Dec. 31, 1968 D. VANDERLAAN ETAL 3,418,837

SELF-LUBRICATED AND SANITARY DRIVE MEANS FOR CAN FLANGER AND THE LIKE

Filed Jan. 26, 1967 Sheet 1 of 3

FIG. 1.

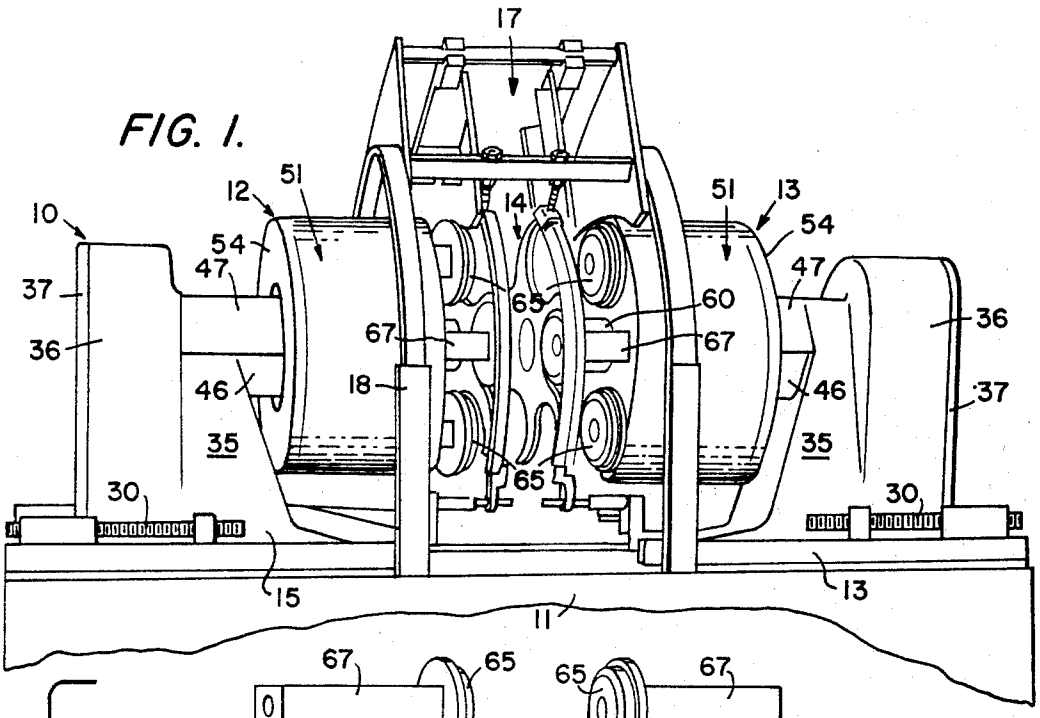


FIG. 4.

