April 18, 1939. J. J. JEFFRIES ET AL 2,154,681

BOTTLE AND STOPPER GRINDING MACHINE

Filed May 10, 1938 4 Sheets-Sheet 1

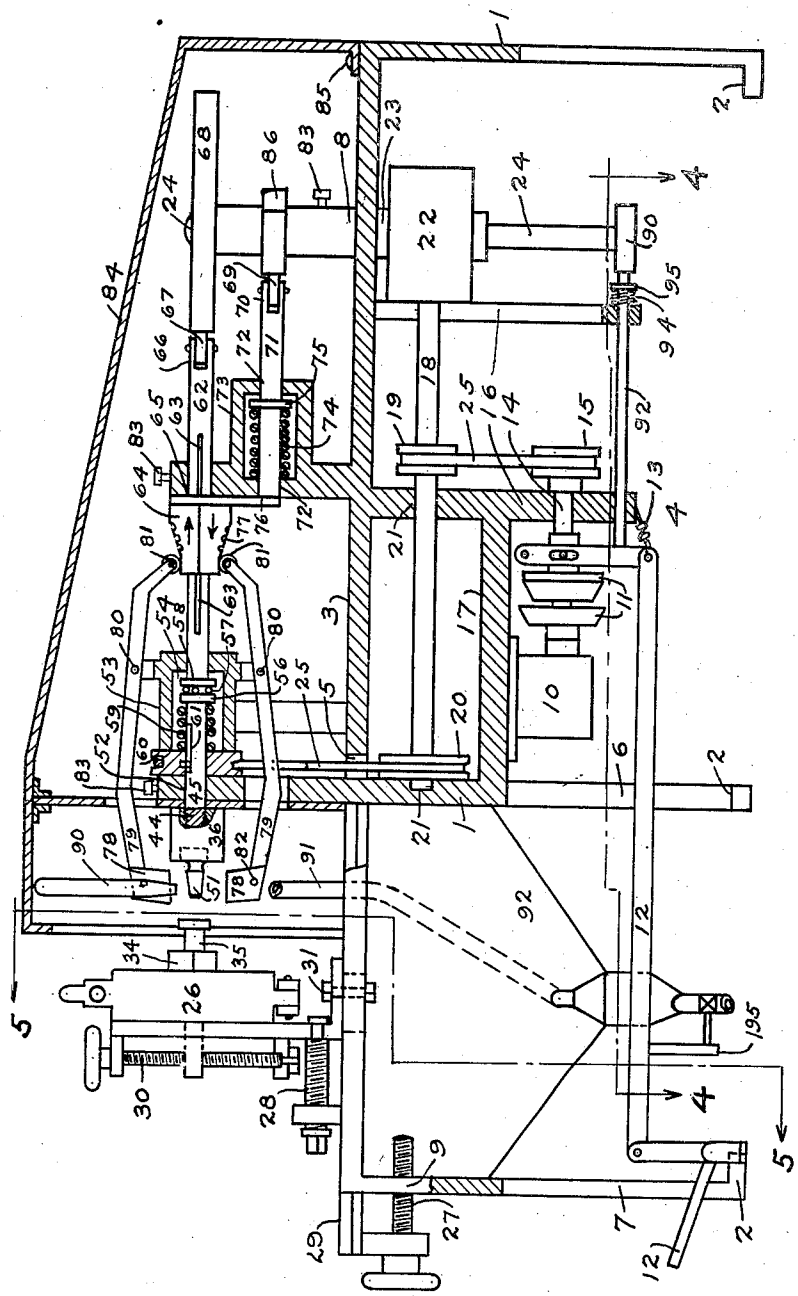


FIG. 1.

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BOTTLE AND STOPPER GRINDING MACHINE

