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INDEX PLUNGER

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The present invention relates to new and useful improvements in locating means and more particularly to an index plunger assembly which can be either manually or automatically operated.

An object of the present invention is the provision of an index plunger assembly which is simple, durable and inexpensive, thereby bringing said invention within the economic reach of the entire tool and metal working industry.

Another object of this invention is the provision of a device wherein a minimum number of parts are used, which in turn reduces its manufacturing cost and maintenance.

Still another object of this invention is the provision of a compact, efficient device which can be quickly and accurately positioned, with a minimum amount of effort and motion either manually or automatically.

Another object of the present invention being the provision of a device, wherein the location of the actuating handle is determined by the location of the body proper.

Still another object of the present invention is the provision of a device where the body is rigidly fixed in a predetermined position so as to eliminate rotation of the body when the actuating handle is rotated.

Another object of the present invention is the provision of a device wherein a first pair of flat cam surfaces are provided to actuate the plunger and a second pair of flat cam surfaces are provided to maintain the plunger in a retracted position.

The foregoing and related objects can be accomplished by the provision of an index plunger assembly having a pair of cylinders having opposed bevelled or inclined ends comprising cam surfaces; an opening through the central axis of said cylinders; a flange on the base of the first truncated cylinder body; a counterbore extending into said first body portion, from the flanged base, and concentric with the central axis; an annular land section in said first body to form a spring seat therein; a plunger shaft with an enlarged end portion slidably positioned within said axial opening of said first body portion; a coiled compression spring interposed between said enlarged end portion of said plunger and said spring seat; said second cylinder inverted on the end of said plunger shaft to permit engagement of the plane cam surfaces therebetween; said plunger shaft affixed to said second cylinder so as to limit the extension of said plunger; a handle affixed to said second cylinder; a flat cam located on the high portion of each of said cam surfaces and in parallel relationship to the respective ends of the body portions; positioning means on said flange to locate said handle with relation to said plane cam surfaces; rotation of said handle to retract said plunger flush with the base of said flange.

Other objects of this invention will appear in the following description and appended claims, reference being had to the accompanying drawings forming a part of this

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specification wherein like reference characters designate corresponding parts in the several views.

In the drawings:

Fig. 1 is a cross-sectional view through an index plunger assembly embodying the present invention.

Fig. 1A is a side elevational view of the device illustrated in Fig. 1 wherein the handle is rotated 180 degrees.

Fig. 2 is a bottom plan view of the index plunger assembly shown in Fig. 1 with the bushing plate removed.

Fig. 3 is a partial sectional view of a modified plunger construction.

Before explaining the present invention in detail, it is to be understood that the invention is not limited in its application to the details of construction and arrangement of parts illustrated in the accompanying drawings, since the invention is capable of other embodiments and of being practiced or carried out in various ways. Also, it is to be understood that the phraseology or terminology employed herein is for the purpose of description and not of limitation.

Referring to the drawings, Fig. 1 is a cross-sectional view of an index plunger assembly 10 embodying the present invention. The index plunger assembly 10 is mounted on a rotatable index plate 12. The plunger member 14 is shown extended into a bushing 16, which is mounted on a fixed locating plate 18.

The index plunger assembly 10 is composed of seven parts, namely a first cylindrical body portion 20, a second cylindrical portion 22, a plunger member 14, a spring 26, a pin 28, a handle 30 and a positioning screw 32. The plunger member 14 is slideably mounted in the cylindrical body portion 20 and actuated by the handle member 30, secured to the second portion 22.

To best understand the operation of the present invention, each part will be described in detail and then described with relationship to the other parts.

The plunger member 14 is of generally cylindrical shape and has an enlarged end section 34 located on the bottom or base of plunger shaft 24. A large chamfer 44 is cut on the enlarged lower end section 34, while a small chamfer 54 is cut on the opposite end of the plunger shaft 24. Immediately below chamfer 54 and on the center line of the plunger shaft 24, is a round opening which extends through the shaft. At the intersection of plunger shaft 24 with the enlarged end section 34 is an annular flat flange or land portion 74.

The first cylindrical body 20 has a bevelled or inclined cam surface 40 located on the upper reduced diameter 21 thereof and a thickened flange section 50 located on the lower end. The cam surface 40 extends at an angle of approximately 30 degrees to a plane which is generally transverse to the longitudinal axis of the cylindrical body 20. A round opening 60 extends coaxially through said cylinder body 20. A counterbore 70, concentric with the opening 60, extends upwardly from the flange 50 and terminates in an annular land section 80. Another opening 90, which has a step therein, is located in the flange 50. The opening is perpendicular to flange 50 and positioned below the lowermost point 100 of said inclined cam surface 40 in said first body portion 20. At the high portion of the cam surface 40 180 degrees removed from the lowermost point 100 of said cam surface 40, is a flat horizontal cam 110 which is in parallel relationship to the base 120 of flange 50.

