May 29, 1951 S. E. WINDER 2,554,545

BOTTLE FORMING MACHINE CAM

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Fig. 1.

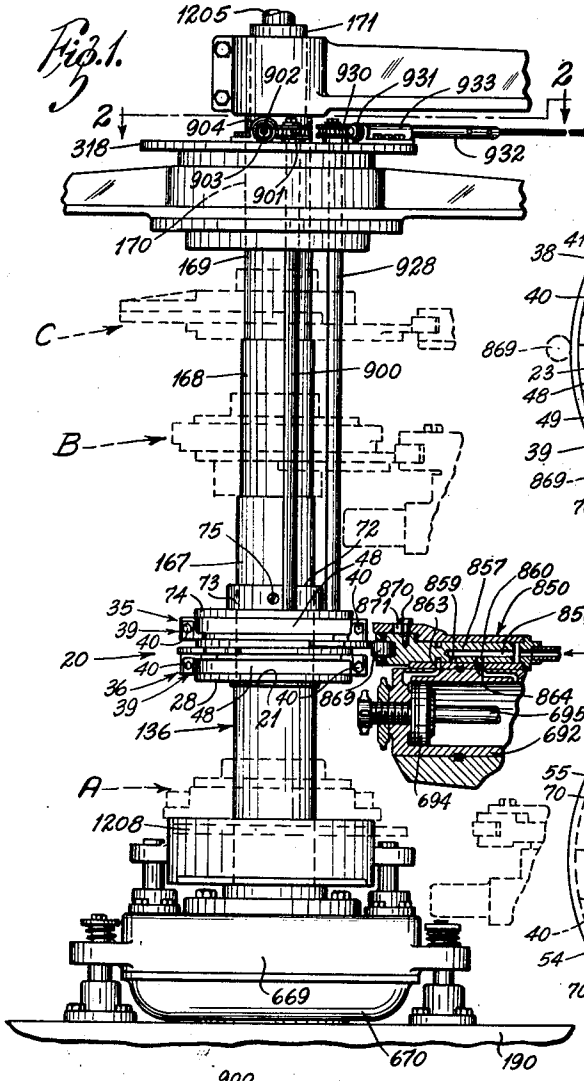


Fig. 5.

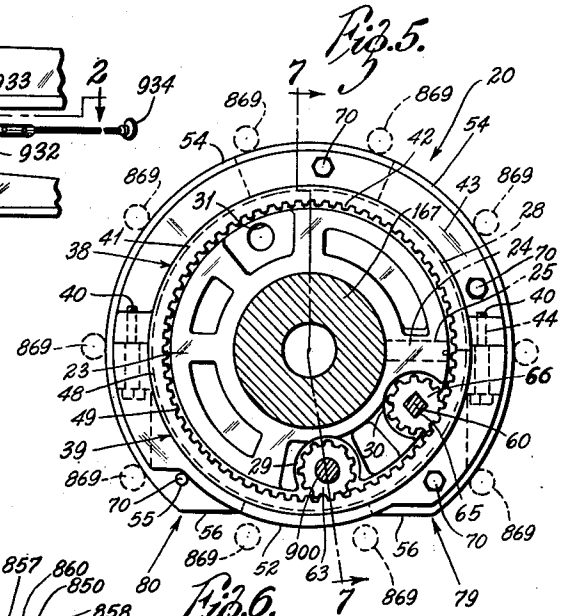


Fig. 6.

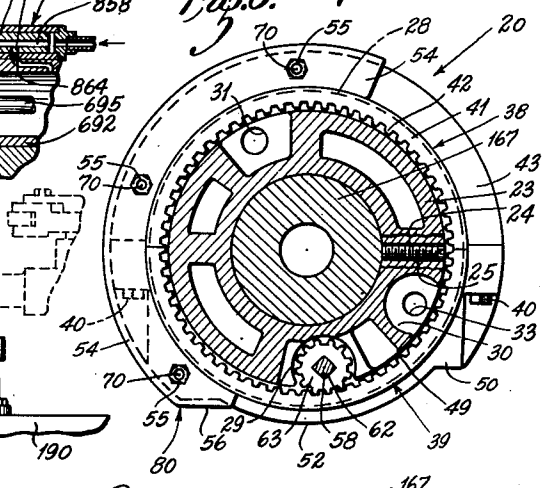


Fig. 3.