Filed May 10, 1938 4 Sheets-Sheet 2

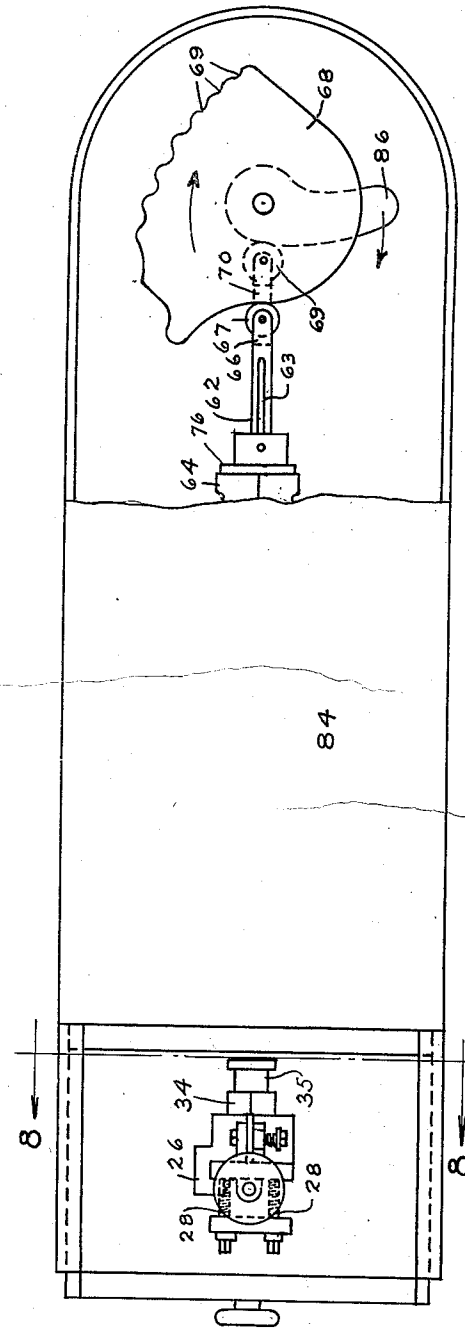


FIG. 3.

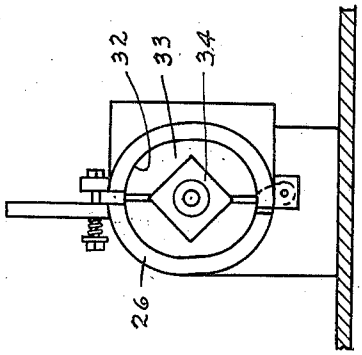


FIG. 8.

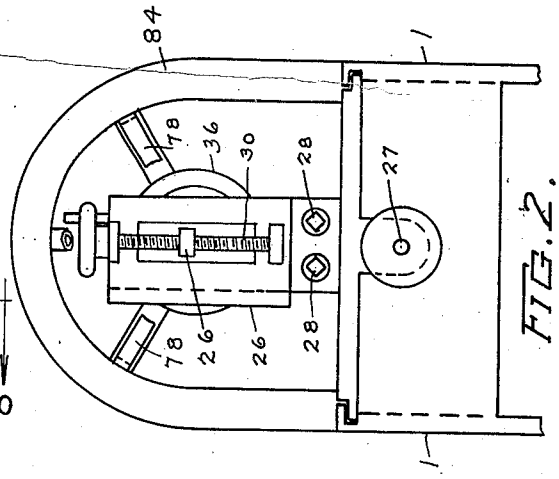


FIG. 2.

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BOTTLE AND STOPPER GRINDING MACHINE

Filed May 10, 1938 4 Sheets-Sheet 3

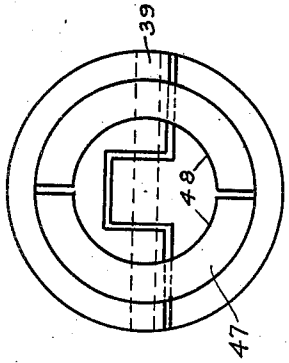


FIG. 11.

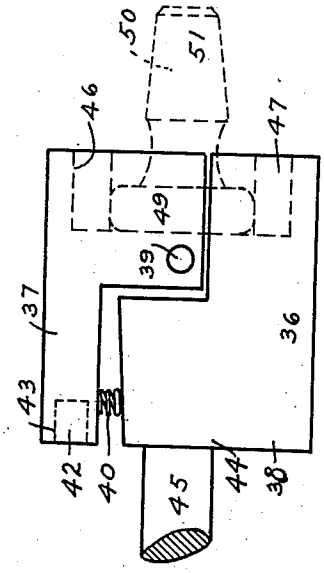


FIG. 9.

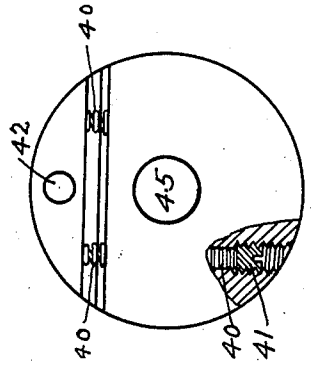


FIG. 10.

