Dec. 22, 1970 A. R. GREGERSEN 3,548,684

ROTARY INDEXING MECHANISM

Filed March 28, 1969 2 Sheets-Sheet 1

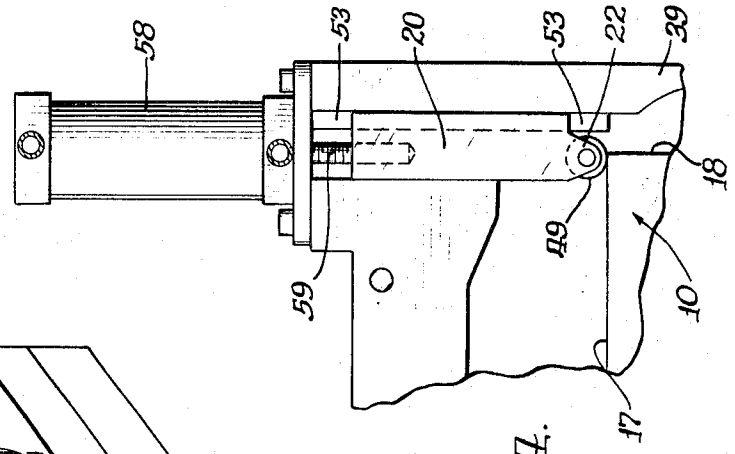


Fig. 4.

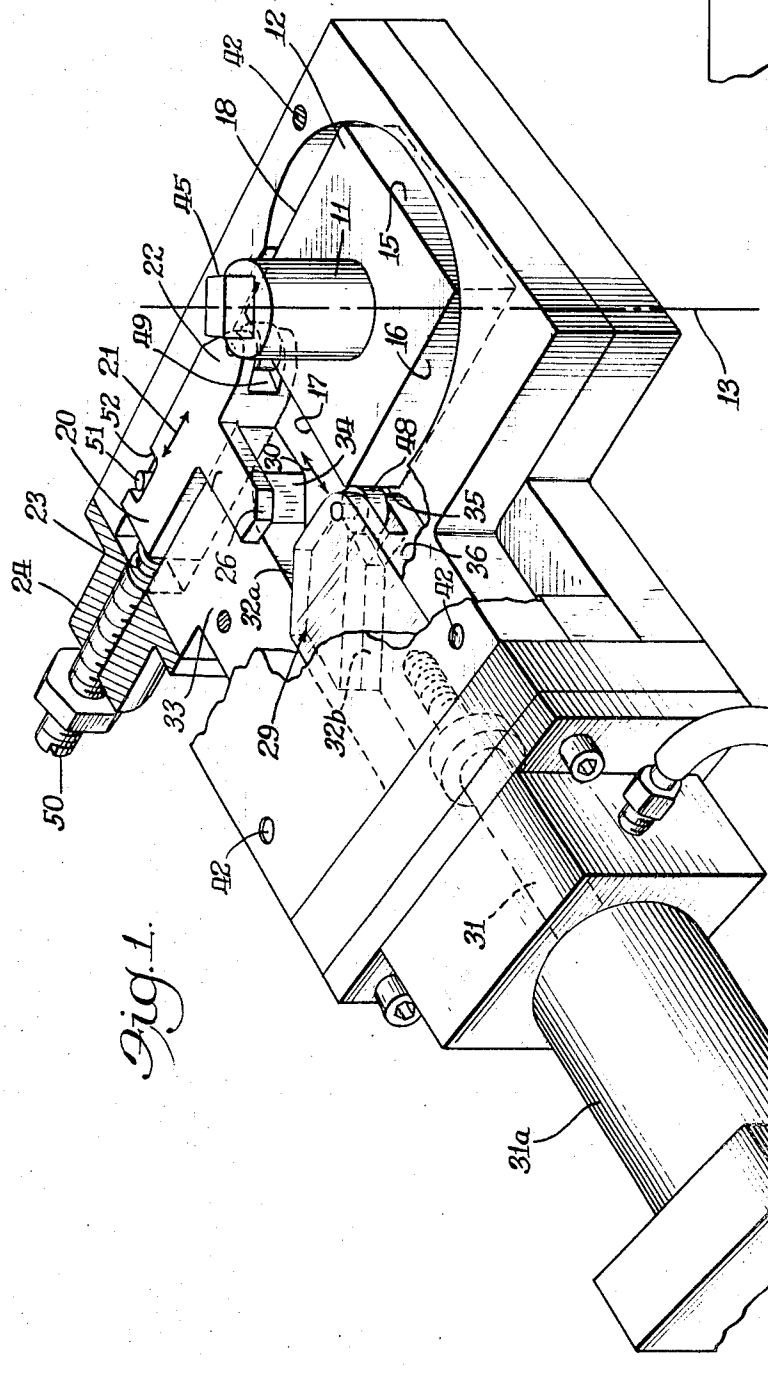


Fig. 1.