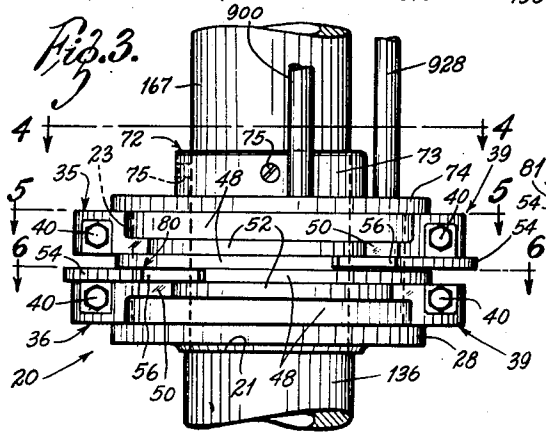
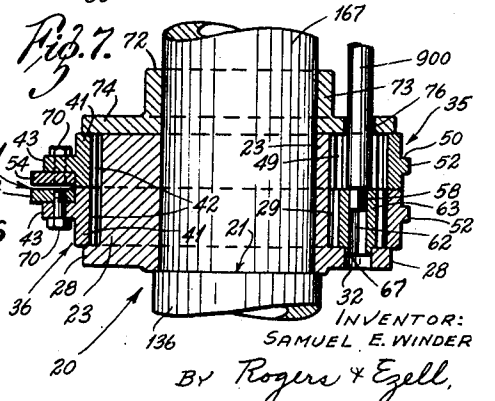


Fig. 7.



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Fig. 2.

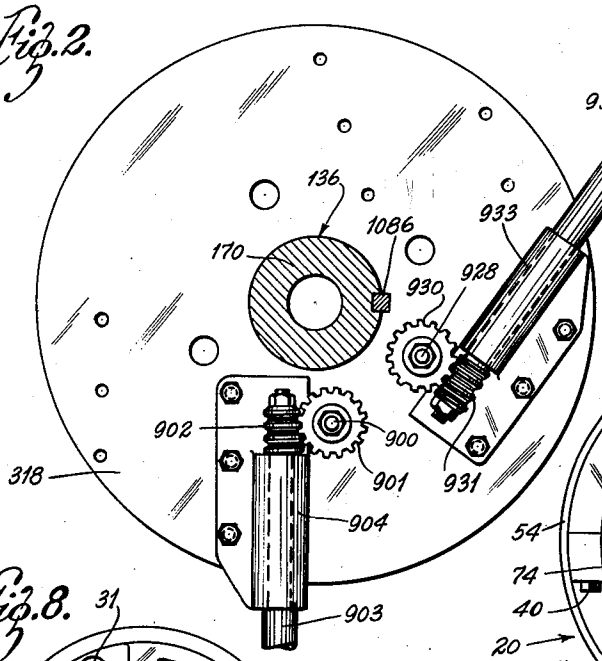


Fig. 15.

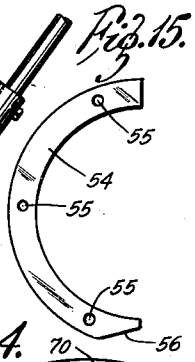


Fig. 16.

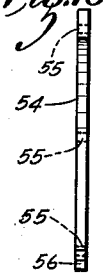


Fig. 4.

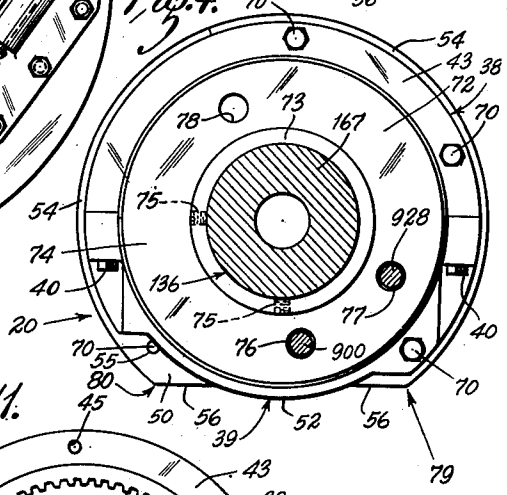


Fig. 8.