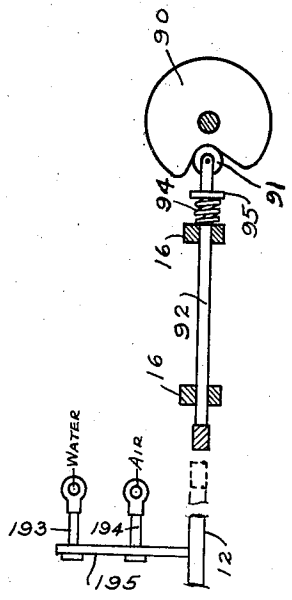


FIG. 4.

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BOTTLE AND STOPPER GRINDING MACHINE

Filed May 10, 1938 4 Sheets-Sheet 4

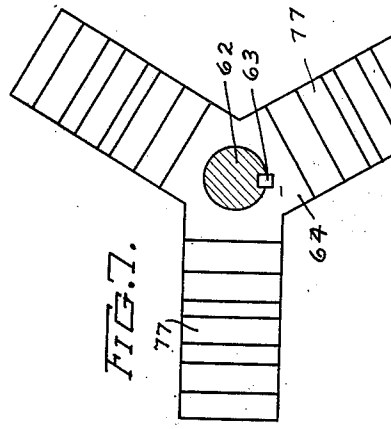


FIG. 7.

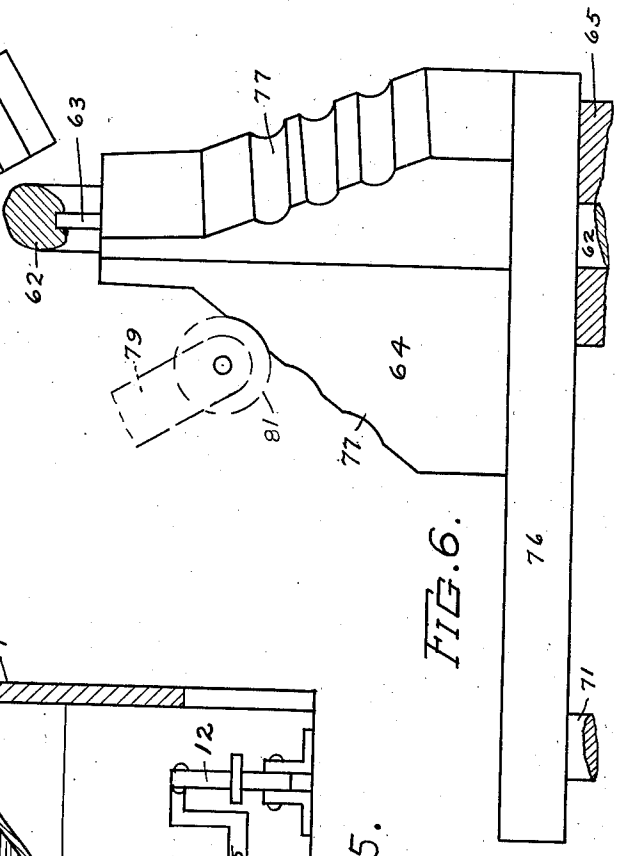


FIG. 6.

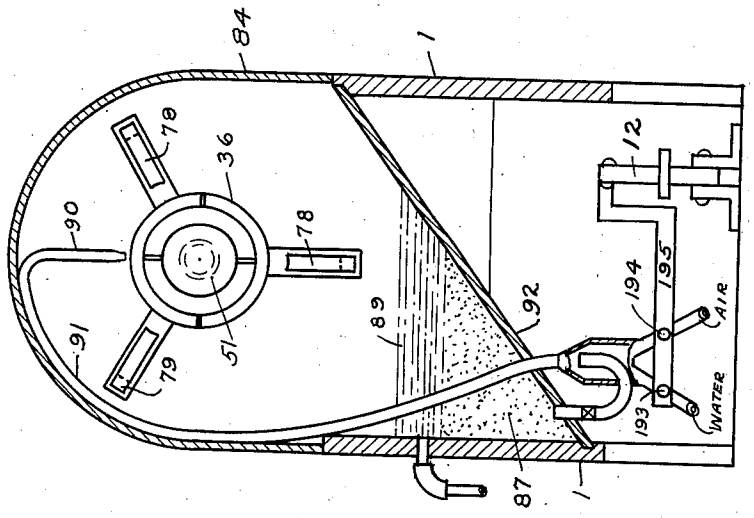


FIG. 5.