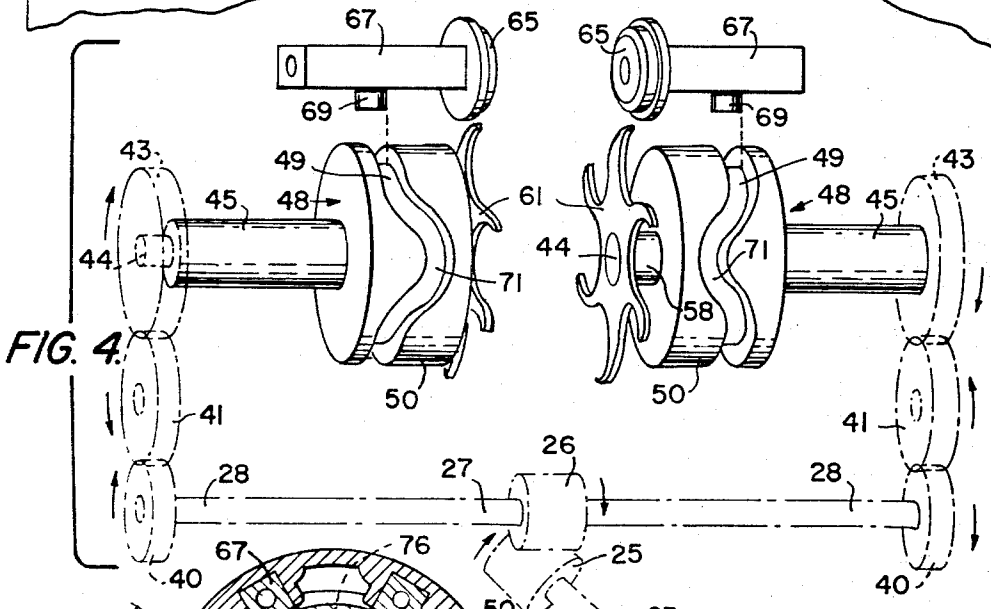
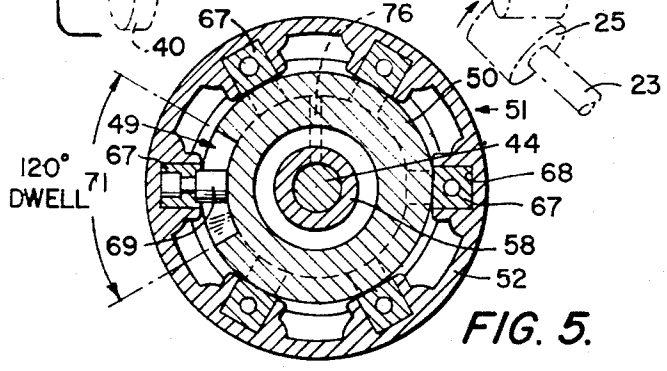


FIG. 5.



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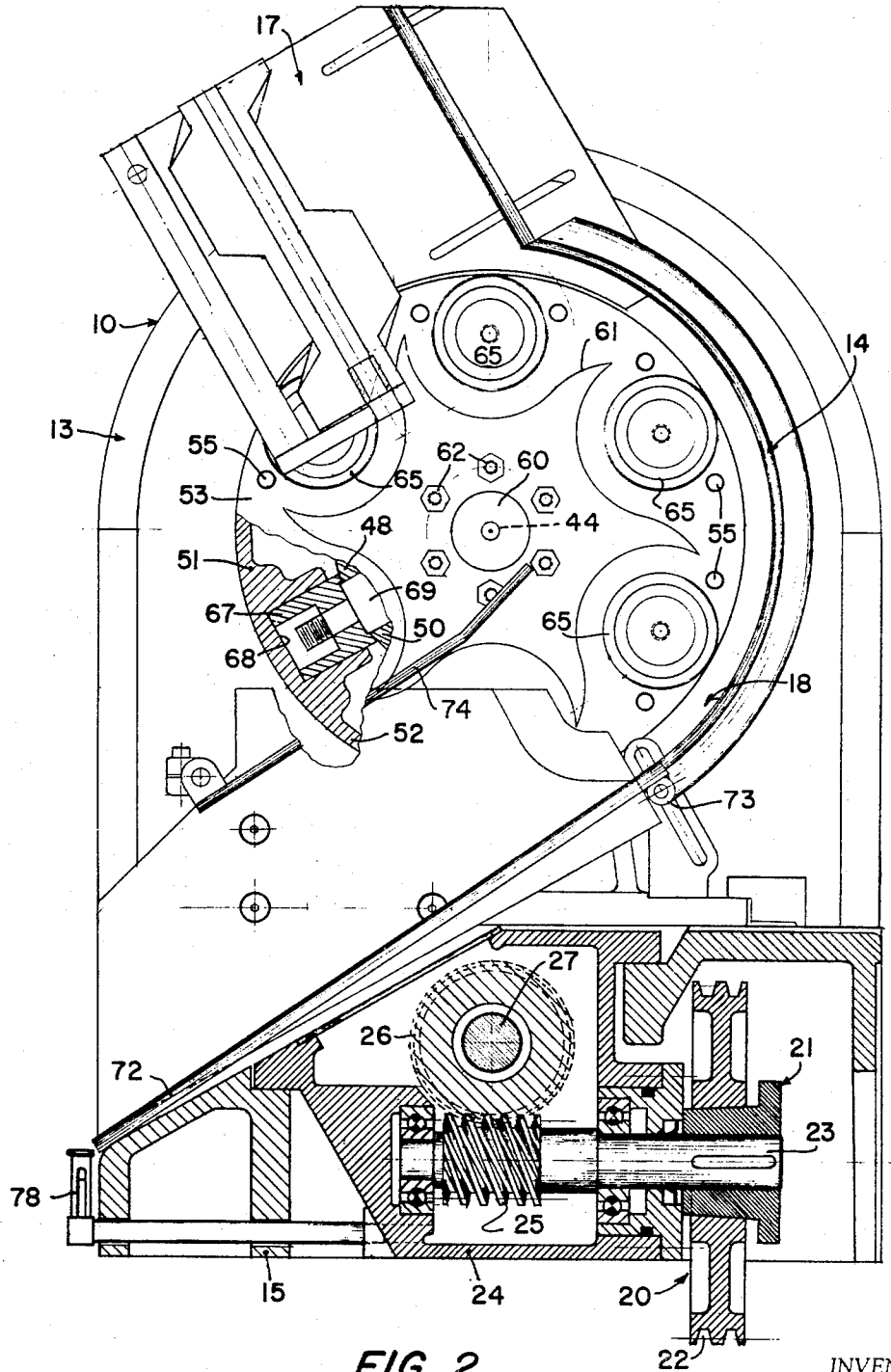


