United States Patent [19]

Jatcko

[11] **3,817,510**

[45] **June 18, 1974**

[54] **CAM WEDGE SWIVEL GRIPPER HEAD**

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[52] **U.S. Cl.** ..... **269/34,** 92/30, 269/218, 269/233, 269/321 ME

[51] **Int. Cl.** **B25b 1/18,** F16j 1/00

[58] **Field of Search** ..... 269/25–27, 269/30–35, 218, 233, 321 ME; 81/128; 92/30

[56] **References Cited**

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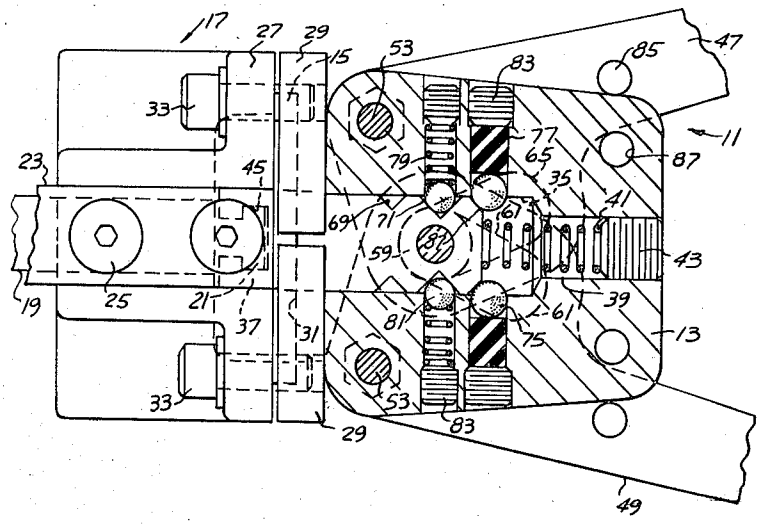
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Primary Examiner—Granville Y. Custer, Jr.
Assistant Examiner—Neil Abrams
Attorney, Agent, or Firm—Cullen, Settle, Sloman & Cantor

[57] **ABSTRACT**

A cam wedge work piece gripper head has a body receiving a power reciprocated plunger and pivotally mounted on the body opposed pairs of normally spaced apart work piece gripping arms. Opposed rollers carried by said plunger nest within angularly related cam slots in the respective pairs of arms so that forward and retracting movements of said plunger effect corresponding closing and opening movements of said pair of arms. A spring resists initial longitudinal forward movement of said plunger. Resilient detents are mounted within the gripper head body and are normally biased against said plunger yieldably resisting initial forward movement thereof and adapted on such forward movement to retainingly engage said plunger against retraction.