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UNITED STATES PATENT OFFICE

2,154,681

BOTTLE AND STOPPER GRINDING MACHINE

John Joseph Jeffries and Henry Carl Knoblock, Baltimore, Md.

Application May 10, 1938, Serial No. 207,079

10 Claims. (Cl. 51—3)

This invention refers to glass making machines and more particularly to a device for fitting glass stoppers into glass bottles. It has among its objects to design a machine that will automatically hold the stoppers firmly as the machine is operated and release same when the machine stops, to provide a special type of chuck for the object just outlined; to have arrangements for adjusting stoppers in bottles during grinding to suit the amount of grinding accomplished; to have an automatic arrangement for grinding the stoppers to predetermined forms before using them in the bottles, and have mechanisms for adjusting the parts of the machines to suit the work to be done. Other objects will become apparent as the invention is more fully set forth.

The conventional manner of grinding stoppers in actual practice is to hold the stopper shank in a metal sleeve by hand. The sleeve is formed to the approximate outline of the shank and coated with a suitable abrasive and water. The stopper rotates with the chuck that holds same and provides the necessary movement to wear the stopper down to a predetermined fitting size. The next step in fitting the stopper to a bottle consists in the insertion of the stopper shank, and the working of same gradually into the neck. The roughness of the shank provides the necessary friction to carry the abrasive to the walls of the neck of the bottle and make it a ground fit. Machines have been designed to do this work with less manual effort but have not been adopted due to certain practical limitations and lack of profitable possibilities.

In this invention, the manual operation for grinding is eliminated, and in its place machine operation is provided. The bottle stoppers are held by a specially designed chuck that holds them under centrifugal force, and readily loosens its hold for removal when the machine stops.

The stoppers themselves are ground first and according to a predetermined system. The system includes the bringing of aligning and abrasive members against the sides of the shank of the stopper and then vibrating same to permit abrasive to react therewith as it is flowed on. When the stoppers are ground, the next function of the mechanism is to disconnect the aforementioned aligning and abrasive members out of the field of action and permit the chuck to carry the stopper into a bottle neck and then in gradual steps grind same to fit. The bottle is held in an adjustable holder in a frame of hard rubber arranged to give the desired frictional resistance and at the same time permit a limited amount of vibratory movement in the bottle to be taken up. This arrangement reduces the possibility of breakage in the bottle to a considerable degree, especially over that due to the use of wood and other common materials available.

In the drawings which illustrate an embodiment of this invention:—

Figure 1 is a view in sectional elevation of a bottle and stopper grinding machine embodying this invention,

Figure 2 is an end view of the machine shown in Figure 1,

Figure 3 is a plan view of Figure 1,

Figure 4 is a sectional view along line 4—4 of Figure 1,

Figure 5 is a sectional view along the line 5—5 of Figure 1 showing abrasive feeding mechanism,

Figure 6 is an enlarged detail of the juggler cam used in this device and is shown in elevation,

Figure 7 is a plan view looking up of Figure 6,

Figure 8 is a detail plan view of the adjustable bottle holder used in this machine,

Figure 9 is a side elevation of the chuck used in this invention,

Figure 10 is a rear elevation of Figure 9,

Figure 11 is a front elevation of Figure 9.

Similar reference characters refer to similar parts throughout the drawings.

In the drawings, the construction includes a frame 1 which has a base 2 which serves to support it on a table or floor. It is provided with a horizontal shelf 3 which serves as a support for the grinding mechanism of the machine and as a protecting roof over a compartment 4 containing the driving mechanism, as well as for greatly strengthening the device. The frame is also arranged with holes or openings 5, 6, 7, 8 and 9 to permit various parts of the machine to pass through as indicated, and referred to later.

The driving mechanism consists primarily of a motor 10 with a clutch contrivance 11 of a conventional form; an operating handle element 12, a spring 13 to resiliently retain the latter in position; an extension shaft 14; pulley 15; and bearing 16, with a supporting arm 17 attached to the frame 1. This driving mechanism is connected with a countershaft 18 pulleys 19 and 20, held to the underside of the shelf 3 at 21 and also powers a speed reducer 22 which is retained in place by the bearing members 23, through which its shaft 24 extends. The belts 25 serve to transmit power to the countershaft and to the grinding mechanism.