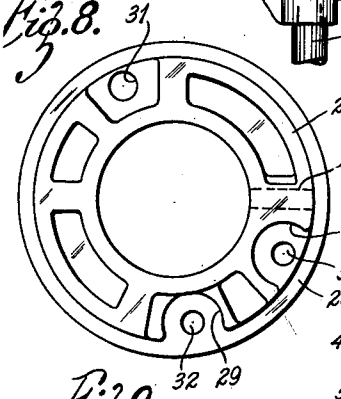


Fig. 11.

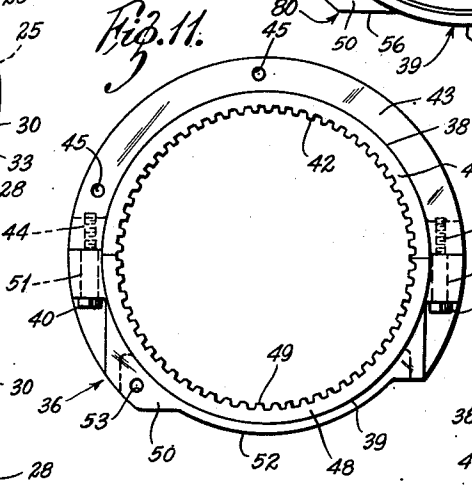


Fig. 13.

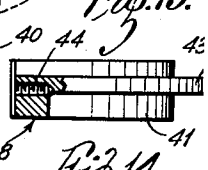


Fig. 9.

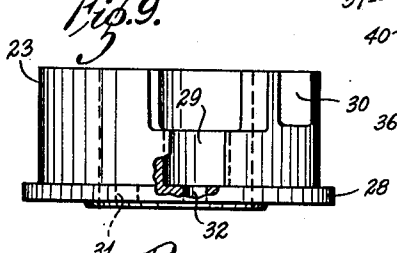


Fig. 14.

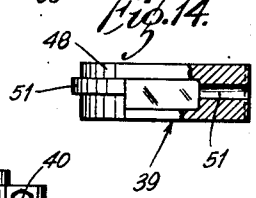


Fig. 10.

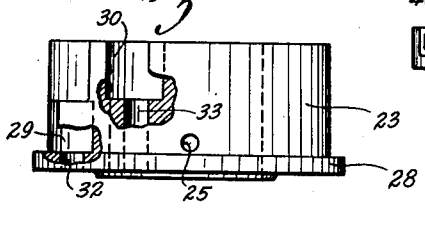
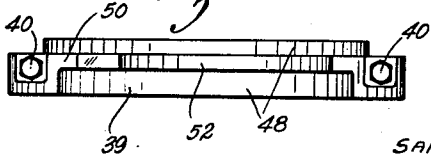


Fig. 12.



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BOTTLE FORMING MACHINE CAM

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Application February 21, 1948, Serial No. 10,161

2 Claims. (Cl. 74—568)

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The present invention relates generally to bottle forming machines, and more particularly to adjustable cam means for controlling the timing of certain elements and devices incorporated in the machine.

Specifically, the invention concerns improvements in the adjustable cam assembly mechanisms associated with the bottle forming machine illustrated and described in my copending application Serial No. 688,470, filed August 5, 1946.

The invention is particularly directed to the cam assemblies whereby the timing, with respect to the opening and closing of the blank molds, the operation of the transfer mechanism, the operation of the blow mold cylinder, and the operation of the blowhead of said machine, is controlled.

The cam assemblies of my said pending application have been found to function very efficiently. However, the improvements included in the present novel mechanism provide additional advantages and features, as will appear, and may be installed on said forming machine without requiring any change in its construction or mode of operation.

The cam assemblies of the pending application are manually adjustable while the forming machine is in operation, and, in this respect as well as in others, no change is contemplated.

A primary object of the invention, therefore, is to provide a cam assembly, or assemblies, which will control the timing of the operations aforesaid.

A further object is to provide for such cam assembly, or assemblies, means whereby adjustments may be more quickly and easily effected, and whereby a considerably greater range of adjustability is afforded.

Another object is to provide convenient means for the ready adjustment of said cams while the machine is in operation.

