

March 2, 1971

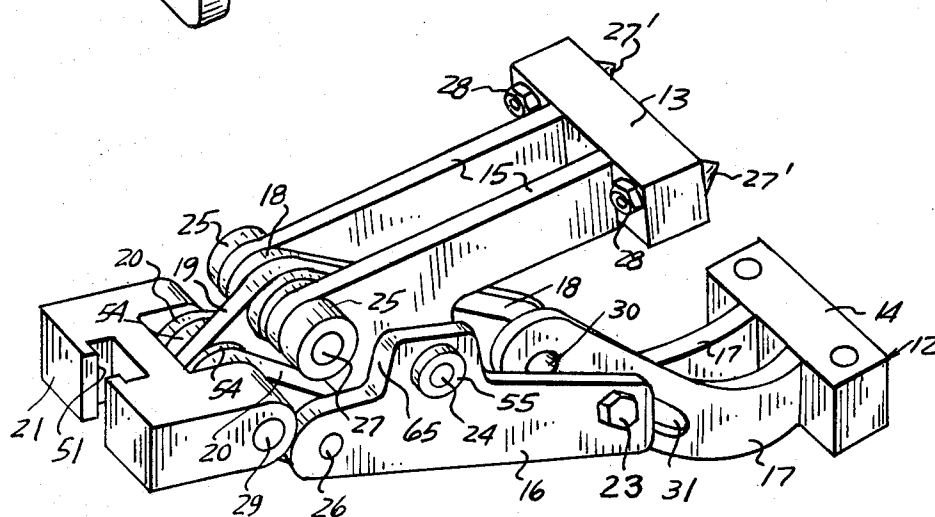
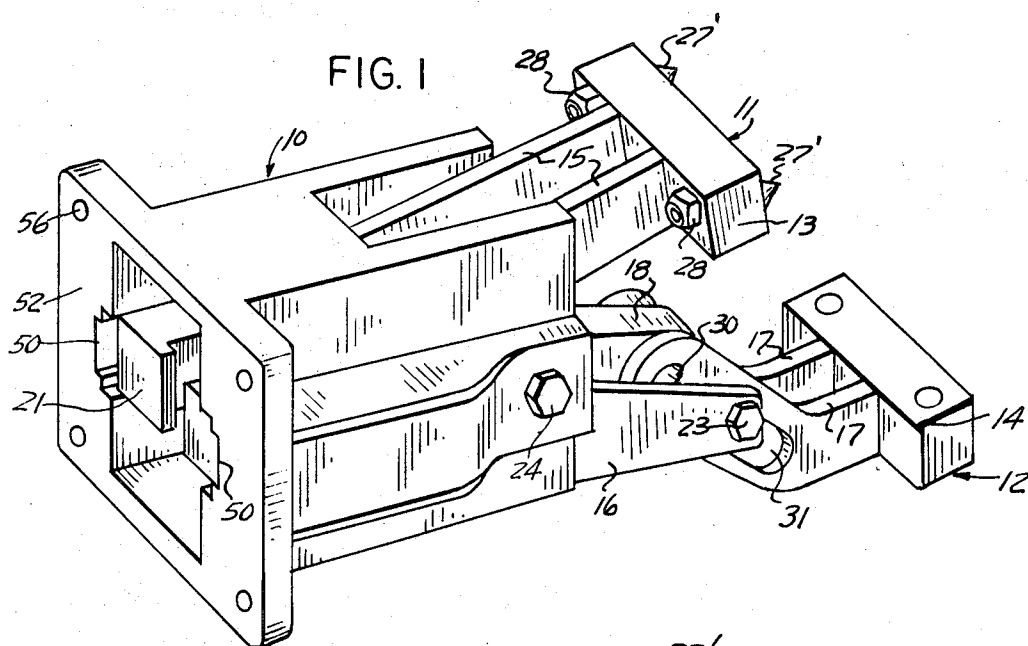
L. F. BLATT