The grinding mechanism has two principal grinding functions, the first being for grinding

the shank of the stopper and the second for grinding the bottle to receive the former. The bottle is placed in a holder 26 which is adjustable horizontally, vertically and angularly by means of the propelling bolt 27 in the slider 29 screwing in the hole 9, and also by the adjusting screw 28 mounted on same; the vertical screws 30 and the bolt 31 respectively. The central portion of the holder is recessed at 32 and contains a polygonally cut rubber insert 33 which permits the insertion of the body of a bottle 34 and its being held securely thereby. This holder is definitely and properly set in a position to align with the chuck of the device, to place the bottle neck 35 where it can be ground in the manner to be described.

The chuck 36 of the machine consists of a pair of shells 37 and 38 respectively that fit into each other and are held together by a pivot pin 39 with coil springs 40 tied in as indicated by connectors 41. The shell 37 has a weight 42 in its periphery located in the groove 43. The purpose of this weight is to provide force sufficient to pull out the shell under centrifugal force and to assist the tendency of the springs 40, to keep them against the inner face of shell 37 at the left side in the drawings. The left side of the shell 38 is screw-threaded at 44 for the shaft 45 which rotates it when in operation. The right side of the shells are cut out in circular form at 46 to receive a soft rubber gripper 47 shaped to fit into same tightly. This gripper 47 has a central opening 48 of such size and type as to elastically hold the head 49 of a stopper 50, whose shank 51 is to be made suitable for insertion in the neck of a bottle after grinding. The gripper is made to tighten harder on the head of the stopper by the action of the shells pivoting on the pin 39 when spun around by the operation of the shaft 45 and the centrifugal force of the weight forcing the weight and spring parts of the shells to separate outwardly. The stopper is so held that the shank part to be ground is set out from the chuck a predetermined distance. The shaft 45 passes through the bearing 52 in the frame 1 into a bell-shaped cup 53 having its interior 54 constructed to permit it, as well as hold grease for lubricating purposes. The shaft 45 has a thrust bearing plate 56 as shown which has ball bearings 57 between it and another thrust bearing plate 58 to keep these parts frictionlessly apart. A coil spring 59 pressing against the pulley 60 which is feather keyed in the shaft 45 at 61 and the plate 56 keeps the pressure on the shaft so as to normally bear the chuck loosely against the surface of the frame in its normal position. The bearing plate 58 is attached to a spindle shaft 62 having a slot 63 to permit a joggler cam 64 to move with it and also slide along same. A bearing is provided in the frame 1 for the shaft 62 at 65. The latter is also arranged with a head 66 to support a roller 67 which engages with a bottle grinding cam 68 rotated by the shaft 24. This cam is preferably of the form shown in Figure 3 and has a series of depressions 69 which give the shaft 62 a vibratory action. The cam moves the chuck 36 through the intervening shafts 45 and 62 gradually forwards and backwards in order to make the grinding progressive into the neck of the bottle instead of suddenly.

Another cam 86 known as the joggler throw cam is also mounted on the shaft 24 and keyed to same, and engages with a roller 69 attached to a bearing head 70. This head is secured on shaft 71 which reciprocates through holes 72 in the walls of the frame member 73. This frame member 73 contains a coil spring 74 which presses against the collar 75 on the shaft 71 and tends to press the roller and head against the cam 86 normally. An arm 76 projects from the shaft 71 as indicated and is connected with the joggler cam 64 so as to reciprocate the same as it moves under the action of the cam 86.

The joggler cam is preferably grooved as shown at 77 to provide a vibrating action that will permit the abrasive to work itself in between its triple set of abrasive shapers and grinding shapers 78. These shapers are blocks of metal suitably formed which press closely against the bottle stopper and cause the abrasive to bear on same and grind it to the predetermined shape. These blocks form holders for retaining the abrasive in place while it is being rubbed against the stopper. The cam 64 is cut on an angular form to make the lever arms 79 pivot on their pins 80 the rollers 81 being provided to assist and eliminate a great deal of friction. The shapers 78 are adjustably held in place by the screws 82 to permit them to be positioned at various positions with regard to the stopper shank to be ground thereby. The various bearings have been provided with grease cups or other lubricating means 83 as may be seen in the drawings. A casing 84 is removably attached to the frame 1 by bolts or other attachments 85 to protect the equipment's operating elements.