FIG. 2.

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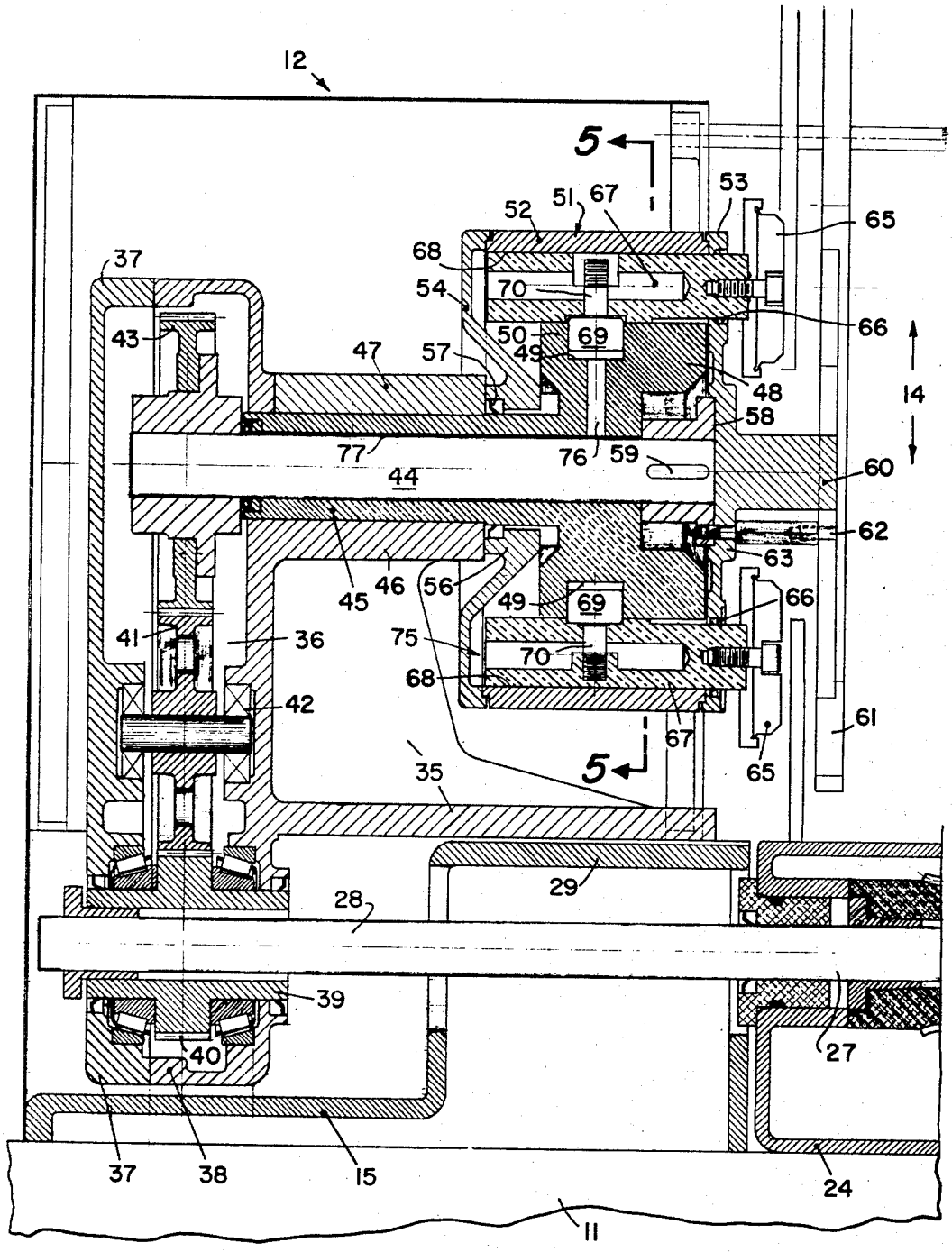


