

Dec. 26, 1950

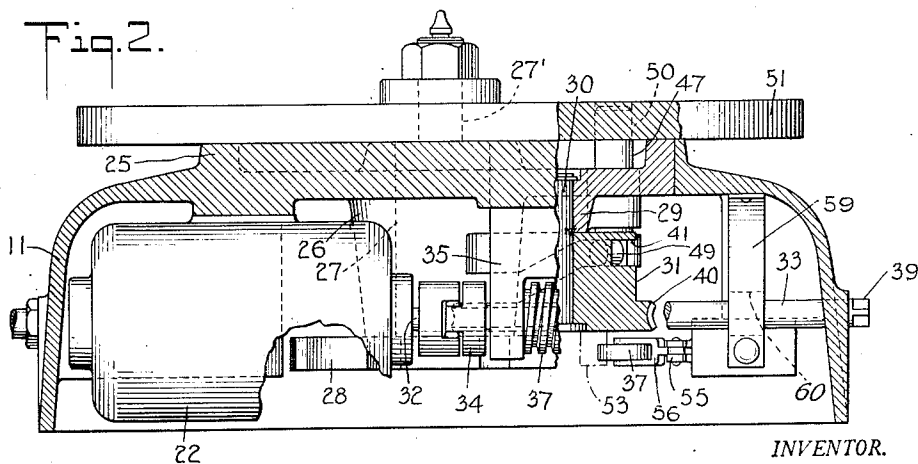
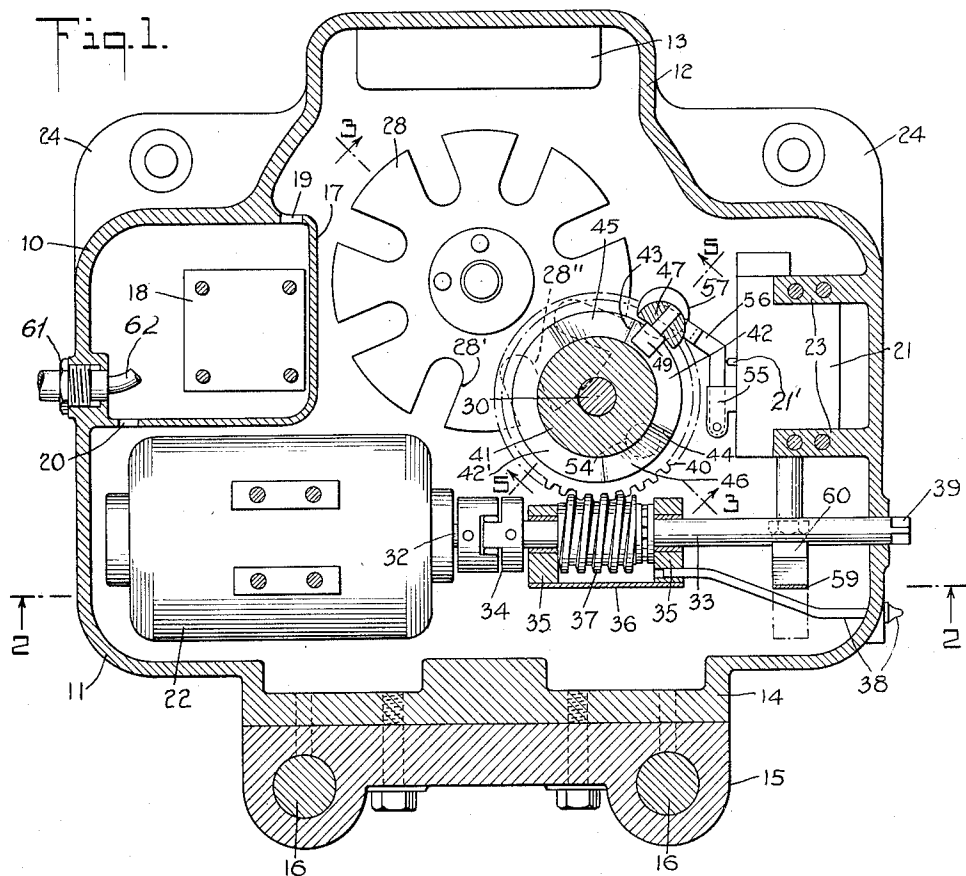
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2,535,490