4 Claims, 3 Drawing Figures



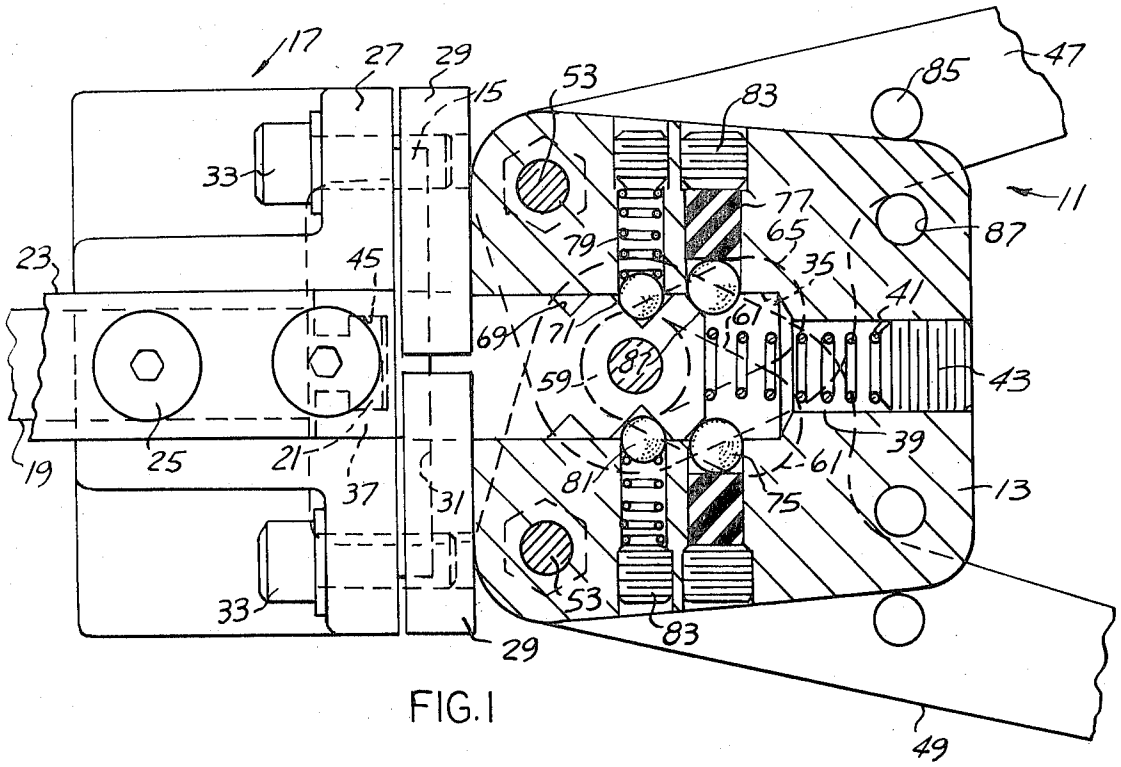


FIG. 1

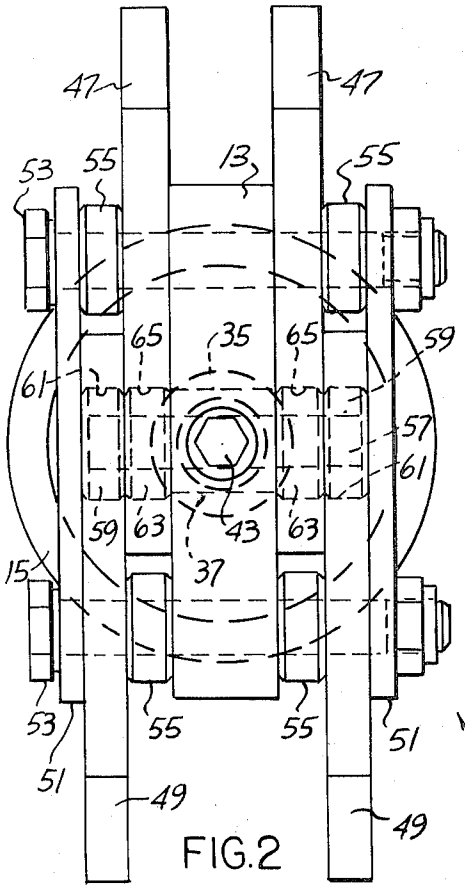


FIG. 2

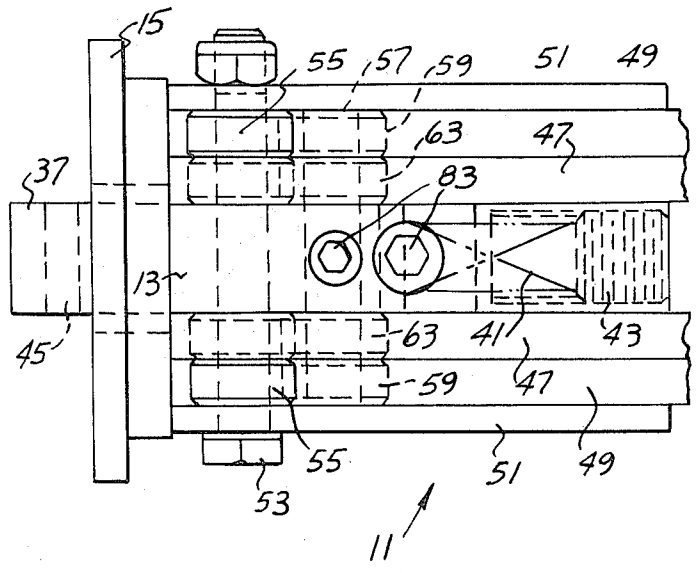


FIG. 3

CAM WEDGE SWIVEL GRIPPER HEAD

BACKGROUND OF THE INVENTION

Heretofore, gripper heads have been employed which include within a body upon which are mounted opposed pairs of work piece engaging arms, a reciprocal power actuated plunger together with a cam mechanism between the plunger and arms for causing opening and closing movements thereof.

