted for use with any number of such chutes.

In order to selectively distribute a cut-off can body A to its proper receiving chute 55, the vacuum cups 52 are arranged in groups of a number equal to the number of chutes. In the present embodiment, as shown in the drawings, there are five cups in each group and the total number of cups around the turret is therefore a multiple of five. For convenience in explanation one group of cups and the chutes to be served by them are numbered from one to five in Fig. 3.

Hence with such a grouping of the cups, the body A held by cup number 1 will be deposited into chute number 1, when the cup is advanced adjacent its associated chute. In like manner, the body held by cup number 2 will be deposited in chute number 2, and so on until each body has been deposited in its proper chute. In this manner the can bodies are distributed equally

among the chutes so that all of these places of deposit receive substantially the same number of can bodies.

This selective distribution of the cut-off bodies A into the chutes 55 is brought about preferably by the timing of the making and the breaking of the vacuum in the cups 52. This timing is effected by a pair of stationary valve plates or discs 61, 62 (Figs. 2, 3, 4 and 5) which are keyed on the stationary turret shaft 42 and which are located one on each side of the turret and in engagement therewith. Valve disc 61 is used in connection with the numbered 1, 2 and 3 suction cups, while valve disc 62 functions for suction cups numbered 4 and 5.

Valve plate 61 is formed with three concentric valve grooves 65, 66, 67 (Figs. 2 and 5) which extend partially around the inner face of the plate in various length. These grooves communicate with ports 68, 69, 70, which are formed in the plate and which connect with a pipe line 71 which leads to any suitable source of vacuum. The grooves are spaced radially from each other and from the center of the valve plate in order to individually serve the 1, 2 and 3 cups 52 of each group of five.

The numbered 1, 2 and 3 as well as the 4 and 5 cups 52 communicate through their couplings 53, with radial channels 75 cut in the turret E. The channels of the numbered 1, 2 and 3 cups terminate at their inner ends in outlet ports 76 which extend toward the left as in Fig. 2 and end at the face of the valve disc 61. Similar outlet ports 76 for the numbered cups 4 and 5 extend toward the right (Fig. 2) and end at the face of the valve disc 62. This will be better understood as the description proceeds.

The channels of each cup in a group of five cups are of different lengths so that they will come into the proper communication with different valve grooves in the valve plates 61, 62. In this way the cups numbers 1, 2, 3 of each group are served respectively by the grooves 65, 66 and 67 in the valve plate 61, while cups number 4 and 5 are served by similar concentric grooves 87, 81 (Fig. 4) cut in the face of the valve plate 62. Grooves 87, 81 communicate with ports 82, 83 which also lead into the vacuum pipe line 71.

Hence in operation, when a number 1 vacuum cup 52 comes into position adjacent the free end of the tubing B at the cut-off station C its port 76 simultaneously comes into register with the vacuum groove 65 and thus brings the cup into communication with the source of vacuum. It is this action that causes the cup to grip and hold the tubing. The port 76 sweeps along the arcuate length of the groove 65 and the vacuum in the cup holds the body after it is cut off.

When the body held by a number 1 cup reaches chute number 1, the vacuum is broken to release the hold on the body. This is brought about by the port 76 having reached the end of the groove 65 in the valve plate 61. Thereafter the body may be stripped off the cup and will be deposited into the chute as will be hereinafter explained.

In like manner, all the other vacuum cups 52 of each group of five operate to establish a vacuum in the cups, successively at the cut-off station C. When the can body with its vacuum cup reaches its respective chute it will be released by breaking of the vacuum. Thus it will be observed that the selective vacuum operation of a vacuum cup is the result of which groove 65, 66, 67, 87 or 81 is in communication with its radial channels 75 and ports 76.

Stripping of a collapsed can body A from a vacuum cup 52 when it reaches its proper chute 55 is brought about by a stripper vacuum cup 101 (Figs. 2 and 3). These stripper cups are mounted on rotatable stripper members or selective distributing devices 102 (Fig. 2) which in turn are mounted on short cross shafts 103 journaled in bearings 104 formed in the side frames 17. The distributing members are continuously rotated by respective spur gears 105 (Figs. 2 and 4) which are carried on the cross shafts and which mesh with the turret gear 44.

There is one of the stripper members 102 located at the entrance end of each chute 55. The stripper cup 101 on each member is positioned in proper relation so that it will come into position with a held body on the turret only when that body is held by a cup corresponding to the chute into which the body is to be discharged. This relation is clearly discernible from Fig. 3 of the drawings.

The stripper cups 101 are vacuumized at the proper time by way of channels 111 (Fig. 2) the outer ends of which come into register with curved vacuum grooves 112 formed in stationary valve discs 113 mounted on the cross shafts 103 and secured to one of each pair of the shaft bearings 104. The vacuum grooves are formed with ports 114 which communicate with pipes 115 (Fig. 1) leading into the vacuum pipe line 71. There is one of these valve discs for each stripper member.