AUTOMATIC ELECTRIC INDEX FIXTURE

Filed May 20, 1949

2 Sheets-Sheet 1



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2,535,490

AUTOMATIC ELECTRIC INDEX FIXTURE

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Application May 20, 1949, Serial No. 94,340

8 Claims. (Cl. 192—2)

1

This invention relates to index fixtures for use in conjunction with various types and kinds of machines for intermittently positioning workpieces in a machine in automatically performing one or more operations on the workpieces. More particularly, the invention deals with a fixture of the character described, wherein positive means is employed for moving the workpiece table keypin into operative and inoperative positions in the successive indexing operations of the table. Still more particularly, the invention deals with a fixture of the character described having means for automatically braking the motor shaft in holding the fixture at rest during the period of performing operations upon workpieces actuated by the fixture.

The novel features of the invention will be best understood from the following description, when taken together with the accompanying drawings, in which certain embodiments of the invention are disclosed and, in which, the separate parts are designated by suitable reference characters in each of the views and, in which:

Fig. 1 is a sectional plan view of a fixture made according to my invention, omitting the electric wiring employed.

Fig. 2 is a section substantially on the line 2—2 of Fig. 1 showing part of the construction in elevation and with parts broken away.

Fig. 3 is a section substantially on the line 3—3 of Fig. 1 on an enlarged scale and with part of the structure in elevation.

Fig. 4 is a diagrammatic view illustrating the wiring diagram; and

Fig. 5 is a partial section on the line 5—5 of Fig. 1.

My present invention is an improvement of the invention shown and described in my prior application, Serial Number 75,770; filed February 11, 1949 and the present invention deals primarily with the method of actuating the keypin and the means for braking the motor shaft and change in the wiring consistent with the new structure employed.

In illustrating my invention, I have shown in Figs. 1 and 2 of the drawing a unitary casing 10, substantially similar to the casing of my prior application and this casing houses the operative parts of the fixture. The casing 10 is open at the bottom, as will appear from a consideration of Fig. 2 and the casing has side walls 11 of the general cross-sectional form, seen in Fig. 1 of the drawing, the walls being offset, as seen at 12, for support of a capacitor 13.

Another offset wall 14 is opposed to the wall

2

12 and to this latter wall is secured a bracket 15 for support of guide rods 16 to position the fixture in a machine. The left side of the casing 10, as seen in Fig. 1, has a box-shaped compartment 17 in which is disposed an electric relay mechanism diagrammatically shown in Fig. 4 at 18 and blankly outlined in Fig. 1.

The compartment 17 has openings 19 and 20, through which circuit wires extend to the capacitor 13, a combination micro-switch and solenoid 21 and an electric motor 22. The micro-switch 21 is supported in a bracket portion 23 in the casing at the right thereof, as seen in Fig. 1. The lower portion of the casing has flange portions 24 at the corners thereof, for additional mounting in connection with the table or base-plate of a machine. The top of the casing has a rather heavy supporting plate 25, note Fig. 2, in connection with which the motor 22 is hung, the plate having a bearing portion 26 for a shaft 27 of a Geneva-type indexing element 28. The top 25 of the casing also has a depending bearing portion 29 for the shaft 30 of a drive unit 31.

A motor shaft 32 is coupled with a worm gear shaft 33 to a flexible coupling 34. The shaft 33 is mounted in another depending fork-shaped bearing 35 having a partial housing 36, note Fig. 1, for retention of lubrication therearound, particularly to lubricate the worm 37 on the shaft within said housing. The housing 36 is removed in the showing in Fig. 2 in order to clearly illustrate the worm 37. Means for lubricating the housing 36 externally of the casing is seen at 38. It will be noted that the shaft 33 extends externally of the casing terminating in a square or angular end 39, whereby a crank or other tool can be utilized to turn the shaft manually whenever desired. On the shaft 30 is arranged a worm gear 40 which meshes with the worm 37.