Other objects and advantages of the invention will become apparent from the description to follow, reference being had also to the accompanying drawings in which the preferred embodiment of the invention has been illustrated in connection with the transfer mechanism of said machine.

It is to be understood, of course, that the other timing cam assemblies operate in much the same manner, but it is not considered necessary to illustrate and describe each of them in detail. The cam assembly for regulating the transfer mechanism has, therefore, been selected as the

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best for illustrative and descriptive purposes, primarily because it includes two, rather than one, adjustable cam plates.

In said drawings:

Fig. 1 is an elevational view of the composite central column of the forming machine with which the present invention is associated, elements included in said invention being shown in relation to a portion of the transfer mechanism, the latter being in vertical section;

Fig. 2 is an enlarged top plan of the upper part of Fig. 1, being a view partly in section and taken on line 2—2 of Fig. 1;

Fig. 3 is an enlarged view of a portion of Fig. 1, more clearly portraying some of the elements included in the invention;

Figs. 4, 5 and 6 are horizontal sectional views, taken, respectively, on lines 4—4, 5—5 and 6—6 of Fig. 3;

Fig. 7 is a vertical sectional view taken approximately on line 7—7 of Fig. 5;

Fig. 8 is a top plan view of an annular sleeve or collar which is rigidly mounted on the column to support the moving parts of the invention;

Fig. 9 is a downwardly projected elevational view thereof, partly in section;

Fig. 10 is an elevational view thereof as it appears from a point ninety degrees to the right in Fig. 8;

Fig. 11 is a top plan view of a split lower internal gear ring member;

Fig. 12 is a downwardly projected elevational view thereof;

Fig. 13 is an elevational view, partly in section, of one segment of said internal ring gear member;

Fig. 14 is a similar view of the other segment thereof;

Fig. 15 is a view of one of a pair of identical cam track segments, on a slightly reduced scale; and

Fig. 16 is a projected edge view thereof.

Inasmuch, as hereinbefore noted, the instant mechanism is directed primarily to timing certain operations of the forming machine, which are described in detail in my said pending application, it is deemed advisable, in the interest of clarity, to identify corresponding parts with the same reference characters employed in that description.

Thus, with particular reference to Fig. 1, parts of the machine shown include the rotatable table 190, the annular rotating vacuum chamber housing 669 associated with a stationary member 670, the air distributor 1208, and the com-

posite central column, generally designated 136.

The latter includes a plurality of integral sections of successively decreasing external diameters, all of them joined by thus resulting annular shoulders. These sections, in ascending order, are indicated 167, 168, 169, 170 and 171. The entire column is hollow, all compressed air for operating the machine being introduced via the pipe 1205.

Also shown, and seen to best advantage in Fig. 2, are the table 318, key 1086, the vertically extending shaft 900 with its attached worm wheel 901, worm gear 902, a shaft 903 rigid therewith, and a supporting bracket 904. The extremity of the shaft 903 opposite the worm gear is provided with a manually rotatable knob, which is not shown.

In addition, there is shown the vertically extending shaft 928, with its attached worm wheel 930, worm gear 931, shaft 932 rigid therewith, and supporting bracket 933. The extremity of the shaft 932 opposite the worm gear is provided with a manually rotatable knob 934.

The elements thus far designated and their operative functions are set forth in detail in said pending application. The adaptation of the instant invention thereto will presently appear, particularly in connection with the transfer mechanism fragmentarily illustrated in vertical section in Fig. 1. The parts of said mechanism portrayed include the valve housing 850, the cylinder 692, the valve slide or plug 857 having a central bore 858, and radial passages 859 and 860. Also shown are radial passages 863 and 864 in the valve housing, a cam roller 869 at the end of a plug, and a guide roller arrangement 870 which engages within a slot 871 to determine the maximum movement of the valve plug, and prevent it from rotating. In addition, there is shown the piston 694 and piston rod 695.

All of these parts are identical with those illustrated in the pending application with but one exception, and that is, the radial passage 859 is bored slightly closer to the right-hand end of the plug 857. The manner in which this transfer mechanism is operable is clearly described in said pending application.

