

July 9, 1940.

W. B. MITCHELL

2,207,629

CAM MECHANISM

Original Filed April 23, 1936

3 Sheets-Sheet 1

Fig. 1.

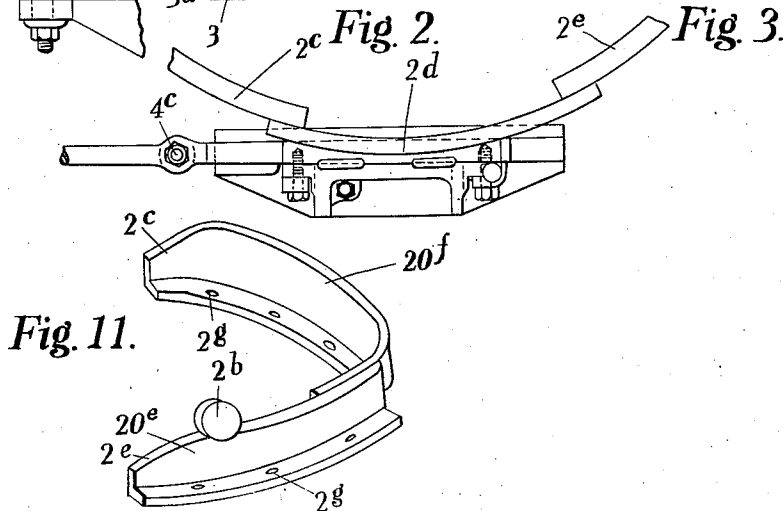
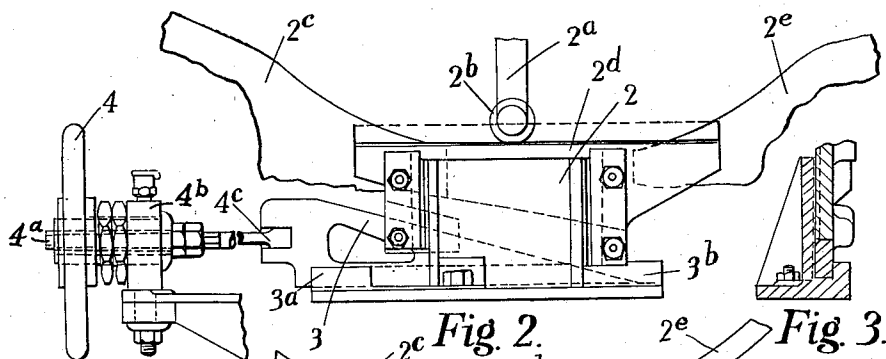


Fig. 11.

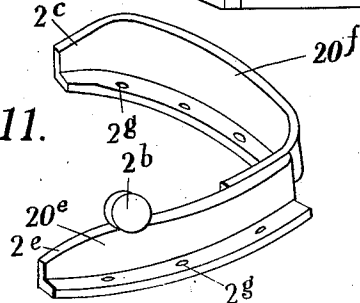
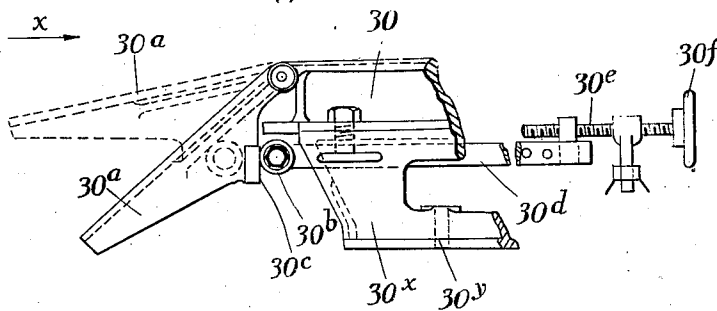


Fig. 10.