FIG. 3.

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SELF-LUBRICATED AND SANITARY DRIVE MEANS FOR CAN FLANGER AND THE LIKE

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ABSTRACT OF THE DISCLOSURE

An apparatus for simultaneously forming flanges on open ends of tubular can blanks as the blanks pass between turrets having opposing dies mounted on slide bars, the drive means of which turrets are confined within sealed lubricant chambers for self lubrication, cleanliness and for shielding the dies and can blanks against contamination by lubricant. Each turret is a sealed drum-like pilot head carrying slide bars around a fixed pilot cam serving as a bearing for the shaft which turns the pilot head; and each turret and its drive means is adjustable toward and from the other and relative to a common source of power to handle various lengths of can blanks.

Background of invention

Can flangers are old and well known in the art. Briefly they consist of a plurality of dies on opposed turrets between which tubular metal can forms are fed along a circuitous path to have their ends flanged by the combined equalized pressure of the opposing dies as the cans move along such path. The dies are caused to reciprocate by cams having levers and drive means for causing the dies to reciprocate. Heretofore the cams and drive means and leverages therefor were exposed to enable lubrication of such exposed moving parts periodically. Lubrication with a grease gun required shutting down of the apparatus. Lubrication by oiling, although accomplished during operation of the apparatus, creates splattering of oil in various directions as the cams and moving parts engage each other and as the dies revolved with the turrets. Over the years, lubrication of prior known flangers has been a hit or miss proposition and often neglectful resulting in lack of maintenance. Moreover, grit, dirt and dust get into the cam tracks and on the rollers and other moving parts causing wear and tear. In most cases the apparatus becomes noisey, the parts clattering due to worn conditions and excessive clearances caused thereby. Worse still, the splattering of oil during high speed operation of the flangers puts oil on the can engaging faces of the dies and often into the internal walls of the can tubes. Such contamination of the can tubes renders them unsanitary as food containers and other pure products. Moreover the presence of oil at the flanges may cause faulty sealing and leakage and later contamination of canned goods.