BRIEF DESCRIPTION OF THE INVENTION

It is an object of the present invention to incorporate in such gripper head construction an adjustable spring means within the body and yieldably resisting initial forward movements of the plunger and to assist in return movements thereof.

It is another object to incorporate within the gripper body resilient detent means which bear against the plunger normally but yieldably resisting forward movements thereof, but which are adapted on such forward movement to further yieldably but retainingly engage said plunger.

It is another object of the present invention to incorporate with said gripper head an actuating unit in conjunction with a power operated piston rod providing a mechanism by which the gripper head body is so mounted upon the actuating unit as to be capable of rotative adjustment on a common axis throughout a range of **360** degrees without disconnecting the gripper head from the actuating unit, merely by loosening the fastening screws.

These and other objects will be seen from the following specification and claims in conjunction with the appended drawings.

THE DRAWINGS

FIG. **1** is a fragmentary partially broken away side elevational view of the present work piece gripper head and actuating unit;

FIG. **2** is a right end elevational view thereof;

FIG. **3** is a fragmentary plan view of the gripper head.

DETAILED DESCRIPTION OF THE INVENTION

Referring to the drawing, the present cam wedge swivel work piece gripper head is generally indicated at **11**, FIG. **1**, and includes an elongated body **13** having a rearwardly extending transverse mounting flange **15** of circular shape.

An actuating unit is fragmentarily shown and designated at **17** and is adapted to receive therethrough the power reciprocated piston rod **19** fragmentarily shown whose T-end **21** is adapted for interlocking axial registry with the corresponding T-slot **45** in plunger **37**, FIG. **1**.

Upon the exterior of the actuating unit there are shown fragmentarily the forward ends of a pair of opposed guide stop bars **23** secured to the actuating unit at **25** and which are adapted to extend rearwardly for sliding and mounting engagement upon a suitable hydraulic cylinder of a conventional construction from which projects piston rod **19**.

The actuating unit includes at its end an upright transverse mounting flange **27**. Loosely applied on the forward face thereof are a pair of opposed coplaner collars **29** which include each a semi-circular undercut

recess **31** adapted to supportably and adjustably receive gripper head mounting flange **15**. Suitable collar screws **33** extend through the actuating unit flange **27** for threaded securing engagement with the opposed collars **29** drawing up the same and for fixedly securing flange **15** therein in any desired axial position between **0** and **360** degrees.

Referring in detail to the cam wedge gripper head, there is provided within body **13** an elongated bore **35** which terminates in a counterbore **39**.

Reciprocal plunger **37** is nested within bore **35** and extends rearwardly as shown in FIG. **1** terminating in the T-slot formation **45** adapted for securing to the forward T end **21** of the piston rod.

Coiled compression spring **41** is nested within said counterbore and is adjustably anchored and positioned by set screw **43**.

A first pair of upper jaw arms **47** bear against opposite sides of body **13** and are pivotally mounted thereon by the pivot bolt **53**.

It is contemplated that the interior portions at the inner ends of the respective jaw arms are spanned by work piece gripping adapters which for clarity have been omitted from the illustration.

A second pair of opposed lower jaw arms **49** bear against the inner jaw arms respectively and are pivotally mounted upon said body by a second pivot bolt **53**, FIG. **2**.

The upright parallel spaced side plates **51** are arranged outwardly of and engaging the lower jaw arms **49** and are secured to the body **13** by the respective corresponding vertically spaced parallel bolts **53** and their associated fasteners.