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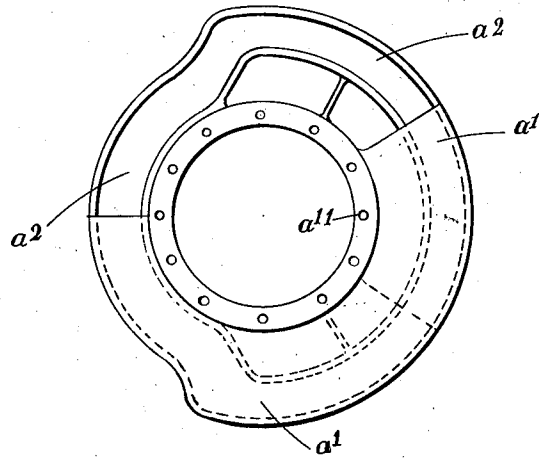
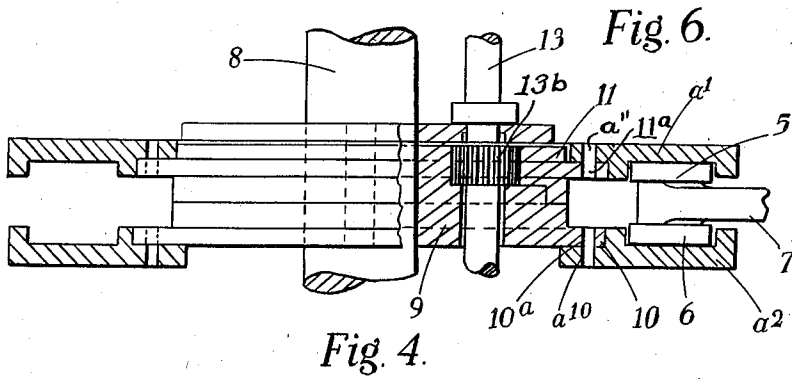
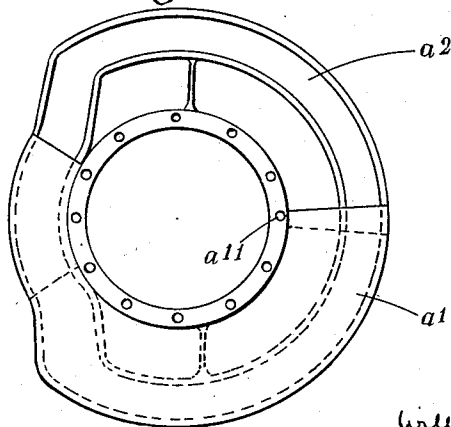


Fig. 5.



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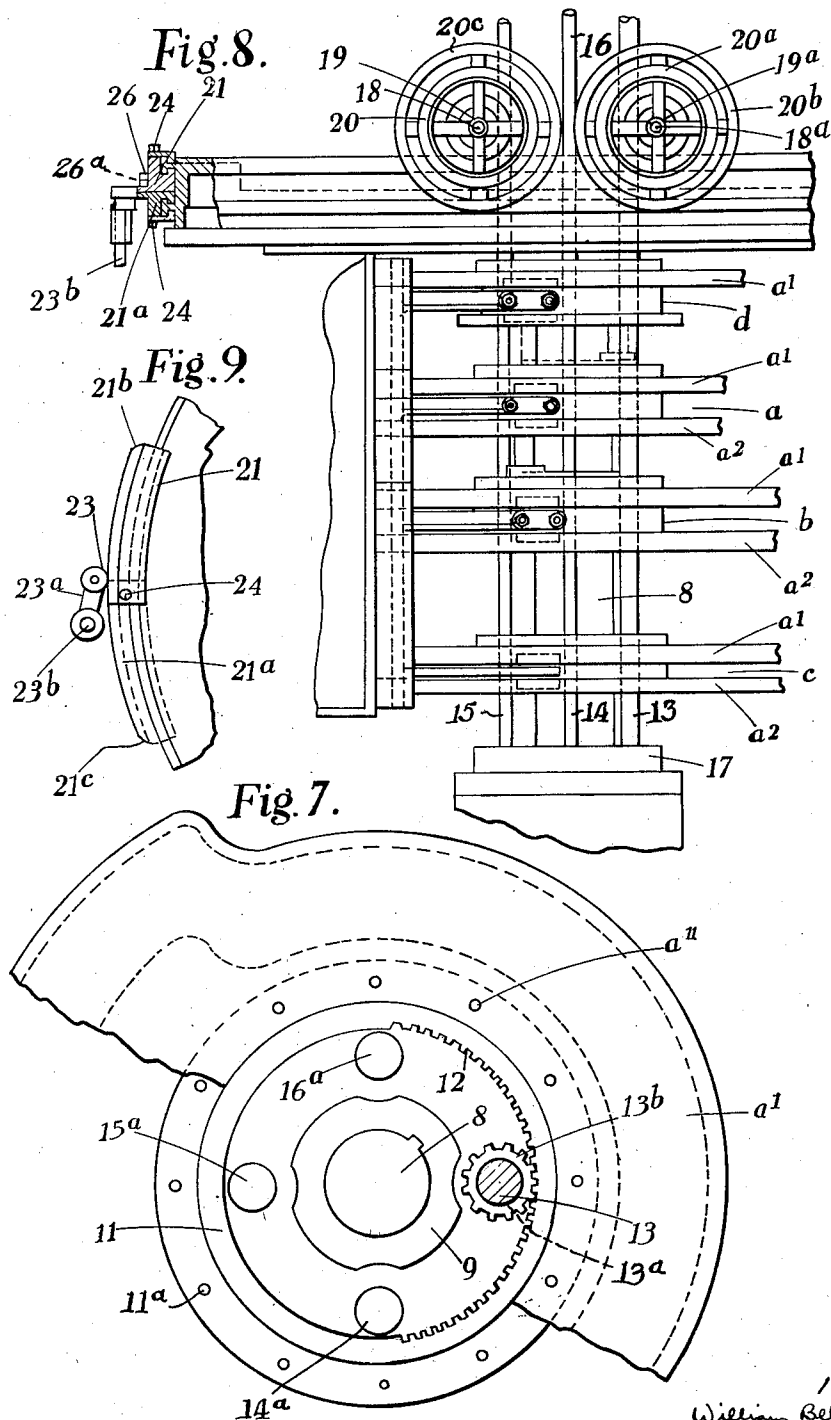
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CAM MECHANISM