It is an object of the present invention to provide a self lubricating can flanger by confining all moving parts, excepting the dies, in a sealed chamber containing a lubricant. In this connection it is a further object to provide an apparatus in which all moving parts are concealed to shield the dies and can forms against contamination and to keep dust, dirt and grit from collecting on the moving parts of the die operating means of the apparatus.

These and other objects and advantages of the present invention will become apparent from a reading of the following description and claims in the light of the accompanying drawing in which:

FIG. 1 is a perspective view of a can flanger embodying the present invention.

FIG. 2 is a vertical section taken centrally of FIG. 1 through the can feed path thereof, parts being broken away for purpose of illustration.

FIG. 3 is a vertical section of a portion of FIG. 2 taken substantially along line 3—3 thereof.

FIG. 4 is a diagrammatic perspective of the drive mechanism and cams embodied in the present invention.

FIG. 5 is a section through the pilot head turret of the device taken substantially along line 5—5 in FIG. 3 and at reduced scale with respect thereto.

Referring to the drawing the can flanger **10** embodying the present invention is shown in FIG. 1 to include a common base **11** having a pair of flangers **12** and **13** opposed to each other with a can transfer passage **14** therebetween. Each flanger **12** and **13** which is of identical design includes a bed plate **15** mounted on the common base **11**. The can transfer passage **14** includes a can blank feeding unit **17** of conventional design by which can blanks gravitating toward the flanger **10** are admitted into the can passage in timed relation with the speed of operation of the flangers. The transfer passage **14** also includes a can track **18** for maintaining can blanks in the required orbit of movement during formation of flanges on the ends of such blanks and for guiding the flanged can blanks out of the flanger.

Having thus explained the general arrangement the flanger **10** will now be described in specific detail to point out the invention therein. As previously stated each flanger unit **12** and **13** is identical and therefore like reference numerals will be used to designate like parts thereof. However, it should be understood that both flanger units **12** and **13** cooperate with each other, have a common drive mechanism **20** and are mounted on their respective bed plates **15** for adjustment toward and from each other to widen or make more narrow the central can passage **14** between them.

Referring now to FIG. 2 the common drive mechanism **20** is shown to include a single power take-off **21** below the can transfer passage **14**. The power take-off **21** comprises a pulley **22** on a shaft **23** extending laterally out of a gear box **24** mounted on the base **11** between the bed plates **15** of both flanger units. Within the gear box **24** a worm gear **25** meshes with a worm wheel **26** mounted on a drive shaft **27** suitably journaled in sealed bearings **16** on each side of the gear box **24**. The drive shaft **27** extends beyond the ends of the gear box and an end **28** of the drive shaft **27** is disposed beneath a respective one of the flanger units **12** and **13** for drive connection therewith (see FIG. 3). It will here be noted that the free end **28** of drive shaft **27** is within the bed plate **15**, the latter being provided with a covering tunnel **29** forming a shield between the shaft **27** and the transfer passage **14**. This assures against contamination of the dies, can tracks and can blanks.

Each flanger unit **12** and **13** is mounted for guided sliding movement on its respective bed plate **15** each of which is firmly secured to the base **11**. Between each flanger unit **12** and **13** and its respective bed plate **15** is a vernier screw adjustment **30** by which the flanger unit is secured to its bed plate and by which such flanger can be set relative to its bed plate and the can transfer passage **14** widened or made narrow to accommodate cans of various depths.

For purposes of clarity it should be understood that the unit **13** shown in FIG. 2 is the righthand one in FIG. 1 whereas the unit **12** in FIG. 3 is the lefthand one in FIG. 1. The reference numerals on each being identical for like parts and the two units operating in unison.