The second cylindrical body section 22, has a bevelled or inclined cam surface 32a associated therewith and which extends at an angle of approximately 30 degrees to a plane which is generally transverse to the longitudinal axis of said body section. A round opening 62 extends coaxially through said second cylindrical section 22 and intersects the flat top section 52 at right angles. A

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chamfer 42 is cut on the outside diameter of the end of the cylindrical section 22, while a flat horizontal cam section 72 is cut from the high portion of cam surface 32a and hence from the longest edge of said cylindrical section 22. The flat horizontal cam 72 is located in parallel relationship to the top portion 52 of the second cylindrical body portion 22. Immediately above said horizontal flat cam section 72, is a threaded opening 82 which intersects the axial opening 62. In the same plane, and at right angles thereto, is another opening 92 which goes completely through both walls of the second cylindrical body portion 22.

The spring 26, used in the present device is a conventional coiled compression spring which may be made of round, square, etc. wire, while pin 28 which holds the unit in the assembled condition, may be of straight or tapered configuration. The socket head screw 32 used in the present device is also of conventional design and commercially available.

The handle portion 30 is made from a rod 31 which is threaded at 41 and has a knob portion 51 on the opposite end thereof.

Figure 1 illustrates an index plunger assembly 10 mounted in an index plate 12. An irregular opening 11 is cut from the index plate 12 to receive the body 20 and accommodate flange 50. The reduced diameter 21 of the cylindrical body portion 20 is provided to eliminate excessive frictional contact of the parts which in turn permits more rapid and simplified assembly of the unit.

The index plunger 14 has assembled over shaft 24 thereon, a coiled compression spring 26. The plunger member 14 and the coiled compression spring 26 are assembled through the central opening 60 in the first cylindrical body portion 20. Plunger shaft 24 also extends through opening 62 in the second cylindrical body 22. A straight or tapered pin 28 is assembled through opening 92 in the second body portion 22 and then through opening 64 in the plunger shaft 24 to hold the device together in the assembled position. The coiled compression spring 26 reacts against spring seats 74 and 80 exerts a downward pressure on plunger member 14, while maintaining the truncated cam surfaces 32 and 40 in engagement.

The threaded portion 82 in the second cylindrical body portion 22 has the threaded handle 30 threadedly affixed thereto. As will be readily appreciated from Figure 2 of the drawings, the relationship of socket screw 32 determines the direction of the handle 30, since screw 32 is in alignment with the handle 30 in the closed or extended position.

The chamfer 44 on the base of plunger 14 acts as a finder for bushing 16 should any misalignment or overshooting occur during actual usage of the device in an index table.

Fig. 1A illustrates the inner relationship of horizontal flat cam surfaces 72 and 110. Rotation of handle 30 in either direction causes cam surfaces 32a and 40 to cooperate and retract plunger member 14 against the action of compression spring 26. When the horizontal flat cam surfaces 72 and 110 are engaged, the plunger member 14 will remain retracted as shown. Rotation of handle 30 disengages the horizontal flat cam surfaces 72 and 110 causes compression spring 26 to extend plunger member 14 as illustrated in Fig. 1.

Fig. 3 illustrates a construction similar to Fig. 1 wherein plunger 214 is used along with a tapered bushing 216. Bushing 216 being mounted in a locating plate 218. The tapered plunger 214 is housed in a cylindrical truncated body 220 which has a flange portion 250 positioned in a movable index plate 212. The positioning of the cylindrical body 220 is accomplished in the same manner as above described, that being by use of a socket head screw 232.

In the event that manual operation of the above index

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plunger assembly 10 is not desired, a clevis or other suitable device (not shown) could be substituted for the knob 51 and automatic mechanical actuation could be substituted.

From the foregoing description it will be apparent to one skilled in the art that the above device is simple, inexpensive and durable. It can be actuated either manually or automatically with a minimum of time and effort. The device when used and positioned properly will give long and satisfactory service to its user.