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3 Sheets-Sheet 3



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2,207,629

CAM MECHANISM

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newed June 4, 1940. In Great Britain April
25, 1935

3 Claims. (Cl. 74-568)

This invention relates to the type or class of machine for the production of articles of glass wherein suction or like apparatus is employed for gathering the glass directly from the tank which contains same in its molten condition for giving shape to said molten glass, forming the desired article thereof, and discharging same when finished. And my said invention consists in the production of cam devices which may be adjusted without the substitution of other members so that the descending of the suction member into the molten glass, the time that it occupies in travelling horizontally in contact with said molten glass, and the position where it ascends out of contact therewith, and movements of the separate parts of the machine for operating the devices which further have to act upon the articles being produced, are all controlled by cams which will enable their separate adjustments to be effected to meet the requirements desired so that the machine is thus produced of a character that will enable it to produce larger or smaller articles or which require different lengths of time for carrying out their respective treatments under conditions stated. In many cases my adjusting mechanism may be employed and utilized during the operation of the machine.

In order that my invention may be readily understood I have hereunto appended sheets of drawings illustrative thereof, in which:

Fig. 1 is a side elevation of the adjustable cam devices which I employ for carrying out the raising and lowering of the suction nozzles.

Fig. 2 is a plan of certain of the parts shown by Fig. 1.

Fig. 3 is a sectional end elevation of certain of the parts shown by Fig. 1.

Fig. 4 is a plan of other cam members I employ shown as adjusted to one limit of their movement.

Fig. 5 is a similar view to Fig. 4 but shows the members adjusted to the other limit of their movement.

Fig. 6 is a sectional elevation showing the members for obtaining a further adjustment of the devices shown by Figs. 4 and 5.

Fig. 7 is a plan of the parts shown by Fig. 6.

Fig. 8 is a side elevation of a part of a glass machine showing the means for operating the parts shown by Figs. 6 and 7.

Fig. 9 is a plan of certain parts shown by Fig. 8.

Fig. 10 is a side elevation of other adjustable cam members which I employ as hereinafter described.

Fig. 11 is a perspective view of a cam which

operates in conjunction with the devices shown by Fig. 1.

In carrying my invention into effect, in connection with the cam 2 which has to be brought into action to cause the parison mould to descend into the proper position into engagement with the molten glass in the furnace and to travel along in contact therewith for a period sufficient to gather up the desired quantity and then to rise out of contact with the mass of glass, I mount said cam, concentric with the centre of rotation of the carriage of the machine. The parts to be operated by said cam 2 are mounted upon the carriage of the machine, while the levers 2a which operate said parts extend below said carriage to have their runners 2b in contact with the upper surface of said cam 2. This cam 2 is formed in three parts 2c, 2d and 2e, each part having openings in its flanged base to receive bolts to enable same to be fixed to the stationary base member of the machine, while the part 2d is provided with a portion which is arranged to slide vertically against the outer surfaces of the parts 2c and 2e. The cam surface 2e commences to lower the parison mould into the glass, while the part 2d will permit same to remain in said glass until the cam surface 2c is reached where the bowls or runners 2b (which are of sufficient width to be engaged by both cam surfaces) are raised to raise the mould out of contact therewith. The extent to which the mould has to descend (as required by the height of the glass in the furnace) I control by constructing the lower surface of the part 2d of tapering formation in order that a wedge shaped member 3 which slides between guides 3a and 3b may be advanced and retracted to raise and lower said part 2d. These movements of the member 3 are effected by a hand wheel 4 which when rotated slides the screwed shaft 4a which passes through the bearing 4b to be pivotally connected at 4c to the member 3. Thus rotation of the hand wheel 4 will advance or retract the wedge member 3 and so raise or lower the vertically slidable portion of the part 2d which controls the descent of the suction nozzle. By arranging the fixing bolts, which fix the cam parts 2c, 2d and 2e to the base plate, to take into T slots, each part may be adjusted independently around the axis of rotation, or they may be moved together as is found necessary in timing the apparatus.