Referring to FIG. 3 the unit **12** is shown to include a braced bracket casting **35** at the outer end of which is formed a main gear housing **36**. This housing **36** has a cover **37** bolted thereto and provided with a sealing gasket such as to maintain lubrication within the housing

36. The lower end 38 of housing 36 is suspended from the casting 35 to provide a sump in the housing 36 and to enable drive connection of a gear train to the drive shaft 27. The free end 28 of the drive shaft 27 extends through a sealed bearing 39 mounted in the lower end 38 of the housing 36. This sealed bearing 39 includes a toothed gear 40 which meshes with an idler gear 41 journaled within the housing 36 on suitable bearings 42. The idler gear 41 meshes with a gear 43 secured to one end of a spindle shaft 44.

The spindle shaft 44 is arranged above and in parallel relation to the extended end 28 of the drive shaft 27 and is journaled for rotation in a bearing 45 supported in a boss half 46 of which is formed integrally with the casting 35. A companion half boss cover 47 is secured by bolts (not shown) to the half boss 46 to embrace the bearing 45 and to secure the bearing 45 in fixed position on the casting 35.

The bearing 45 is formed integrally with an enlarged head 48 disposed between the boss 46–47 and the can transfer passage 14. This enlarged head 48 has a cam track or groove 49 formed in its periphery and serves as a fixed pilot cam 50 for the flanger unit 12 or 13 as the case may be.

A pilot head 51 is arranged for rotation about the pilot cam 50 but is actually connected to and driven by the spindle shaft 44. For this reason the pilot head 51 is a hollow drum consisting of a cylindrical peripheral outer shell 52 with an inner cover 54 and an outer cover 53 secured to the respective ends of the shell 52 by bolts 55. A suitable oil seal is provided between each cover and the shell.

The outer cover 54 has an inset hub portion 56 disposed around the bearing 45, between the boss 46–47 and the pilot cam 50, and provided with a suitable oil seal 57. The inner cover 53 has a hub structure 58 keyed as at 59 to the inner end of the spindle shaft 44 for rotation thereby. The inner cover 53 also has an integral inwardly extending central body 60 coaxial of the shaft 44. A star wheel 61 is secured to the body 60 within the can transfer passage 14 by a plurality of bolts 62 which extend into a flange 63 formed as a part of the hub structure 58. By this arrangement the drum shaped pilot head 51 is caused to rotate about the pilot cam 50 without touching the same as the spindle shaft 44 turns.

The pilot head 51 carries a plurality of can end engaging and forming dies 65 arranged to move toward and from the can transfer passage 14. These dies 65 are secured to the inner ends of slide bars 67 each of which extend through an opening 66 formed in the inner cover 53. Each slide bar 67 is supported for guided movement in a guide groove or track 68 formed on the inner surface of the cylindrical shell 52 of the pilot head 51. The guide tracks 68 are equally spaced peripherally on the shell 52 and each slide bar 67 has a roller 69 mounted thereon and extending inwardly into the cam track 49 formed on the adjacent periphery of the pilot cam 50.

As best seen in FIG. 5 the guide groove tracks 68 are square in cross section as are the slide bars 67. Each cam roller 69 is mounted on a stud shaft 70 which is secured to a slide bar 67 and only the roller 69 engages the fixed pilot cam 50. As the pilot head 51 turns about the pilot cam 50 the several slide bars are forced outwardly by centrifugal force to seat firmly in their respective guide grooves 68. The rollers 69 follow the cam track 49 thus causing the slide bars 67 and their respective dies 65 to reciprocate toward and from the can transfer passage 14. As illustrated in FIGS. 4 and 5 the cam track 49 on each pilot cam 50 extends around the pilot cam in a common plane except for a dwell 71 of 120 degrees extending inwardly toward the can transfer passage 14. The dwell 71 on each pilot cam 50 is aligned axially with the other such that the slide bars 67 and dies 65 on each flanger unit 12 and 13 move toward each other

once in each revolution of the pilot heads 51. The dwells 71 are so disposed relative to the can track 18 as to press the opposing dies against the open ends of a tubular can blank as it is received between them. The can blanks thus have an outwardly curved annular flange formed on their open ends simultaneously.