The operation of the device is in general as follows. The motor 10 is started and the clutch mechanism 11 thrown into gear. This makes the pulley 15 drive the countershaft 18 through the use of one belt 25, which in turn, turns the pulley 20 and the speed reducer 22. The belt 25 and shaft 24 cause the pulley 60 and coupling to operate the shafts 45 and 24 respectively. The shaft 24 rotates the cams 68 and 86 in the direction indicated by the arrow on the drawings. The smaller cam with its peculiar form causes the roller 69, head 70, shaft 71, arm 76, and joggler cam 64 to move towards the adjustable holder 26. At the same time the pulleys 20 and 60 with their connecting belt are rotating rapidly, causing the chuck 36 to go round likewise, with the stopper held in its resilient jaws of soft rubber. These jaws tighten on the stopper as the centrifugal force from the rotating action of the shells 37 and 38 causes the weight 42 to press outwardly on one end and pivot the shells on their pin 39 and cause the other end portion to move inwardly and press in towards the center line of the chuck. This secures the stopper in place firmly.

As the joggler cam 64 is forced towards the left by the cam 86 its greater width spreads the rollers 81 further apart and in turn force the levers 79 to pivot on their pins 80 and bring the grinding shapers 78 against the shank of the stopper. This abrades the surface of the stopper and the grinding dust 87 and water 89 under the pressure of the latter wedge in. The grinding material, air and water are conveyed through the nozzle 90, piping 91 from a suitable container 92. The abrasive is controlled through shut off valves 193 and 194 operated through arm 195 attached to clutch operating element 12. The movement of the joggler throw cam 86, the rotation of the joggler cam 64 and the vibratory action of the levers 79 with their holders 78, have the effect of grinding the surface of the stopper shank. When this is accomplished the cam 86 is so built that it releases its pushing action as it takes pressure off the roller 69, head 70, shaft 71, arm 76, arms 79 and holders 78. At that moment, however, the second cam 68

comes into action and presses the roller 67, the head 66, the shaft 62, and chuck 36 towards the holder 26 and positions the stopper inside the mouth of the bottle 35, where its rotation grinds into same progressively. The cam presses these parts more and more until the whole shank is within the bottle and ground in to fit. The form of this cam surface is such as to cause a vibratory or in and out action as already explained. The feather keys permit the movement of the shafts in a reciprocating manner without interfering with the rotation thereof or causing the parts operated by the other cams to be affected by the cam action in use.

When the grinding is completed, the cam 68 is shaped to permit the parts just mentioned to return to their normal places, and the stopper is ready to be replaced by another. The shutting down of the mechanism turning the chuck and cams loosens up on the stopper in the chuck and permits its removal and replacement by another without the usual difficulty and trouble. The bottle is simply taken out of the holder 26 and another put in its place.

The matter of detailing the adjustments further does not seem to require more description.

The clutch mechanism for the motor 10 is controlled by a cam 90 acting on a roller 91, rod 92, and link 195 on the clutch member. The spring 94, collar 95, serve to give these parts proper tension for positioning them normally. The cam 90 is mounted on the shaft 24 coming from the speed reducer 22 and operates to throw off the power when the cam 90 has made one revolution. The grinding of the stopper and bottle is completed through the actuation of the above described mechanism during the period of the single revolution of this cam 90.

While but one form of the invention is indicated in the drawings, it is not desired to limit this application for patent otherwise than limited by the prior art, as it is appreciated that other forms of construction could be used that would employ the same principles and come within the scope of the appended claims.

Having thus described the invention, what is claimed is:

1. A glass stopper and bottle grinding machine comprising in combination, a frame, a resilient holder mounted on the said frame, for holding a bottle, a chuck with driving mechanism mounted on the frame, said chuck being arranged for resiliently holding a stopper for the bottle, means for grinding the stopper variably, means for carrying the ground stopper into the neck of the bottle for fitting and grinding same together, said means being mounted on the frame, and adapted to isolate the grinding means from the stopper to permit the stopper to fit itself unobstructively in the neck of the bottle.

2. A glass stopper and bottle grinding machine comprising in combination, a frame, a resilient holder mounted on the said frame, for holding a bottle, a chuck with driving mechanism mounted on the frame, said chuck being arranged for resiliently holding a stopper for the bottle, means for grinding the stopper variably, means for carrying the ground stopper into the neck of the bottle for fitting and grinding same together, said means being mounted on the frame, and adapted to isolate the grinding means from the stopper to permit the stopper to fit itself unobstructively in the neck of the bottle, centrifugal controls for the said chuck for adjusting the amount of gripping therefor, and an attachment for vibrating the grinding means.