Inventor:
Arthur R. Gregersen
By: Darbo, Robertson & Vandenburgh
Atty's.

Dec. 22, 1970 A. R. GREGERSEN 3,548,684

ROTARY INDEXING MECHANISM

Filed March 28, 1969 2 Sheets-Sheet 2

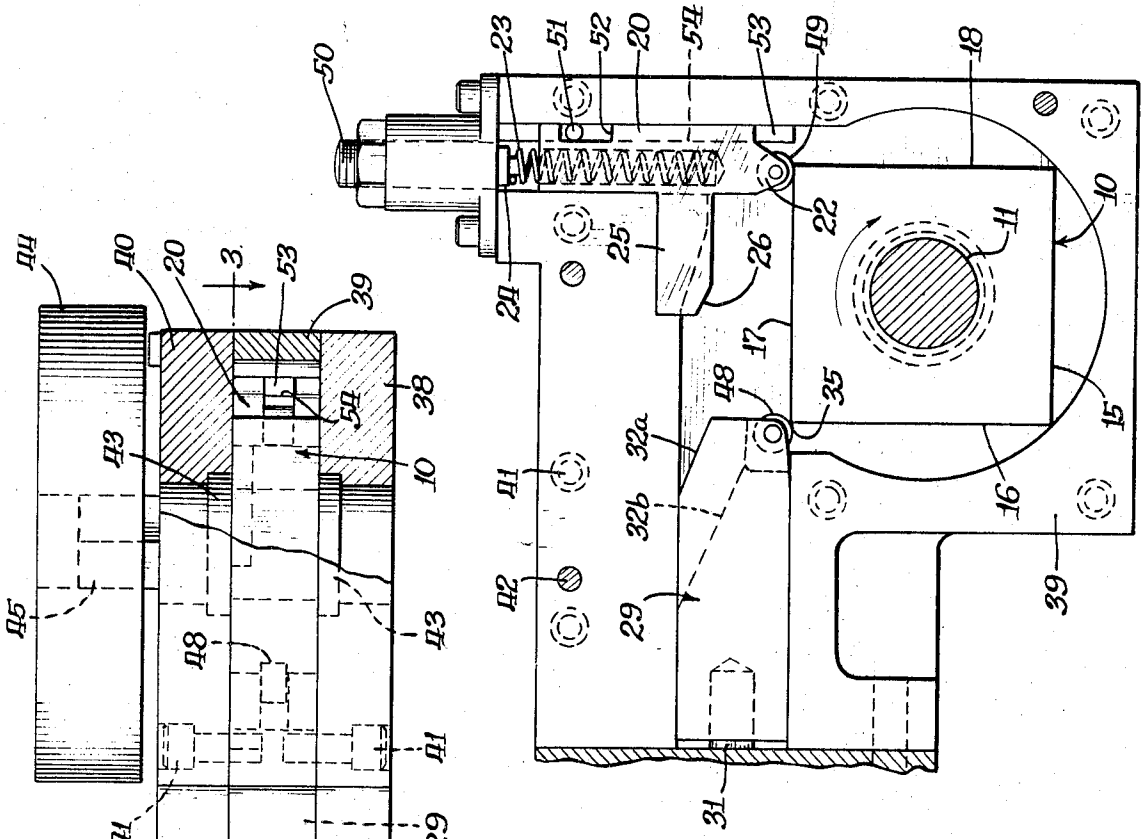


Fig. 3.