The worm gear 40 comprises part of the drive unit 31. Another part of the unit includes a cam groove 41 having a raised portion 42, which extends between the positions 43, 44, as noted in Fig. 1 of the drawing. Leading up to the ends 43, 44 are bevelled surfaces 45 and 46 which join the lower surface 42' of the cam groove with the upper surface 42 thereof. The cam groove 41 controls operation of a plunger keypin 47, note Fig. 5. The pin 47 is mounted in a bushing 48, secured in the top wall 25, the pin carrying, at its lower end, a stud 47' supporting a roller 49 which operates in the cam groove 41 to control movement of the pin 47 into and out of a series of circumferentially

spaced apertures or sockets 50 in an index plate 51 of the machine.

The plate 51 is mounted for free rotation around a reduced end 27' of the shaft 27 in moving a workpiece or a series of workpieces on the plate 51 with respect to a forming tool of a machine. In Fig. 4 of the drawing, an upper portion of a tool is diagrammatically seen at 52.

In Fig. 5 of the drawing, the pin 47 is shown in a recess or socket 50 to key the plate 51 against rotation. The roller 49 of the pin is disposed in the cam groove 42.

Carried by and protruding from the lower surface of the drive unit 31, or the worm gear 40 thereof, is a stud 53, upon which is mounted a roller 54, note Fig. 3. The roller 54 is adapted to enter successive notches 28' of the indexing element 28 in intermittent rotary shifting of the plate 51 for indexing the work thereon. In Fig. 1 of the drawing, the roller 54 is shown in a position preparatory to entering the notch or recess 28'' of the element 28, the plunger keypin 47 being still in the raised position. As the gear 40 is rotated, the drive pin of the gear, represented by the stud 53 and roller 54, will start to enter the recess 28'' as and when the plunger keypin 47 has reached its lowermost position and disengages the plate 51. Continuation of rotation of the gear 40 will cause the element 28 to be actuated one step, at which time, the drive pin will move out of the recess 28'' and the keypin 47 will again be moved into raised position by movement of the roller 49 onto the raised surface 42 of the cam groove.

Supported in conjunction with the micro-switch and solenoid unit 21 on a bracket 55 is a pivoted arm 56 carrying, at its free end a roller 57. Suitable means is provided to maintain the arm 56 and roller 57, such for example as the spring not shown, in operative position as, in other words, with the roller 57 in the path of movement of the drive pin 53 or the roller 54 thereon.

It will thus be seen that, as the drive pin passes the roller 57, the arm 56 is swung to the right to actuate a micro-switch element 21' for purposes later described. This action takes place when the roller 49 is able to ride onto the inclined surface 45. At this instance, actuation of the micro-switch 21' will break the circuit to the motor 22 and, at the same time, actuate the solenoid 58 diagrammatically seen in Fig. 4 of the drawing, which operation will move a brake arm 59 to move the brake shoe 60 on the arm into engagement with the shaft 33 so as to brake rotary movement of the motor shaft to bring the roller 49 to a stop position on the surface 42, substantially as seen in Fig. 1. In some instances, the use of the brake shoe 60 and the means for actuating the same will not be necessary and sufficient frictional engagement will be provided to stop the movement of the roller 49 on the raised surface 42 at a point where the drive pin 53 is still out of engagement with a notch of the Geneva 28.

One side of the casing has a suitable fitting 61, through which circuit wires, diagrammatically seen at 62, are admitted into the box 17. These wires form a series of electric currents and are diagrammatically seen at 63 and 64 in Fig. 4 of the drawing. In this figure, the various mechanisms of the index fixture are diagrammatically shown without regard for relative positions thereof one with respect to the other. The tool 52

has a trip arm 52', diagrammatically shown for actuating a micro-switch 65.

In the diagrammatic sketch, 66 represents a foot or hand switch controlling the machine operation and, at 67, is a suitable switch solenoid mechanism used to control spindle or tool actuation. Tracing the circuit, it will appear that the wire 63 extends to a solenoid actuated switch arm 68, actuated by a solenoid 69 in the relay mechanism 18. The wire 63 also extends to the control switch 65 and to the unit 67. From the latter, a wire 70 extends to a contact 71 in the micro-switch mechanism 21. Normally the switch arm 72 of the micro-switch mechanism is in engagement with a contact 73, which leads to a contact arm 74 of the relay mechanism 18. Also in this circuit is a wire 75 which goes to the solenoid 69 and then to a circuit wire 76 which extends to the micro-switch 65 and also to a circuit wire 77 having a contact 78 adapted to be engaged by the contact plate 63 and also extending to the capacitor 13. From the capacitor 13 is a wire 79 which extends to the electric motor, another wire 77' extending from the wire 77 to the motor and from the motor is a wire 80 which extends to a contact 81 of the relay. The solenoid 58 is placed in the circuit by wires 82, 83; the wire 82 contacting the wire 80 and the wire 83 contacting the wire 77', as noted.