Also indicated in Fig. 1 by broken lines are, at A, the cam assembly for operating the valves controlling the opening and closing of the blank molds; at B, the cam assembly for operating the mold cylinders; and at C, the cam assembly for operating the blowhead. These cam assemblies generally embody mechanism similar to that about to be described.

The cam assembly, generally indicated 20, selected to exemplify the present invention, is mounted on the column section 167 and supported on the shoulder 21. It includes the collar 23, which is rigidly attached to the column by a screw 24 extending through an aperture 25 provided in said collar. The collar is provided with an annular base flange portion 28, a pair of recesses 29 and 30, and a vertical opening 31, for reasons to appear. The recesses 29 and 30 are counterbored to provide vertical bearing openings 32 and 33 which continue through the base flange 28.

Supported on the base flange 28 for rotary movements about the collar 23 are a pair of identical upper and lower internal ring gear assemblies. The upper of said assemblies is generally designated 35, and the lower 36.

With particular reference to Fig. 11, in which

the lower assembly 36 is shown detached, each internal ring gear assembly is seen to comprise two halves or segments, designated 38 and 39, rigidly secured together to form a unitary structure by means of tap bolts 40. The segment 38 includes a body portion 41 provided with internal gear teeth 42, an integral laterally extending flange portion 43, and a pair of horizontal threaded apertures 44 to receive the bolts 40. A pair of spaced vertical apertures 45 is provided in the flange 43.

The segment 39 includes a body portion 48 provided with internal gear teeth 49, an integral laterally extending flange portion 50, and a pair of horizontal openings 51 to accommodate the shanks of the tap bolts. As manifest from an inspection of this view, the parts are so designed that, when in properly assembled relation, a complete internal ring gear is provided. It is also seen in Fig. 12 that the flanges 43 and 50 are in the same plane. The latter flange is preferably cut away, as at 52, and is provided with a vertically disposed aperture 53 in spaced relation to the apertures 45 in the flange 43.

The upper assembly 35 is identical in every respect, and the same reference numerals are applied to the parts. However, when in proper position on the column, the upper ring assembly is inverted. With particular reference to Figs. 15 and 16, one of a pair of identical arcuate cam tracks or plates 54 is seen to include three spaced threaded apertures 55 which coincide with the apertures 45 and 53. There is also provided a beveled or tapered portion 56.

With reference now to Figs. 5, 6 and 7, it is seen that the shaft 900 terminates at its lower end in a square extremity 58, and that the vertical shaft 928 terminates at its lower end in a similar extremity 60. The extremity 58 enters a square opening 62 in a pinion 63, which is in mesh with the internal ring gear of the lower ring assembly 36. The extremity 60 enters a square opening 65 in a pinion 66 in mesh with the internal ring gear of the upper assembly 35. Each of the pinions is provided with a depending annular boss 67 adapted to enter the openings 32 and 33 in the collar 23, whereby said pinions are rotatably supported as shown in Fig. 7.

It should thus be apparent that rotation of the shaft 900 will cause the lower ring assembly 36 to rotate about the collar 23, and that rotation of the shaft 928 will cause the upper ring gear assembly 35 to do likewise.

It should also be apparent from an inspection of Fig. 10 that the recess 30 is disposed at a higher elevation than is the recess 29 in order to position the pinions.

As best seen in Fig. 7, the cam track segments 54 are secured to the flanges 43 and 50 by means of tap bolts 70, which pass through the apertures 55 and engage the threaded holes 45 and 53. To protect the internal mechanism and simultaneously maintain the parts in position, a cover 72, including a collar portion 73 and an annular base flange 74, is secured to the column by setscrews 75, or the like. Openings 76, 77 and 78 are provided in the cover for the passage therethrough, respectively, of the shafts 900, 928, and a similar shaft which, though not shown, extends to the cam assembly A, after also passing through the opening 31 provided in the collar 23.

As described in said pending application, each valve assembly roller is maintained outwardly, that is, to the left as viewed in Fig. 1, by air under pressure. Thus for example, the roller 869

is so maintained by air pressure against the valve plug 857. Thus, as the machine rotates, the cam faces 54, riding against the roller, move the latter to the right against the pressure of air, but when said cam faces do not engage the roller, the latter is caused to move to the left.