A first pair of spacers **55** are arranged upon the upper bolt **53** and interposed between the respective upper jaw arms **47** and the corresponding side plate **51**.

Additional spacers **55** are mounted upon the lower pivot bolt **53** and are interposed between body **13** and the outer or second pair of lower jaw arms **49** to complete the assembly shown in FIG. **2**.

Transversely extending roller shaft **57** extends through plunger **37** and projects from its opposite sides and mounts adjacent its outer ends the respective outer rollers **59**, FIG. **2**, which are movably positioned within the acute angularly disposed slot **61** formed in the respective lower jaw arms **49**.

An additional pair of rollers **63**; namely, inner rollers are also mounted upon roller shaft **57** and are nested within the corresponding pair of acute angularly extending slots **65** formed within the upper jaw arms **47**.

In this construction, it is noted that the outer ends of the roller shaft **57** are in registry with the respective side plates **51**.

It is noted furthermore from FIG. **2** that respective rollers **59** and **63** on opposite sides are in engagement with each other with the inner rollers in engagement with plunger **37** and, thus, in the assembly shown, retained against accidental displacement.

Inner forward movement of the plunger **37** under the control of the power operated piston rod **19** will be against the yielding but compressive action of the coil spring **41**. Furthermore, return movement of said plunger will be assisted by said coil spring.

Resilient detent means are mounted upon body **13**, FIG. **1**, and normally extend at right angles to the plunger axis for the purpose of resisting initial forward

movement of the plunger, but primarily for the purpose of yieldably anchoring the plunger in a forwardly moved position against retraction to provide for medium holding pressure of the arms with respect to a work piece gripped therebetween.

It is contemplated as a part of the present invention that the said resilient detent means may be provided by an opposed pair of bores which extend through said body transverse to the plunger axis and within which a spring plunger is mounted and adjustably positioned so that their inner ends bear against opposite side portions of said plunger and upon forward movement of said plunger adapted to seat within corresponding detent notches **71** formed in said plunger.

It is contemplated that the resilient detent means may be in the form of an opposed pair of steel balls **75**, a resilient member such as a block of rubber or equivalent material as at **77** and an adjustable set screw **83**.

As shown in FIG. **1**, the balls **75** normally bear against the forward cam surfaces **87** on said plunger yieldably resisting initial forward movement thereof but which upon such forward movement, are adapted to retainingly nest within the opposed detent notches **71** in said plunger to provide a medium holding pressure.

The resilient members **77** may be coil springs if desired.

It is contemplated that in order to provide for maximum holding pressure that there be an additional set of resilient detent means which include the steel balls **81**, additional resilient members **79** and corresponding set screws **83**. In this case, under normal retracted position of the plunger, the balls **81** are yieldably and retainingly nested within the opposed plunger notches **71**. Upon inward projection of said plunger, balls **81** are nested within a second opposed pair of detent notches **69** in said plunger and the first set of balls **75** are nested within plunger detent notches **71** for maximum holding pressure of said plunger when in forward work piece securing position.

It is contemplated as a part of the present invention that under some circumstances, one pair of jaw arms may be held stationary against movement. For this purpose, there is provided a transverse pin which extends through the body and apertures **85** in one pair of said jaw arms such as the arms **47**, FIG. **1**. In that case, the corresponding rollers **63** would be omitted and jaw apertures **85** in registry with corresponding body aperture **87**.

Under some conditions spring **41** may be omitted.

In operation with plunger **37** projected forwardly and the jaws closed upon a workpiece, the balls **75** and **81** effectively lock the plunger and the jaws against separation.

OPERATION

Though not shown in the drawing, there is employed a hydraulic or air cylinder with a reciprocating piston connected to the piston rod **19** fragmentarily shown.