Having thus described my invention, I claim:

1. In a locating device, the combination of a first hollow body portion; a flange section on one end thereof; a first surface forming a cam on the opposite end of said body; a second hollow body portion; a second cam surface on said second hollow body portion; said cam surfaces being inclined with respect to a plane which is generally transverse to the longitudinal axes of said first and second body portions, each of said cam surfaces having a high portion, a plunger shaft extending through the first and second hollow body portions; a spring interposed between said plunger shaft and said first body portion; said plunger shaft being affixed to said second hollow body portion so as to limit the extension of said plunger shaft and maintain said first and second cam surfaces in engagement; a flat horizontal cam located on the high portion of each of said inclined cam surfaces and in parallel relationship to the respective ends of said body portions; a handle affixed to said second hollow body portion, rotation of said handle 180 degrees in either direction causing retraction of said plunger shaft.

2. In a locating device, the combination of a first hollow cylindrical body portion; a flange section on one end thereof; a first angular flat 360 degrees cam surface on the opposite end of said first cylindrical body; a second hollow cylindrical end portion; a second angular flat 360 degrees cam surface on said second hollow end portion; a plunger shaft extending through said first cylindrical body and said second hollow end portion; said plunger shaft having an enlarged end section; a spring interposed between said enlarged end section of said plunger shaft and said first cylindrical body portion; said plunger affixed to said second hollow end portion with a pin, so as to limit the extension of said plunger shaft and maintain said first and second flat cam surfaces in engagement; a handle affixed to said second hollow end portion, rotation of said handle 180 degrees in either direction operates to retract said plunger shaft.

3. In an index plunger, the combination of a first cylindrical body portion; a flange on one end thereof; a central bore in said first cylindrical body; a spring seat in said central bore; a first angular flat 360 degrees cam surface on the opposite end of said cylindrical body; a second cylindrical end portion; a central bore in said second cylindrical end portion; a second angular flat 360 degrees cam surface on said second cylindrical end portion; a plunger shaft having an enlarged end section extending through said central bore in said first cylindrical body portion and through the central bore in said second cylindrical end portion; a compression spring interposed between said enlarged end of said plunger shaft and said spring seat in said central bore of said first cylindrical body; one end of said plunger shaft affixed to said second hollow end portion with a pin, so as to limit the extension of said plunger shaft and maintain said first and second flat cam surfaces in engagement; a handle affixed to said second hollow end portion, rotation of said handle 180 degrees in either direction operates to retract said plunger shaft.

4. In an index plunger the combination of a first cylindrical body portion; a flange on one end of said body and at right angles thereto; a round opening in the edge of said flange; a central bore in said first cylindrical body portion; a step in said central bore which forms a

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spring seat; a first angular flat cam surface extending at approximately 30 degrees with respect to a plane which is generally transverse to the longitudinal axis of said first body portion on the opposite end of said cylindrical body, the lowermost part of said flat cam being in alignment with said round opening in said flange; a second cylinder; a central bore in said second cylinder; a second angular flat cam surface extending at approximately 30 degrees with respect to a plane which is generally transverse to the longitudinal axis of said second cylinder on said second cylinder; said flat cam surfaces cooperable with each other; a plunger shaft having an enlarged end section through and piloted in said central bore of said first cylindrical body and through the central bore in said second cylinder; a compression spring interposed between said enlarged end of said plunger shaft and said spring seat in the central bore of said first cylindrical body; the end of said plunger shaft affixed to said second hollow cylinder with a pin, so as to limit the extension of said plunger shaft and maintain said first and second flat cam surfaces in engagement; a handle affixed to said second cylinder; said handle positioned above the round opening in said flange.

5. A device as in claim 4, wherein a third flat cam surface is located on the uppermost edge of said first cam and in parallel relationship with said flange; a fourth flat cam surface located on said second cylinder and in parallel relationship with said third cam surface; rotation of said handle approximately 180 degrees to permit cooperation of said third and fourth cam surfaces to hold said plunger in a retracted position.

6. In a locating device, the combination of a first hollow body portion, a first surface forming a cam on

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an end of said first body portion, a second hollow body portion, a second cam surface on said second body portion, each of said surfaces being inclined with respect to a plane which is generally transverse to the longitudinal axes of said first and second hollow body portions, each of said cams having a high portion, a plunger shaft extending through the first and second hollow body portions, said plunger shaft being affixed to said second hollow body portion, a spring urging said first and second inclined cam surfaces into engagement with each other, means located at the high portion of each of said inclined cam surfaces for releasably holding said high portion in opposed relationship when they are moved to such relationship, and a handle affixed to at least one of said second hollow body portion and said plunger shaft, rotation of said handle about 180 degrees in either direction causing retraction of said plunger shaft.

7. A locating device according to claim 6, said rotation of said handle being effective to change the angle of said cam surfaces with respect to each other.

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