In the arrangement of cams which I employ for causing the lever devices which are required to move the members of the machine that have to treat the gathered glass prior to discharging it

from said machine, and which have to operate their levers radially, I form same as shown by Figs. 4, 5, 6 and 7 of the drawings. These cams which are shown at *a*, *b* and *c* of Fig. 8 I form in two parts *a*¹ and *a*², one to slide over the other in one horizontal plane, while the other part lies in the horizontal plane beneath. The bowls or runners 5 and 6 which are both mounted upon the lever arm 7 are arranged to take into the grooves of cams *a*¹ and *a*² respectively, while the said cam grooves at their concentric parts overlap in order that the movements of the lever arm 7 are at all times controlled by either the cam *a*¹ or the cam *a*². As indicated in Figures 4 and 5, each of the cam parts *a*¹ and *a*² have two concentric arcuate portions with different radii of curvature. The arcuate portions of the cam part *a*¹ overlap the similar arcuate portions of the part *a*² so that the parts *a*¹ and *a*² may be relatively adjusted around their common center to vary the total length of the arcuate portions of different curvature.

The stationary supporting column 8 supports the cams *a*, *b*, *c* and *d* by means of a member 9 which is keyed upon said column 8, and said member 9 has a flange 10 formed at its lower edge in order that bolts may be made to pass through holes 10*a* in said flange and through holes *a*¹⁰ in a flange formed on the cam member *a*². The cam member *a*¹ is bolted in like manner to an annular member 11 having openings 11*a* to correspond with the openings *a*¹¹ in said cam member *a*¹ and having internal teeth 12 to engage with a pinion 13*b* hereinafter described. The member 9 which is fixed upon the supporting column 8 has openings 13*a*, 14*a*, 15*a* and 16*a* formed in it through which shafts 13, 14, 15 and 16 pass to have their lower ends suitably held in a bearing 17 while their upper ends have each a worm wheel fixed thereto to be rotated by worms mounted upon each of shafts 18 and 18*a* and hollow shafts 19 and 19*a* which surround said shafts 18 and 18*a*.

The shafts 18, 18*a*, 19 and 19*a* have each a hand wheel 20, 20*a*, 20*b* and 20*c* fixed to their outer ends in order that rotation of these hand wheels will rotate the shafts they operate.

The pinion 13*b* is fixed upon or formed integrally with the shaft 13, similar pinions (not shown) being fixed upon the shafts 14, 15 and 16, corresponding to the cams *b*, *c* and *d*.

The adjusting of the cams is as follows:—

In adjusting the machine to produce a different kind of article, or for other reasons, it may be found that these cams *a*, *b*, *c* and *d* require to be rotatively adjusted around the column 8 in order to carry out their respective actions upon the article being formed sooner or later after the glass has been received at the furnace, and to make these adjustments the bolts at *a*¹⁰ and *a*¹¹ can be removed and the parts *a*¹ and *a*² of any of these cams can be rotated as a unit and can be again fixed by bolts taking into others of the holes in the members 9 and 11. Should it be found necessary whilst the machine is in motion to vary the relation between said cams *a*¹ and *a*², this may be done by turning the hand wheel 20 which, in turn, operates the pinion 13*b* and thus causes relative adjustment of the parts *a*¹ and *a*² of the cam *a*. Thus the arcuate portion of larger radius of curvature may be increased or diminished, the portion of lesser radius of curvature being simultaneously diminished or increased by the same angle. This relationship of the cams *a*¹ and *a*² can be varied between the limits as shown by Figs. 4 and 5. Although in the em-

bodiment of the invention illustrated on the drawings, no pinion and rack is provided for the part *a*² of the cam, it is to be understood that such members may be provided, if desired, so that either part *a*¹ or *a*² can be adjusted independently as described.