The guide stop bars **23** fragmentarily shown, being anchored to the actuating unit **17** at **25**, are at their other ends guidably and slidably mounted upon said hydraulic cylinder. Thus, when the hydraulic cylinder is energized, the initial forward movement of the piston rod **19** translates the actuating unit and the jaws while in the open position shown until the rear ends of the said guide stop bars **23** engage a stop on the cylinder. This limits the forward movement of the actuating unit **17** and the jaws, to a position, for example, adjacent a work piece in a machine tool that has just been finished or treated. Despite the fact that the actuating unit has now been stopped by the functioning of the guide bars **23**, there will, nevertheless, be an additional forward movement of the piston rod **19** approximately one inch in the same direction. It is this forward movement of the piston rod **19** relative to the actuating unit and the attached jaw assembly which causes the jaws **47–49** to close upon the work piece. It was this final longitudinal forward movement of the piston rod which moved the plunger **37** to a position forward of that shown in FIG. **1**. Thus, with the jaws closed upon the work piece, the balls **75** and **81** effectively lock the plunger in such forward position and at the same time, lock the jaws against separation.

Now upon reversal of the pressure connections to the hydraulic cylinder, the piston rod **19** begins its retracting movement. The jaws, however, remain closed so that the work piece is transported by the closed jaws to an unloading position. At that point, actuating unit **17** is again stopped mechanically. There is override again for approximately 1 inch in the same direction of the piston rod **19** now relative to the actuating unit and jaw body which overcomes the pressure of the balls with respect to the plunger so that the plunger again returns to the position shown in FIG. **1** and the jaws open, permitting the dropping of the work piece at such unloading station.

Having described my invention, reference should now be had to the following claims.

I claim:

1. A cam wedge work piece gripper head comprising a body having a longitudinal bore at one end;

a plunger reciprocally mounted in said bore and projecting from said body adapted for connection to a reciprocal piston rod;

a first pair of jaw arms bearing against opposite sides of the body at their one ends pivotally mounted on said body;

a second pair of jaw arms outwardly of and bearing against said first pair of jaw arms, at their one ends pivotally mounted on said body;

opposed parallel side plates bearing against said second pair of arms;

the pivotal mounting of said arms including a pair of spaced pivot bolts which extend through said side plates, said respective arms and said body; said bolts anchoring the side plates to said body;

the other ends of said pairs of arms projecting forwardly of said body and spaced apart adapted on closing to grip a work piece therebetween;

resilient detent means on said body yieldably engaging said plunger against initial inward movement relative to said body;

there being a detent notch on said plunger normally spaced from said detent means and adapted to operatively and retainingly receive said detent means on inward projection of said plunger;

and cam means on said plunger registerable with angularly related slot means in said arms whereby inward and outward movements of said plunger effect relative closing and opening movements of said arms;

said body rearwardly of the side plates terminating in a transverse annular flange;

an actuating unit having a body, a bore receiving said piston rod and a mounting flange;

a pair of opposed coplaner collars, each having an undercut semi-circular recess bearing against said mounting flange and positioned over a rearward portion of said gripper head body with its annular flange nested in said recesses;

fasteners between said mounting flange and collars retainingly supporting said gripper head flange in axial alignment with said actuating unit; whereby, on loosening of said fasteners, said gripper head may be rotated relative to said actuating unit in the range of 0 to 360 degrees.

2. A cam wedge work piece gripper head comprising a body having a longitudinal bore at one end;

a plunger reciprocally mounted in said bore and projecting from said body adapted for connection to a reciprocal piston rod;

a first pair of jaw arms bearing against opposite sides of the body at their one ends pivotally mounted on said body;

a second pair of jaw arms outwardly of and bearing against said first pair of jaw arms, at their one ends pivotally mounted on said body;

opposed parallel side plates bearing against said second pair of arms;

the pivotal mounting of said arms including a pair of spaced pivot bolts which extend through said side plates, said respective arms and said body; said bolts anchoring the side plates to said body;

the other ends of said pairs of arms projecting forwardly of said body and spaced apart adapted on closing to grip a work piece therebetween;

resilient detent means on said body yieldably engaging said plunger against initial inward movement relative to said body;

there being a detent notch on said plunger normally spaced from said detent means and adapted to operatively and retainingly receive said detent means on inward projection of said plunger; control means on said plunger operatively registerable with said arms whereby inward and outward movements of said plunger effect relative closing and opening movements of said arms, said body rearwardly of the side plates terminating in a transverse annular flange;

an actuating unit having a body, a bore receiving said piston rod and a mounting flange;

a pair of opposed coplaner collars, each having an undercut semi-circular recess bearing against said mounting flange and positioned over a rearward portion of said gripper head body with its annular flange nested in said recesses; fasteners between said mounting flange and collars retainingly supporting said gripper head flange in axial alignment with said actuating unit; whereby, on loosening of said fasteners, said gripper head may be rotated relative to said actuating unit in the range of 0° to 360°.