The can blanks are maintained in axial alignment with the flange forming dies by the star wheels 61 on the pilot heads 51 as the dies pass the dwell zones 71. The flanged can blanks are thereafter released from the star wheels to roll by gravity down the discharge end 72 of the can track 18 in a conventional manner. The can track 18 has an adjusting mount 73 by which to change the track for can blanks of various diameter. A stripper bar 74 mounted in the discharge end 72 of the track 18 assures removal of the flanged can blanks and avoids jamming of the can feed.

In summary it will be noted that each flanger unit 12 and 13 includes a housing 36 providing a sealed enclosure for the gear train 40–41–43 and for grease and lubricant in which the gears constantly turn. The lower gear 40 being in a sump 38 at the lower end of the housing will pick up grease or lubricant and transmit the same to the other gears 41 and 43 as they operate.

The pilot cam 50 is a combined bushing 45 and cam head 48 preferably made of bronze providing an appreciably long bearing for the spindle shaft 44 which is turned by the gear train.

The pilot cam 50 is fixed (non rotative) and has its enlarged head 48 encased within the drum-like pilot head 51 which is drivingly connected to the spindle shaft 44 for rotation therewith.

The drum-like pilot head 51 provides a sealed chamber 75 within which suitable oil and or lubricant is confined. The level of the oil within the chamber 75 need not be too high but sufficient to bathe each slide bar 67 as it turns about the cam head 48. It should here be noted that as the drum-like pilot head 51 turns, the oil within the chamber 75 clings to the inner side of the shell 52 by centrifugal force, thus keeping each slide bar 67 and rollers 69 supplied with oil throughout the entire orbit of movement.

Note in FIG. 2 that an oil passage 76 formed in the fixed cam head 48 communicates with the cam groove 49 and is disposed radially of and vertically above the spindle shaft 44 so that oil from the high point of the cam track 49 gravitates toward the spindle shaft 44 to lubricate it at the bearing 45. A groove 77 formed lengthwise at the high point of the internal wall of the bushing 45 serves to feed oil from the passage 76 along the length of the spindle shaft 44.

From the foregoing it will be appreciated that all moving parts of each flanger unit 12 and 13 are constantly lubricated; the lubrication chambers and housings shielding the parts running in oil from transmitting oil to the forming dies or can blanks, thus requiring no attendant or oiling by persons in the can forming plant.

The power take-off unit 21 is likewise lubricated by a bath of oil maintained in the gear box 24, the oil level of which can be observed on a gauge 78 as shown in FIG. 2.

While the self lubricating features of the can flanger shown in the accompanying drawings have been described in detail, it will be appreciated by those skilled in the art that the same may be modified, altered and/or varied without departing from the spirit or scope of the invention therein. We, therefore, desire to avail ourselves of all modifications, alterations and/or variations as may fairly come within the purview of the appended claims.

What we claim as new and desire to protect by Letters Patent is:

1. In a can flanger in which a plurality of flange forming dies arranged on opposite sides of a can transfer passage simultaneously engage the open ends of can blanks, opposing flanger units each comprising:

(a) a base plate,

(b) a bracket mounted on said base plate,
(c) a housing on said bracket containing a lubricant,
(d) a gear train in said housing,
(e) a pilot cam having a reduced portion mounted on said bracket and having a bore providing a bearing,
(f) a spindle shaft mounted for rotation in the bearing bore of said pilot cam, said spindle shaft having one end thereof extending into said housing and drivingly connected to said gear train.
(g) a drum-like pilot head journaled on the reduced portion of said pilot cam and drivingly connected to the other end of said spindle shaft, said pilot head having an inner chamber containing a lubricant and a plurality of guide grooves formed on the inner peripheral wall of said pilot head in parallel relation to said spindle shaft,
(h) a slide bar mounted for reciprocation in each of said guide grooves and extending exteriorly through a sealed opening in that end of said pilot head adjacent said cam transfer passage and supporting one of such flange forming dies,
(i) a cam groove formed in the periphery of said pilot cam, and
(j) a cam roller on each one of said slide bars disposed in the cam groove on said pilot cam.