The adjustable cams shown by Figs. 8 and 9 I preferably use in connection with the valves which operate the pressure air and suction valves and I arrange said cams 21, 21*a* to be suitably mounted upon the fixed annular member 22 in order that I may slide the cam 21 over the cam 21*a* to bring their inclined portions 21*b* and 21*c* closer to or further from each other. The bowl or runner 23 which is connected to the lever 23*a* to operate its shaft 23*b* is of sufficient width to be acted upon by both cams 21 and 21*a* at the part where they overlap. When said cams have been adjusted by sliding same as described they can be fixed in position by bolts 24. In order to arrange both the pressure and the suction controlling cams upon the member 22 I form the pressure controlling cams (such as 21, 21*a*) to be at a lower level than the suction cams (26, 26*a*) and therefore by having the bowl which operates the suction valve placed in a higher position than the bowl 23 of the pressure valve, these valves can be operated independently. It will be understood that the cams 21, 21*a* and 26, 26*a* can be adjustably moved around the periphery of the member 22, as well as having the length of the concentric portion where they overlap, varied.

In order to allow for adjustment of the cam which operates the knife for cutting off the excess glass which extends from the base of the parison mould after same is raised from the furnace, I arrange said cam as shown by Fig. 10. This cam is adjustably mounted by T slots upon the base of the machine and operates a runner and lever carried by the carriage. The runner approaches this cam 30 whilst in its lowest position and in the direction of the arrow *x* in order that when it reaches the part 30*a* of said cam it is raised by said part 30*a* to operate the knife.

To enable the adjustment of said cam 30 in relation to the position in which the glass is received I provide its base member 30*x* with openings 30*y* through which T bolts may take into T slots in the base member of the machine. The cam 30 may thus be adjusted around said base member.

To enable the speed at which the knife member operates to be increased or decreased I raise or lower the part 30*a*.

The raising and lowering of the part 30*a* is carried out by the advancing and retracting of the bowl 30*b* which is in contact with the surface 30*c* of the member 30*a*. This bowl 30*b* is mounted upon a bar 30*d* which has the screwed rod 30*e* connected to it in order that by the hand-wheel 30*f* being rotated said screwed rod may be moved to raise or lower the part 30*a* for the purpose stated.

Two cams similar to the one shown by Fig. 11 are mounted upon the base of the machine and are arranged to the left and to the right of the cam member 2 shown by Fig. 1 and are concentric therewith. These cams are each formed in two parts 20*e* and 20*f* which slide one within the other and are fixed to the base by T-bolts in order that the distance between their inclined ends 2*e* and 2*c* can be varied to vary the length of their overlapping parts which are parallel to the base member. The runner 2*b* described in reference to Fig. 1 is raised and lowered by these cams 20*e*.

and 20f and the similar cams at the other side of the cam 2 to raise and lower the parison mould, and thus any variation in the distance between the ends 2e and 2c varies the time that said nozzle
5 is raised.

The adjusting of the end 2e and the end 2c of the similar cam where they coincide with the cam 2 also adjusts the length of time which the nozzle remains dipped in the glass in the furnace, the cam 2 regulating the depth of dip as described.
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Such being the nature of my said invention, what I claim is:

1. In a machine for the production of articles of glass, a cam comprising a pair of members in parallel planes each member having a cam groove in a face thereof including two concentric circular portions of different radii, said members being arranged with their grooved faces presented to each other, the groove portions of each said member overlapping the portions of similar curvature of the other member, and means for adjusting said members relatively to each other about the common center of curvature of said cam portions.
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2. In a machine for the production of articles of glass, a rotatable shaft, a series of cams on said shaft, each said cam comprising two mating mem-
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bers arranged in parallel planes and having cam grooves in their opposing faces, means adjustably securing one member of each said cam to said shaft, and means operable during operation of the machine to adjust the other member of each cam
5 relatively to its secured member, the same groove in each said member having two concentric circular portions of different curvature overlapping corresponding groove portions in the mating cam member.
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3. In a machine for the production of articles of glass, a cam comprising two mating members arranged in spaced parallel planes and having grooves in their opposing faces, the groove of each said member having two concentric circular portions of different curvature, each said portion overlapping a portion of similar curvature in the mating member, means for relatively adjusting said members about the center of curvature of the groove portions, and a cam follower including a lever extending in between said member, and a pair of elements carried by said lever to ride in said grooves, said elements being spaced so that one of the elements rides in the groove of one said member and the other element rides in the groove of the other member.
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