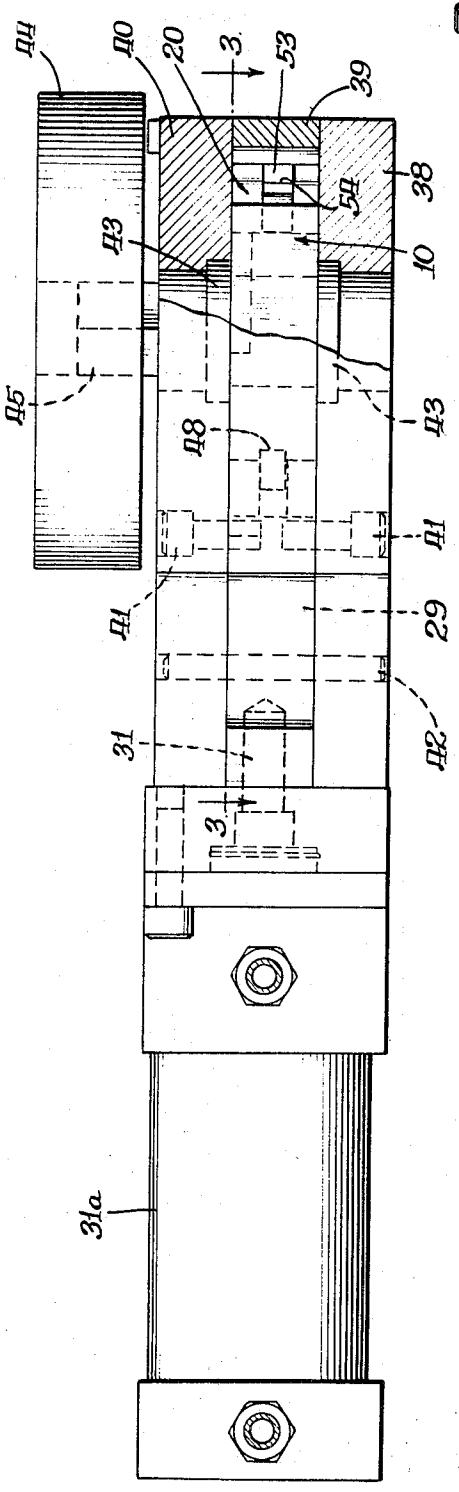


Fig. 2.

Inventor:
Arthur R. Gregersen
By:
Darbo, Robertson & Vandenburgh
Atty's.

United States Patent Office 3,548,684 Patented Dec. 22, 1970

3,548,684

ROTARY INDEXING MECHANISM

Arthur R. Gregersen, Hinsdale, Ill., assignor to Ty Miles, Inc., Westchester, Ill., a corporation of Illinois

Filed Mar. 28, 1969, Ser. No. 811,491
Int. Cl. B23b 29/32
U.S. Cl. 74—822 4 Claims

ABSTRACT OF THE DISCLOSURE

An indexing mechanism has a polygonal block rotatable about an axis through its midpoint. When a driving and locking plunger is withdrawn, a finger presses against one side of the block to rotate the block slightly so that a corner of the block is in the path of the plunger. The plunger then moves towards the block pushing on the said corner and rotating the block to its next dwell position where it is held by the plunger being pushed against a face of the block by a fixed wedge on the opposite side of the plunger.

SUMMARY OF THE INVENTION

The present invention relates to a simple, positive acting, rotary indexing mechanism in which the rotary portion is securely locked against movement in each of its dwell positions.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is an isometric, schematic view of an embodiment of the invention;

FIG. 2 is a side elevation, partially broken away, of a complete embodiment in accordance with the schematic illustration of FIG. 1;

FIG. 3 is a partial section as viewed at line 3—3 of FIG. 2; and

FIG. 4 is a partial plan view of a modification of the embodiment of FIGS. 2 and 3.

DESCRIPTION OF SPECIFIC EMBODIMENT

The following disclosure is offered for public dissemination in return for the grant of a patent. Although it is detailed to ensure adequacy and aid understanding, this is not intended to prejudice that purpose of a patent which is to cover each new inventive concept therein no matter how others may later disguise it by variations in form or additions or further improvements. The claims at the end hereof are intended as the chief aid toward this purpose; as it is these that meet the requirement of pointing out the parts, improvements, or combinations in which the inventive concepts are found.

There is a control block or body, generally **10**, which has cylindrical bosses **11** on the opposite sides **12** thereof so that it may be mounted for rotation about an axis **13**. Block **10** has four faces **15–18**. The number of such faces is determined by the number of "stops" or "dwells" that the indexing mechanism is to have, the two being equal. The illustrated embodiment, with four faces **15–18**, is to have four stops or dwells.