2. The device in accordance with claim 1 having a vernier adjusting means between said base plate and each of said flanger units for setting the latter relative to said can transfer passage to accommodate can blanks of various lengths.

3. The device in accordance with claim 1 having a common drive for said flanger units, comprising a power take off having a gear box centrally located beneath said can transfer passage, a drive shaft having its ends extending beneath a respective one of said flanger units parallel to the spindle shafts thereof and drivingly connected to the gear train in the housing thereof.

4. The device in accordance with claim 3 having a vernier adjusting means between said base plate and each of said flanger units for setting the latter relative to said can transfer passage to accommodate can blanks of various lengths.

5. The device in accordance with claim 3 in which the bed plate of each of said flanger has a tunnel-like portion adjacent said gear box for enshrouding the drive shaft extending therefrom in the region of said can transfer passage.

6. The device in accordance with claim 5 including a vernier adjusting means between said base plate and the brackets mounted thereon for moving the pilot head on each of said flanger units toward and from said can transfer passage dependent upon the length of can blanks to be flanged.

7. In a can flanger of the type having a pair of flanger units each including a turret having a plurality of flange forming dies facing a can transfer passage wherein opposing dies simultaneously engage the open ends of tubular can blanks to form flanges thereon: a self lubricating, sanitary drive means therefor comprising:

(a) a power take-off below said can transfer passage including a sealed gear box containing a lubricant and a common drive shaft having its ends extending from said gear box beneath a respective one of said flanger units,

(b) each of said flanger units comprising a bed plate having a tunnel formed thereon adjacent said gear box for enshrouding one end of said drive shaft relative to said can transfer passage,
(c) a bracket casting mounted on said bed plate for movement toward and from said can transfer passage and having a sealed lubricant containing housing formed thereon remote from said can transfer passage and having a sump and a sealed bearing for supporting the free end of said one end of said drive shaft,
(d) a gear train in said housing including a gear concentric to said sealed bearing and drivingly connected to said one end of said drive shaft,
(e) a combined bushing and pilot cam head mounted on said bracket casting and having a bearing bore parallel to said one end of said drive shaft,
(f) a spindle shaft mounted for rotation in the bearing bore of said bushing and pilot cam head, said spindle shaft having one end thereof drivingly connected to the gear train within said housing,
(g) a sealed, lubricant containing drum-like pilot head mounted on said bushing and sealingly surrounding said pilot cam head,
(h) means for connecting the opposite end of said spindle shaft to said drum-like pilot head for turning the latter about said pilot cam head,
(i) a plurality of guide grooves formed on the inner peripheral wall of said drum-like pilot head in spaced circumferential arrangement and parallel to said spindle shaft and said drive shaft,
(j) a slide bar arranged in each of said guide grooves and extending from said drum-like pilot head toward said can transfer passage for supporting one of said flange forming dies,
(k) a cam groove formed in the periphery of said pilot cam head, and
(l) a cam roller on each of said slide bars extending into the cam groove in said pilot cam head for reciprocating said slide bars and their flange forming dies toward and from tubular can forms as they pass through said can transfer passage.

8. The device in accordance with claim 7 including means for adjusting the bracket casting of each of said flanger units relative to said bed plates comprising a screw rod mounted on said bed plates parallel to said drive shaft and said spindle shaft and threaded bosses on each of said bracket castings threadedly connected to said screw rods for moving said bracket castings relative to said bed plates upon manual turning of said screw rods.

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U.S. CL. X.R.

72—354; 113—115