3,567,208

TOGGLE ACTION JAW TYPE GRIPPER

Filed June 6, 1969

2 Sheets-Sheet 1



March 2, 1971

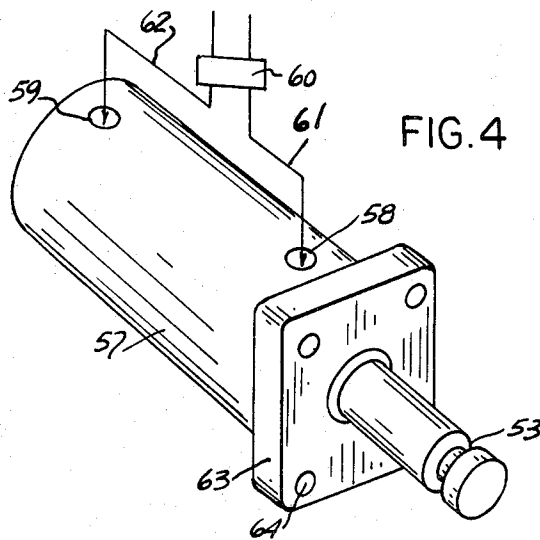
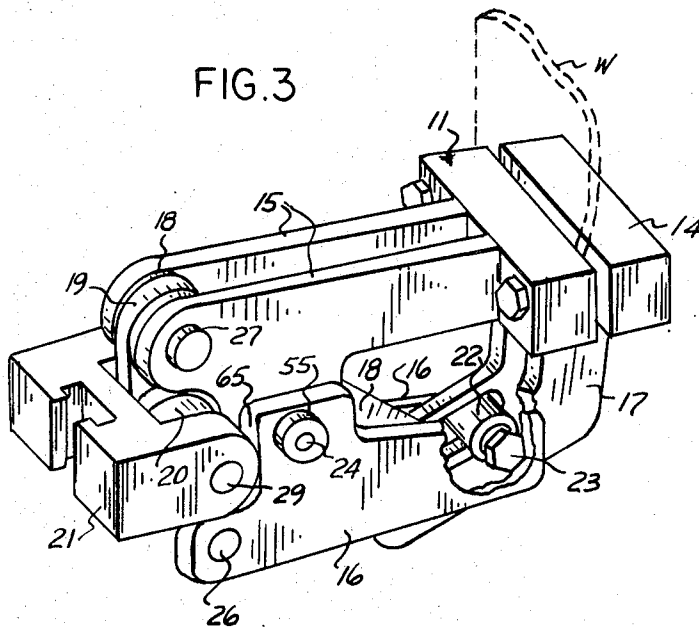
L. F. BLATT

3,567,208

TOGGLE ACTION JAW TYPE GRIPPER

Filed June 6, 1969

2 Sheets-Sheet 2



INVENTOR
LELAND F. BLATT

BY Cullen, Shoman, & Cantor

ATTORNEYS

1

2

3,567,208

TOGGLE ACTION JAW TYPE GRIPPER

Leland F. Blatt, Grosse Pointe, Mich.
(24121 Mound Road, Warren, Mich. 48091)

Filed June 6, 1969, Ser. No. 831,122

Int. Cl. B23q 3/08

U.S. Cl. 269—32

8 Claims

ABSTRACT OF THE DISCLOSURE

A toggle action jaw type gripper pivotally mounting upon a body an inner jaw for movements in a first path, and pivotally mounting a cooperative outer jaw for movement in a compound wide angle path, the latter determined by the use of a pivot link pivoted to the body and to the inner jaw arms, and upon which the outer jaw is pivotally mounted, together with a pair of arm plates pivoted to the body and having a pin and slot flexible connection with said outer jaw. The inner jaw and the arm plates are simultaneously actuated by reciprocating a clevis guidably in the body which is linked to said inner jaw and to said arm plates.

The present invention represents an improvement over my earlier issued U.S. Pat. No. 3,371,953 dated Mar. 5, 1968, entitled, "Gripper."

The present invention is, furthermore, an improvement of my copending U.S. patent application, Ser. No. 666,753 filed Sept. 11, 1967, now Pat. No. 3,482,831, entitled, "Toggle Action Jaw Type Gripper." In said application, the inner jaw is stationary with respect to the body whereas the outer jaw is pivotally mounted thereon.

BRIEF DESCRIPTION OF THE INVENTION

The present invention is an improvement over the earlier issued patent and copending patent application in providing an improved jaw type gripper with the jaws having a respective wide opening and with the inner jaw pivotally movable in a first path and with the outer jaw pivotally movable in a compounded wide angle second path adapted to provide therebetween when closed, gripping forces upon vertical up or down flanges of a workpiece.

It is a further object to provide an improved toggle action jaw type gripper in a compact construction and wherein, the respective inner and outer jaws are indirectly and pivotally interconnected with each other and upon a jaw body and incorporating reciprocal power means within the jaw body with a linkage for effecting a simultaneous opening and closing movement of the respective inner and outer jaws.

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

FIG. 1 is a perspective view of the present toggle action jaw type gripper with the jaws fully opened.

FIG. 2 is a similar view with the jaw body removed.

FIG. 3 is a perspective view similar to FIG. 2 showing the jaws closed.

FIG. 4 is a schematic perspective view of a power cylinder adapted for assembly with the jaw body of FIG. 1.

Referring to the drawing, the present power operated jaw type gripper includes an elongated hollow body 10 upon which is pivotally mounted inner jaw assembly 11 and outer jaw assembly 12.

The inner jaw assembly includes upper mounting plate 13 and a pair spaced apart parallel upper arms 15 secured thereto.

The outer jaw assembly includes mounting plate 14 and a pair of spaced apart parallel lower jaw arms 17.

The outer jaw arms 17 have a flexible pin and slot connection with the pair of arm plates 16 which are themselves pivotally mounted at 24 upon said body.

The elongated formed pivot link 18 at one end is interposed between end portions of the inner jaw arms 15 and connected thereto by the transverse pin 27.

One end of pivot link 18 projects forwardly of said body and arranged upon opposite sides thereof are the outer jaw arms 17 pivoted thereto by pivot pin 30.