3. A cam wedge work piece gripper head comprising a body having a longitudinal bore at one end;

a plunger reciprocally mounted in said bore and projecting from said body adapted for connection to a reciprocal piston rod;

a first pair of jaw arms bearing against opposite sides of the body at their one ends pivotally mounted on said body;

a second pair of jaw arms outwardly of and bearing against said first pair of jaw arms, at their one ends pivotally mounted on said body;

opposed parallel side plates bearing against said second pair of arms;

the pivotal mounting of said arms including a pair of spaced pivot bolts which extend through said side plates, said respective arms and said body; said bolts anchoring the side plates to said body;

the other ends of said pairs of arms projecting forwardly of said body and spaced apart adapted on closing to grip a work piece therebetween;

resilient detent means on said body yieldably engaging said plunger against initial inward movement relative to said body;

there being a pair of opposed detent notches on said plunger normally spaced from said detent means and adapted to operatively and retainingly receive said detent means on inward projection of said plunger;

control means on said plunger operatively registerable with said arms whereby inward and outward movements of said plunger effect relative closing and opening movements of said arms;

and a tapered cam surface on the forward end of said plunger;

said resilient detent means including a pair of opposed spaced bores in said body;

and nested in each bore a ball, a resilient member and an adjustable set screw;

said opposed balls retainingly engaging said cam surface normally holding said plunger against forward movement and maintaining said jaw arms open; whereby on forward movement of said plunger, said balls are retracted and successively nest within said detent notches to operatively and retainingly engage said plunger for securing said jaws in a closed position.

4. A cam wedge work piece gripper head comprising a body having a longitudinal bore at one end;

a plunger reciprocally mounted in said bore and projecting from said body adapted for connection to a reciprocal piston rod;

a first pair of jaw arms bearing against opposite sides of the body at their one ends pivotally mounted on said body;

a second pair of jaw arms outwardly of and bearing against said first pair of jaw arms, at their one ends pivotally mounted on said body;

opposed parallel side plates bearing against said second pair of arms;

the pivotal mounting of said arms including a pair of spaced pivot bolts which extend through said side plates, said respective arms and said body;

said bolts anchoring the side plates to said body;

the other ends of said pairs of arms projecting forwardly of said body and spaced apart adapted on closing to grip a work piece therebetween;

resilient detent means on said body yieldably engaging said plunger against initial inward movement relative to said body;

there being opposed longitudinally spaced detent notches on said plunger;

control means on said plunger operatively registerable with said arms whereby inward and outward movements of said plunger effect relative closing and opening movements of said arms;

a tapered cam surface on the forward end of said plunger;

said resilient detent means including longitudinally spaced pairs of opposed spaced bores in said body;

and nested in each bore, a ball, a resilient member and an adjustable set screw, one opposed pair of balls being normally nested in one opposed pair of plunger notches and the other pair of balls retainingly bearing against said cam surface normally holding said plunger against forward movement and maintaining said jaws open; and whereby, on forward movement of said plunger, said sets of balls are retracted and successively nest within said detent notches on said plunger to operatively and retainingly engage said plunger at a plurality of points for securing said jaws in a closed position.

* * * * *

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,817,510 Dated June 18, 1974

Inventor(s) Joseph M. Jatcko

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

On the cover sheet [76] "Bloomfield Hills, Mich." should read -- Roseville, Mich. --.

Signed and sealed this 29th day of October 1974.

(SEAL)

Attest:

McCOY M. GIBSON JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents

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