A plunger, generally **20**, is mounted for movement along a path as indicated by arrows **21**. Plunger **20** has a finger **22** positioned to be urged against block **10** by the pressure of spring **23**. Spring **23** bears against a fixed member **24**. Plunger **20** also has a second finger **25** with a camming surface **26** on the end thereof.

A locking block or plunger **29** is mounted for movement along a path, as indicated by arrows **30**. Plunger **29** is connected to a piston rod **31** of air cylinder **31***a*. Plunger **29** has a camming face **32***a* positioned to cooperate with camming surface **26** and a cam face **32***b* to cooperate with a fixed cam **33** having a cam face **34**.

The operation of the apparatus is as follows. FIG. 1 illustrates the locking block **29** in approximately the withdrawn position so that control block **10** is free to rotate about axis **13**. Under these circumstances, control block **10** is rotated a short distance in a clockwise direction by reason of the outward movement of plunger **20** under the urging of spring **23**. This movement causes corner **35**, between faces **16** and **17** of block **10**, to be positioned in the path of movement of locking block **29**. Cylinder **31***a* is then actuated to cause locking block **29** to move toward control block **10**. In doing so, locking block **29** comes into contact with face **16** since corner **35** has been moved out into the path **30** of the locking block. The continued movement of locking block **29** rotates control block **10** in a clockwise direction. As the control block **10** approaches its next dwell position, the cam face **32***a* contacts the camming surface **26** to cause plunger **20** to move toward fixed member **24**, compressing spring **23**. Thereafter, camming face **32***b* comes in contact with the cam face **34** of cam **33** so that control face **36** of locking block **29** is forced into face to face contact with face **16** of control block **10**. This wedging of the locking block between cam **33** and one of the faces **15–18** of control block **10** insures that block **10** is securely held against rotation during the "dwell" period.

Upon the completion of the dwell period (whatever length of time may be desired), air cylinder **31***a* is reactivated to move the piston rod **31** and the locking block **29** to the left, away from control block **10**. This movement initially releases plunger **20** so that it is urged against control block **10** by spring **23**. However, any rotation of the control block **10** is prevented by locking block **29** until the face **36** of the locking block clears the corner between one of the pairs of faces **15–18**. As soon as that corner is cleared, rotation of the control block **10** in a clockwise direction is commenced by plunger **20**, and is continued by the return movement of locking block **19** towards plunger **20**.

A number of advantages of this form of structure and operation will be apparent to those skilled in the art. One of the principal advantages is the rigidity with which the rotating control block **10** is held during the dwell period. While there are many types of indexing mechanisms, e.g., Geneva drives, rotating cams, etc., there are few that are so constructed that they will resist substantial forces which may be present during a dwell period and which act in a direction such as to try to cause the rotary movement of the indexing mechanism. While in many instances the force may not be sufficient to actually break any parts, it may be sufficient to cause some displacement of the indexed table or the like. Obviously, any such displacements are disadvantageous because they will result in inaccuracies in the operations being performed.

Another advantage of the apparatus is that, if there is bearing wear, this will not result in a general "sloppiness" of the index table. To the contrary, the bosses (that form the shaft of the rotating element and fit in the bearings) are always pushed to one side of the bearing. To the extent that there is any bearing wear, it will always appear at one side, so far as the indexing table is concerned, during the dwell period and can be more readily compensated for since it is not erratic in direction and amount. A further advantage is the simplicity of operation. Only one driving element, illustrated as air cylinder **31***a* in FIG. 1, is required. While an air cylinder is illustrated, this could be any sort of a motor apparatus which would provide a relatively linear movement to locking block **29**. Another advantage is the ease of timing, or of changing the lengths of the dwell periods and of the intermediate, rotating periods. It will be apparent to those skilled in the art that easily adjusted electric cycle timers can be employed to control air cylinders.

FIGS. 2 and 3 are more further illustrations of a specific embodiment according to the principles described in connection with FIG. 1. In this embodiment there is a frame formed by essentially three components, a bottom plate **38**, a middle plat **39**, and a top plate **40**. These plates are held together with various screws **41** and dowels **42**. The bosses **11** of the control block **10** are journaled in suitable bearings **43** in plates **38** and **40**. The table **34** to be indexed is secured to a square boss **45** formed as a part of control block **10**.