It will be understood that, in actuation of the solenoid 69, the circuits are completed through the plate 68 and contact 78 and the plate 74 and contact 81. The indexer is automatically actuated in the following manner, assuming that the parts are in the position, as seen in Fig. 1, and operation is being performed upon the workpiece and the tool 52 or the spindle supporting the same is being moved into raised position out-of-engagement with the workpiece.

When the arm 52 strikes the micro-switch 65 to actuate the switch, this operation will close the circuit to the relay, thus putting the electric motor 22 into operation through the capacitor 13, which automatically puts the drive unit 31 into operation. In this operation, the keypin 47 will be first released from engagement with the plate 51; then the plate will be rotated one step, controlled by the feed motion of the Geneva element 28 employed and, as this operation is completed and the pin 47 again is moved into another key socket of the plate 51, the arm 56 is tripped, as above stated, to actuate the switch element 21' of the micro-switch 21, causing the contact 72 to move into engagement with the contact 71, thus closing the circuit to the control switch 67 to again put the machine driving the tool 52 into operation. In the movement of the contact 72 into engagement with the contact 71, circuit is broken through the contact 73, thus automatically breaking the motor circuit, causing the motor to come at rest, whereupon the contact 72 is again moved into the closed circuit position with the contact 73, preparatory to the next descending operation of the tool 52. In other words, when the tool again reaches its raised position, the micro-switch 65 will again be actuated to repeat the above-described operation. Control through the switch 66 may be automatic or, this switch can be manually operated in each intermittent actuation of the element 22, depending entirely upon the type of work being performed on the machine or the degree of automatic operation which may be required.

In the above-described operation, if the brake mechanism is employed or, in other words, the

5

solenoid 58 and its circuit wires, then it will be apparent that, when the motor circuit is broken, the solenoid circuit is broken, allowing the brake mechanism to actuate.

It will be apparent that my improved apparatus or index fixture can be utilized in connection with machines of any type or kind for intermittent rotary feed of workpieces of any type or kind, regardless of the manner of performing operations thereon. In other words, a machine of this kind can be utilized where operations on the workpiece are performed by hand, in which event, suitable controls will be provided for intermittent actuation of the motor and feed of the work supporting table or plate 51.

Having fully described my invention, what I claim as new and desire to secure by Letters Patent is:

1. An apparatus of the class described comprising a casing, a workpiece supporting plate rotatably mounted on the casing, a Geneva engaging said plate for imparting intermittent rotation thereto, a drive unit for actuating said Geneva, said unit having worm gear, means comprising a motor driven worm engaging said Geneva, gear for intermittently operating said Geneva, said unit including a cam portion, a lock pin slidably mounted in the casing and directly actuated by the cam portion of said unit to control movement of the lock pin into operative and inoperative position with respect to said plate in intermittently retaining the plate in predetermined position, and means comprising a switch in the casing adjacent said unit and in electric circuit with said motor and actuated by said unit to control intermittent drive of the unit.

2. An apparatus of the class described comprising a casing, a workpiece supporting plate rotatably mounted on the casing, a Geneva engaging said plate for imparting intermittent rotation thereto, a drive unit for actuating said Geneva, said unit having worm gear, means comprising a motor driven worm engaging said Geneva, gear for intermittently operating said Geneva, said unit including a cam portion, a lock pin slidably mounted in the casing and directly actuated by the cam portion of said unit to control movement of the lock pin into operative and inoperative position with respect to said plate in intermittently retaining the plate in predetermined position, means comprising a switch in the casing adjacent said unit and in electric circuit with said motor and actuated by said unit to control intermittent drive of the unit, and means externally of the casing controlling the electric motor circuit.