It is noted that, in operative position, the cam track segments 54 are oppositely disposed. With this arrangement, as indicated at 79 in Figs. 4 and 5, the tapered end 56 of the segment attached to the upper assembly 35 permits the cam roller 859 to ride inwardly, and, as indicated at 80, the tapered end 56 of the segment attached to the lower assembly 36 causes said roller to ride outwardly, as the machine turns clockwise. It is also noted that the parts are so designed that clearance space obtains between the track segments, as indicated at 81 in Fig. 7. Thus, whereas the upper assembly 35 rests on the lower assembly 36, the upper and lower track segments never come into contact with one another.

From the foregoing, it is obvious that the space between the points 79 and 80 may be varied by rotating either the upper or the lower ring assembly, or both.

In this manner, an adjustable composite track is provided, by means of which the beginning and the end of a cam action may be controlled.

Operation

Assuming that, before the machine is set in motion, the assembly has been adjusted to provide the approximate timing necessary for a particular type of ware, more minute and accurate adjustments may be made with the machine in full operation.

To this end, the manually operable knobs on the outer ends of the shafts 903 and 932 are provided. Assuming then that it is desired to shift the upper track segment, either clockwise or counterclockwise from the position it occupies in Fig. 5, the shaft 932 is rotated. This rotation transfers rotary motion to the pinion 66, which, in turn, motivates the upper ring assembly to which said segment is attached. Similarly, if it be desired to shift the lower cam segment, either clockwise or counterclockwise from the position it occupies in Fig. 5, then the shaft 903 is rotated. Such rotation transfers rotary motion to the pinion 63, which, in turn, motivates the lower ring assembly to which said lower segment is attached.

From the foregoing, it should be evident that the invention attains its objects by a combination of elements which are highly efficient. Whereas the preferred embodiment thereof has been illustrated and described, the invention obviously admits of slight modifications, without departing from the principle thereof. Therefore, the scope of the invention is limited only by the appended claims.

What is claimed is:

1. In a bottle forming machine including a rotatable central column, a valve assembly for operating the transfer mechanism, and a reciprocable roller for controlling the action of said valve assembly; cam mechanism for regulating the reciprocal movements of said roller, said mechanism including a collar rigidly secured to said column, an annular projecting base flange on the collar, a pair of similar substantially annular members supported on the base flange in superimposed relation for rotary movements relative to one another about said collar, a laterally projecting integral flange on the upper of said annular members, a laterally projecting integral flange on the lower annular member, an arcuate cam track segment secured to each flange and adapted to engage said roller, a beveled end on each cam track, an internal ring gear formed on the inner periphery of each annular member, a first pinion in constant engagement with the upper internal gear ring, a second pinion in constant engagement with the lower internal gear ring, recessed portions terminating in different planes formed in said collar each to receive one of said pinions, bearing openings in said collar each to receive an integral depending boss portion of one pinion, a pair of vertically positioned shafts each in engagement at its lower end with one of said pinions, and means at the upper end of each shaft manually operable to rotate each of said pinions individually.

2. In a bottle forming machine including a rotatable central column, a valve assembly for operating the transfer mechanism, and a reciprocable roller for controlling the action of said valve assembly; cam mechanism for regulating the reciprocal movements of said roller, said mechanism including a collar rigidly secured to said column, an annular projecting base flange on the collar, a pair of similar substantially annular members supported on the base flange in superimposed relation for rotary movements relative to one another about said collar, a laterally projecting integral flange on the upper of said annular members, a laterally projecting integral flange on the lower annular member, an arcuate cam track segment secured to each flange and adapted to engage said roller, a beveled end on each cam track, an internal ring gear formed on the inner periphery of each annular member, a first pinion in constant engagement with the upper internal gear ring, a second pinion in constant engagement with the lower internal gear ring, recessed portions terminating in different planes formed in said collar each to receive one of said pinions, bearing openings in said collar each to receive an integral depending boss portion of one pinion, a pair of vertically positioned shafts each in engagement at its lower end with one of said pinions, means at the upper end of each shaft manually operable to rotate each of said pinions individually, and a cover member including a collar portion rigidly secured to said central column and having an annular flange portion adapted to overlie the pinion and ring gear members.

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REFERENCES CITED

The following references are of record in the file of this patent:

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