At the corner of locking block **29**, which is urged into control block **10** during the rotation of the latter, there is inset a rotatable roller to reduce friction and wear. Similarly, the finger **22** of plunger **20** has a rotatable roller **49** to reduce wear in its contact with control block **10**. The abutment **24**, against which spring **23** seats, is made adjustable by making it a part of a threaded member **50**. A dowel pin **51** secured to frame **38–40** fits in a slot **52** in plunger **20** so as to limit the extent of movement of the plunger. A guide **53**, forming a part of middle frame plate **39**, fits in a slot **54** in plunger **20**.

FIG. 4 illustrates a modification wherein plunger **20** is actuated by a controllable power means, such as an air cylinder **58**. The piston rod **59** is secured to plunger **20**, as by means of the two being threaded together. When it is desired to start the movement of control block **10**, as between dwell periods, the air cylinder **58** is actuated so as to move plunger **20** to the right in FIG. 4 and give a slight initial movement to control block **10**. Immediately thereafter plunger **20** is retracted by air cylinder **58** so that the control block **10** is free to rotate under the urging of locking block **29**, as hereinbefore described. Of course, other suitable motor means can be used in place of air cylinder **58**.

I claim:

1. A rotary indexing mechanism wherein X number of dwell stops are required, said mechanism including:

a frame;

a control block mounted on said frame for rotation about an axis, said block having X number of faces positioned in a contiguous series about said axis with each face being approximately parallel to said axis, said control block defining corners between adjacent faces thereof which corners are at a greater radial distance from said axis than are the remainder of said faces;

a fixed block mounted on said frame and having a face in spaced relationship to one of said faces of the control block;

a moving block mounted on the frame for movement along a path and having two faces, one of which is in contact with said face of the fixed block and the other of which is in contact with said one face of the control block with said faces being so positioned that said control block is locked against rotation;

power means mounted on the frame and connected to said moving block to withdraw the moving block from said locking position in which the faces thereof are in contact with faces of the other blocks to a displaced position; and

movable means mounted on said frame, positioned at least 90° from said path and movably contacting said control block to initiate rotation of said control block when said moving block is in the displaced position whereby one of the corners thereof is moved into said path, said moving block having a portion which contacts said one corner as the moving block returns

to its locking position to rotate the control block to the next dwell position.

2. A mechanism as set forth in claim **1**, wherein the face of the fixed block and said one face of said moving block are angularly positioned with respect to said other face of said moving block so that the moving block is wedged toward the control block as the moving block approaches its locking position from the displaced position.

3. A mechanism as set forth in claim **1**, wherein said movable means is resiliently urged toward said control block and is movable along a second path angularly positioned with respect to the path of the moving block, said movable means having a finger contacted by said moving block when the latter is in the locking position to restrain the movable means from exerting pressure on the control blocks, said moving block moving away from said finger as the moving block goes to its displaced position whereby the movable means contacts said control block and commences the rotation thereof away from its dwell position.

4. A rotary indexing mechanism including:

a frame;

a control body having two generally parallel sides spaced from each other, said body being bounded by a plurality of faces extending between said sides and angularly positioned with respect to each other, said body being positioned in said frame for rotation about an axis normal to said sides and equidistant from said faces, the angular intersections between said faces forming corners which protrude farther from said axis than does the remainder of the faces, said body having a number of dwell positions with respect to said frame, which number of positions is equal to the number of said faces;

a plunger mounted on the frame for movement in a first path toward and away from an outer portion of one of said faces when the body is in a dwell position and generally in a plane intersecting the body between said sides, said plunger being urged toward said portion to contact the portion and initiate movement of the body away from the dwell position; and

locking block means having a locking fame, said block means being movable along a second path between a displaced position at which the body can rotate free of contact by the block means and a locking position at which said locking face is in juxtaposition to one of the body faces when the latter is in the dwell position, said second path being so positioned that as the block means moves from the displaced position toward the locking position the block means will contact a corner of the control body which has been displaced from the dwell position by the plunger and rotate the control body to a dwell position when the block means reaches the locking position with the control body thereafter remaining in the dwell position until the block means returns substantially to the displaced position.

References Cited

UNITED STATES PATENTS

2,933,930	4/1960	Huhn	74—817(UX)
2,972,487	2/1961	Blackburn	74—822X

FOREIGN PATENTS

869,177	5/1961	Great Britain	74—825

FRED C. MATTERN, JR., Primary Examiner

F. D. SHOEMAKER, Assistant Examiner