Hence, for example, when a vacuum cup 52 of the number 2 series in each group brings its held can body A into position adjacent the entrance end of the chute number 2, the stripper cup 101 located at that chute comes into engagement with the body on the side opposite to that engaged by the cups 52, as best shown in Fig. 3. At this time the vacuum channel 111 in the stripper member 102 comes into communication with the vacuum groove 112 in the valve disc 113 and as a result a vacuum is created in the stripper cup. The cup thus grips the body and pulls it away from its holding suction cup 52.

To facilitate the transfer of the body from a vacuum cup 52 to a stripper cup 101 a blast of compressed air is forced into the cup 52 to break the vacuum therein and to force the released body away from the cup and into more positive engagement with the stripper cup. This blast of compressed air is forced through the cup channels 75 in the turret when their ports 76 come into register with respective air grooves 121, 122, 123, in the valve plate 61 or with similar grooves 124, 125 in the valve plate 62 as the case may be. These air grooves are also arcuate in form and are disposed adjacent the ends of the vacuum grooves. The air grooves may be said to constitute separated continuations of the respective vacuum grooves 65, 66, 67, 87, 91. The air grooves are in communication with pipes 127 which lead from any suitable source of compressed air.

When a body A has been picked up by a stripper cup 101 from a vacuum cup 52, it is carried through a short, curved path of travel by the rotation of the stripper member 102 and then is dropped into the adjacent chute 55. The vacuum channel 111 at this time comes into register with an atmosphere port 130 in the disc 113. The vacuum in the stripper cup 101 is thereupon broken. A stationary stripper bar 131 secured to the chute is engaged by the body as it moves along its circular path of travel and into position over the entrance end of the chute. This engagement positively knocks the body off the stripper cup 101 in case it has any tendency to cling fast.

It is thought that the invention and many of its attendant advantages will be understood from the foregoing description, and it will be apparent that various changes may be made in the form, construction and arrangement of the parts without departing from the spirit and scope of the invention or sacrificing all of its material advantages, the form hereinbefore described being merely a preferred embodiment thereof.

I claim:

1. In a machine for making can bodies from tubing that has been flattened into double wall ribbon form for convenience in shipment and storage, the combination of cutting means for severing the flattened tubing into can body lengths to produce partially formed can bodies, means for receiving said cut-off partially formed can bodies and for carrying them along a path of travel, distributing devices adjacent said path of travel for engaging and holding a cut-off can body to strip it from said receiving means, and means for moving a distributing device into stripping position only when a cut-off can body is located in a predetermined position on said receiving means for selectively diverting the partially formed can bodies into different places of deposit for further operations incidental to the manufacture of such can bodies.

2. In a machine for making can bodies from tubing that has been flattened into double wall ribbon form for convenience in shipment and storage, the combination of feeding devices for advancing the flattened tubing continuously in a straight line of travel, cutting means adjacent said feeding devices for cutting the moving flattened tube as it advances into flat can body lengths to produce partially formed can bodies, means for receiving said flat cut-off partially formed can bodies and for carrying them along a path of travel in a flat condition, and distributing devices adjacent said path of travel for selectively diverting the partially formed can bodies into different places of deposit for further operations incidental to the manufacture of such can bodies, said distributing devices having means thereon for engaging and removing the severed can bodies from said receiving means.

3. In a machine for making can bodies from tubing that has been flattened into double wall ribbon form for convenience in shipment and storage, the combination of cutting means for severing the flattened tubing into can body lengths to produce partially formed can bodies, a rotatable carrier turret for receiving said cut-off partially formed can bodies and for guiding them along a path of travel, means on said turret for holding the partially formed can bodies in place while moving with said turret, distributing devices arranged in spaced positions along the periphery of said carrier turret and adjacent said path of travel for engaging and holding a cut-off can body to strip the latter from said turret, and means for making said distributing devices progressively effective so that all distributing devices engage and hold said cut-off can bodies in the order of their arrangement on said turret for selectively diverting the guided partially formed can bodies from said turret and for shifting them into different places of deposit for further operations incidental to the manufacture of such can bodies.

4. In a machine for making can bodies from tubing that has been flattened into double wall ribbon form for convenience in shipment and

storage, the combination of feeding devices for advancing the flattened tubing continuously, rotary cutting means adjacent said feeding devices, a rotatable turret adjacent said cutting means and having continuous movement in synchronism with said advancing tubing, cut-off blades spaced at intervals around said turret for cooperation with said cutting means for severing the flattened tubing into can body lengths to produce partially formed can bodies, means on said turret and disposed between said cut-off blades for holding the cut-off partially formed can bodies in place while moving with said turret, and distributing devices adjacent the periphery of said turret having means thereon for positively engaging and selectively stripping the partially formed can bodies from said turret and for shifting them into different places of deposit for further operations incidental to the manufacture of such can bodies.