3. An apparatus of the class described comprising a casing, a workpiece supporting plate rotatably mounted on the casing, a Geneva engaging said plate for imparting intermittent rotation thereto, a drive unit for actuating said Geneva, said unit having worm gear, means comprising a motor driven worm engaging said Geneva, gear for intermittently operating said Geneva, said unit including a cam portion, a lock pin slidably mounted in the casing and directly actuated by the cam portion of said unit to control movement of the lock pin into operative and inoperative position with respect to said plate in intermittently retaining the plate in predetermined position, means comprising a switch in the casing adjacent said unit and in electric circuit with said motor and actuated by said unit to control intermittent drive of the unit, means externally of the casing controlling the electric motor cir-

6

cuit, and an automatically actuated brake element in the casing and operatively engaging the shaft of the worm for checking rotation of the motor in stopping action of said unit.

4. An index fixture of the character described comprising a casing, a table mounted for intermittent rotary movement on said casing, indexing mechanism within the casing for intermittently actuating said table and to key the table in a plurality of indexing positions, said indexing mechanism including an electric motor, means comprising a switch in the casing adjacent said indexing mechanism and automatically actuated by said indexing mechanism to break the circuit to said motor in intermittently stopping actuation of said mechanism, means comprising a switch externally of the casing for completing the circuit to said motor to actuate said indexing mechanism, the table keying means of said mechanism comprising a pin, and said mechanism including a cam positively moving said pin into operative and inoperative positions.

5. An index fixture of the character described comprising a casing, a table mounted for intermittent rotary movement on said casing, indexing mechanism within the casing for intermittently actuating said table and to key the table in a plurality of indexing positions, said indexing mechanism including an electric motor, means comprising a switch in the casing adjacent said indexing mechanism and automatically actuated by said indexing mechanism to break the circuit to said motor in intermittently stopping actuation of said mechanism, means comprising a switch externally of the casing for completing the circuit to said motor to actuate said indexing mechanism, the table keying means of said mechanism comprising a pin, said mechanism including a cam positively moving said pin into operative and inoperative positions, and means within the casing of the fixture operatively engaging a motor driven shaft to check rotation of said shaft in movement of the pin into operative position.

6. An index fixture of the character described comprising a casing, a table mounted for intermittent rotary movement on said casing, indexing mechanism within the casing for intermittently actuating said table and to key the table in a plurality of indexing positions, said indexing mechanism including an electric motor, means comprising a switch in the casing adjacent said indexing mechanism and automatically actuated by said indexing mechanism to break the circuit to said motor in intermittently stopping actuation of said mechanism, means comprising a switch externally of the casing for completing the circuit to said motor to actuate said indexing mechanism, the table keying means of said mechanism comprising a pin, said mechanism including a cam positively moving said pin into operative and inoperative positions, means within the casing of the fixture operatively engaging a motor driven shaft to check rotation of said shaft in movement of the pin into operative position, and means automatically controlling actuation of said last named means.

7. An index fixture of the class described comprising a casing, a workpiece supporting table rotatably mounted on the casing, a drive unit in the casing, said unit comprising a drive pin and a cam, means comprising an electric motor for intermittently actuating said unit, a member intermittently engaged by the drive pin for imparting intermittent rotary movement to said

7

table, a key pin directly actuated by said cam for movement into and out of key position with the table, a switch mechanism in an electric circuit to said motor, said mechanism including a switch element adjacent and automatically actuated by said unit controlling intermittent operation of the unit and said table.

8. An index fixture of the class described comprising a casing, a workpiece supporting table rotatably mounted on the casing, a drive unit in the casing, said unit comprising a drive pin and a cam, means comprising an electric motor for intermittently actuating said unit, a member intermittently engaged by the drive pin for im-

8

parting intermittent rotary movement to said table, a key pin directly actuated by said cam for movement into and out of key position with the table, a switch mechanism in an electric circuit to said motor, said mechanism including a switch element adjacent and automatically actuated by said unit controlling intermittent operation of the unit and said table, and electrically actuated brake means in said circuit for automatically stopping rotation of the unit in movement of said key pin into inoperative position.

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No references cited.