3. In a device of the class described, a chuck comprising in combination, a plurality of shells hinged together, said shells having a recess for containing a stopper, and weights located in the shells for centrifugally controlling the pressure at the recess for holding the stopper, when the chuck is rotated.

4. In a device of the class described, a chuck comprising in combination, a plurality of shells hinged together, said shells having a recess for containing a stopper, and weights located in the shells for centrifugally controlling the pressure at the recess for holding the stopper, when the chuck is rotated, and a resilient member in the recess for frictionally engaging the stopper and transmitting pressure thereto arising from the centrifugal control.

5. A stopper grinding machine comprising in combination, a frame, a chuck for holding a stopper mounted in the frame, a resilient member in the chuck for receiving and holding the stopper in the chuck, resilient means acting on the parts of the chuck for actuating same and causing pressure to be exerted on the resilient member aforesaid, weight means disposed in the chuck adapted to press on and actuate the parts additionally on the rotation thereof in the machine, means for rotating the chuck connected with the frame, a cam member operated cooperatively with the chuck, grinding shapers actuated by the said cam member and adapted to variably grind the stopper in a predetermined manner, and operative means for rotating the chuck and cam member.

6. A glass stopper grinding machine of the class described comprising in combination, a frame, a chuck on the frame for holding a container stopper, said chuck being arranged with centrifugally actuating means for tightening the holding pressure of the jaws of the chuck on the said stopper, a cam member, a shaft attached to and for operating the chuck and cam member lever mechanism mounted on the frame and in contact with the said cam member for movement thereby, grinding means on the mechanism adapted to register on the stopper and grind the same in its travel with the chuck, and means for projecting the chuck and stopper therein to another position for further grinding at predetermined periods.

7. A stopper and bottle neck grinding machine comprising in combination, a frame for supporting the parts of the machine and a bottle in predetermined relationship, a chuck for holding the stopper, said chuck having a resilient gripper therein for contact with the stopper, and weight means for actuating the jaw portions of the chuck and automatically increasing the pressure of same on the gripper as the chuck is operated, a joggler cam operating in conjunction with the said chuck, mechanism for grinding the stopper variably operated by the said joggler cam, means for conveying grinding material to the said mechanism for use on the stopper, and means for displacing the stopper from the said mechanism and inserting same in the bottle to be ground to a fit therein.

8. A stopper and bottle neck grinding machine comprising in combination, a frame for supporting the parts of the machine and a bottle in predetermined relationship, a chuck for holding the stopper, said chuck having a resilient gripper therein for contact with the stopper, and weight

means for actuating the jaw portions of the chuck and automatically increasing the pressure of same on the gripper as the chuck is operated, a joggler cam operating in conjunction with the said chuck, mechanism for grinding the stopper variably operated by the said joggler cam, means for conveying grinding material to the said mechanism for use on the stopper, and means for displacing the stopper from the said mechanism and inserting same in the bottle to be ground to a fit therein, means for resiliently actuating the last mentioned means, said means being mounted on the frame and connected with the operating portions thereof for potentially returning the chuck and cams to various predetermined positions.

9. In a machine of the class described, a chuck for holding stoppers, centrifugal mechanism for automatically tightening the portions of the chuck for holding the stoppers, means for holding and operating the chuck, a joggler mechanism operating cooperatively with the chuck, grinding mechanism for aligning and abrading the stoppers in the chuck and for variably controlling the grinding of the same in a predetermined manner in conjunction with the joggler mechanism, and means for projecting the chuck and stoppers to another position for further manipulation and finishing, when the aligning and abrasing to be done by the aforesaid mechanism is completed.

10. In a machine of the class described, a chuck for holding stoppers, centrifugal mechanism for automatically tightening the portions of the chuck for holding the stoppers, means for holding and operating the chuck, a joggler mechanism operating cooperatively with the chuck, grinding mechanism for aligning and abrasing the stoppers in the chuck and for variably controlling the grinding of the same in a predetermined manner in conjunction with the joggler mechanism, and means for projecting the chuck and stoppers to another position for further manipulation and finishing, when the aligning and abrasing to be done by the aforesaid mechanism is completed, and means for supplying grinding materials adjacent the grinding mechanism while the chuck and grinding mechanism is operating with a stopper.

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