5. In a machine for making can bodies from tubing that has been flattened into double wall ribbon form for convenience in shipment and storage, the combination of feeding devices for advancing the flattened tubing continuously, rotary cutting means adjacent said feeding devices for cutting into can body lengths, the moving flattened tube as it advances to produce partially formed can bodies, a rotatable turret adjacent said cutting means, cut-off blades spaced at intervals around said turret for cooperation with said cutting means for severing the flattened tubing, suction cups on said turret and disposed between said cut-off blades for holding the cut-off partially formed can bodies in place while moving with said turret, valve means communicating with a source of vacuum and with said suction cups during a portion of their travel with said turret for attracting the partially formed can bodies to said suction cups, distributing devices disposed adjacent the periphery of said turret, and means carried by said distributing devices for selectively removing the partially formed can bodies from said suction cups and for shifting the can bodies into different places of deposit for further operations incidental to the manufacture of such can bodies.

6. In a machine for making can bodies from tubing that has been flattened into double wall ribbon form for convenience in shipment and storage, the combination of feeding devices for advancing the flattened tubing continuously, rotary cutting means adjacent said feeding devices for cutting the moving flattened tube as it advances into can body lengths to produce partially formed can bodies, a rotatable turret adjacent said cutting means, cut-off blades spaced at intervals around said turret for cooperation with said cutting means for severing the flattened tubing, suction cups on said turret and disposed between said cut-off blades for holding the cut-off partially formed can bodies in place while moving with said turret, valve means communicating with a source of vacuum and with said suction cups during a portion of their travel with said turret for attracting the partially formed can bodies to said suction cups, distributing devices adjacent the periphery of said turret for selectively removing the partially formed can bodies from said turret and for shifting them into different places of deposit for further operations incidental to the manufacture of such can bodies, and means for introducing compressed air into said suction cups when they come adjacent said

distributing devices to facilitate removal of the partially formed can bodies from said turret.

7. In a machine for making can bodies from tubing that has been flattened into double wall ribbon form for convenience in shipment and storage, the combination of cutting means for severing the flattened tubing into can body lengths to produce partially formed can bodies, a rotatable carrier turret for receiving said cut-off partially formed can bodies and for carrying them around a curved path of travel, a distributing member disposed adjacent the periphery of said carrier turret and rotatable in time with said carrier turret, and means on said distributing member for positively engaging and stripping the partially formed can bodies from said carrier turret to distribute them to a place of deposit for further operations as an incident in the manufacture of such can bodies.

8. In a machine for making can bodies from tubing that has been flattened into double wall ribbon form for convenience in shipment and storage, the combination of cutting means for severing the flattened tubing into can body lengths to produce partially formed can bodies, a rotatable carrier turret for receiving said cut-off partially formed can bodies and for carrying them around a curved path of travel, a distributing member disposed adjacent the periphery of said carrier turret and rotatable in time with said carrier turret, a suction cup on said distributing member for positively engaging and removing the partially formed can bodies from said carrier turret to distribute them to a place of deposit for further operations as an incident in the manufacture of such can bodies, and valve means communicating with a source of vacuum and with said suction cup for attracting the partially formed can bodies from the carrier turret to the suction cup.

9. In a machine for making can bodies from tubing that has been flattened into double wall ribbon form for convenience in shipment and storage, the combination of cutting means for severing the flattened tubing into can body lengths to produce partially formed can bodies, a rotatable carrier turret located adjacent said cutting means, suction cups carried on said turret and extending beyond its periphery for holding said flattened tubing during the cutting of and for receiving said cut-off partially formed can bodies for carrying the same along a curved path of travel, a plurality of distributing members disposed adjacent the periphery of said carrier turret and rotatable in time therewith, a suction cup on each of said distributing members for engaging a can body on its surface opposite to the surface held by said turret suction cup for stripping the body from the turret cup thus selectively distributing said can bodies to a plurality of different places of deposit for further operations incidental to the manufacture of such can bodies, and valve means communicating with a source of vacuum and with each of said suction cups to facilitate removal of the partially formed can bodies from said carrier turret.

10. In a machine for making can bodies from tubing that has been flattened into double wall ribbon form for convenience in shipment and storage, the combination of cutting means for severing the flattened tubing into can body lengths to produce partially formed can bodies, a rotatable carrier turret for receiving said cut-off partially formed can bodies and for carrying

them around a curved path of travel, a distributing member disposed adjacent the periphery of said carrier turret and rotatable in time with said carrier turret, a suction cup on said distributing member for engaging and removing the partially formed can bodies from said carrier turret to distribute them to a place of deposit for further operations as an incident in the manufacture of such can bodies, stripper means disposed adjacent said distributing member for stripping the removed partially formed can bodies from said suction cup, and means for receiving and for guiding the stripped-off can bodies to their place of deposit.

11. In a machine for making can bodies from tubing that has been flattened into double wall ribbon form for convenience in shipment and storage, the combination of cutting means for severing the flattened tubing into can body

length to produce partially formed can bodies, a rotatable turret located adjacent said cutting means, a plurality of separated localities of deposit arranged around the periphery of said turret, suction cups carried by said turret with one of said cups corresponding to each of said localities of deposit, and distributing devices located adjacent each of said localities, said distributing devices each having means thereon for positively engaging and removing a partially formed can body from a said suction cup, and means for operating each of said distributing devices to insure only the removal of a partially formed can body from the said corresponding suction cup without affecting any can bodies held by suction cups not corresponding to a particular distributing device, whereby each can body is delivered to a selected predetermined locality of deposit.

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