The respective inner jaw arms 15 and the arm plates 16 are formed with central bosses 65 which are apertured to receive the pivot bolt 24 which extends through body 10 and is secured thereto, said pivot bolt also extending through pivot link 18.

Accordingly, the arms 15 and the arms 16 are pivotally mounted upon body 10 upon the fixed pivot 24.

The pin and slot flexible connection between the outer jaw arms 17 and the arm plates 16 includes a pair of opposed elongated slots 31 formed through and along the respective outer jaw arms 17. Transverse pivot bolt 23 extends between the arm plates 16, is secured thereto and mounts between the said arm plates 16 roller 22 which is guidably positioned within the arm slots 31.

Upon the outer ends of the pivot pin 27 are spacers 25 which are interposed between inner jaw arms 15 and the body 10 for snugly filling the space therebetween and to provide a compact construction.

Clevis 21 is slidably positioned for reciprocal movements within the internal elongated slot 50 formed upon the interior of the body 10, FIG. 1. Suitable linkage means are provided to pivotally interconnect said clevis respectively with inner jaw arms 15 and the arm plates 16 which control pivotal opening and closing movements of the outer jaw assembly 12.

For this purpose, the link means include the first link 19 pivotally connected to said clevis by the pin 29 with said link also pivotally connected to the inner jaw arms 15 by the transverse pivot pin 27, FIG. 2.

In this construction, the upper end of the pivot link 18 is bifurcated to receive the upper end portion of the link 19 for its pivotal connection with the transverse pin 27.

A pair of parallel links 20 are also pivotally connected to clevis 21 by the pivot pin 29 with their other ends connected respectively to the arm plates 16 by the transverse pivot pin 26, FIG. 2.

Inner jaw 11 is apertured to receive a pair of gripper points 27' secured in place by nuts 28, there being corresponding transverse apertures formed through lower jaw mounting plate 14 to receive said gripper points and to fixedly secure therebetween the upright workpiece W shown in FIG. 3, where the jaws are shown in closed position.

To eliminate any damage to the hardened conical points 27', the inner connecting mounting plates 13 and 14 may be revised to accept only one gripper point, or various special designs for gripping a part peculiar only to their design.

As shown in FIG. 2, a pair of wear washers 54 are arranged upon opposite sides of the link 19 interposed between said link and the additional links 20 through which the pivot pin 29 extends.

Additional spacers not shown are mounted upon the pivot pin 26 and interposed between the lower ends of the control links 20 for filling the space therebetween and to provide a compact unit.

The clevis 21, FIGS. 2 and 3 includes in its rear face, an upright T slot 51 which is adapted to cooperatively receive a similarly slotted end of the reciprocal piston rod 53 projecting axially from power cylinder 57.

Body 10 includes at one end the transverse mounting flange 52 which has a plurality of apertures 56 there-

3

through adapted for registry with corresponding apertures 64 within the power cylinder mounting flange 63 when the two parts are brought together with the piston rod 53 interlocked with clevis 21.

The power cylinder includes rod end port 58 and blind end port 59 respectively connected by conduits 61 and 62 to the control valve 60 schematically shown adapted to receive a source of pressure fluid such as compressed air for controlling reciprocal movements of the piston rod 53 and its connected piston upon the interior of said power cylinder.

Suitable fasteners or screws project through apertures 56 and are adapted to be threaded through or bolted to the corresponding apertures 64 in the power cylinder mounting flange 63.

By this construction, a simplified means is provided for connecting and disconnecting the gripper assembly from the power cylinder or replacing it with another gripper assembly merely by removing four screws or bolts from the respective flanges 52 and 63. Furthermore, in view of the T slot connection between the clevis and the piston rod 53 by removing the connecting screws, the gripper housing and body 10 may be rotated to any one of several 90° related positions with respect to the power cylinder assembly and resecured without disconnecting the piston rod 53 from said clevis, and wherein the function and operation will remain just the same.

OPERATION

With cylinder rod port 58 pressurized through the valve 60, clevis 21 is in its rear-most retracted position within the guide slot 50 and the jaws 11 and 12 are fully opened. By connecting rod port 58 with exhaust and pressurizing blind port 59 through said valve 60, clevis 21 moves forward within the body slot 50 and through the toggle action of the links 18 and 19, the jaws 11 and 12 begin to close.

The upper jaw performs through one arc through its pivot mounting 24. The lower jaw through the action of the arm plates 16 carrying roller 22, causes the latter to move through and along the angular slots 31 of the outer jaw arms 17 creating a fast and extensive movement of the lower jaw assembly 12 to the closed position shown in FIG. 3 engaging the workpiece W fragmentarily shown.

In the closed position of the respective jaws, clevis 21 bears against the corresponding bosses 65 forming a part of the arm plates 16 as well as the inner jaw arms 15. This limits forward movement of the clevis pivot pin 29 so as not to pass dead center with respect to the pivot pins 26 and 27; thus, limiting the toggle action from going over center.

This limits the jaws from locking in closed position, as less pressure will be available on the rod side of the cylinder as an opening force as is available on the full piston or blind side of the cylinder. Thus, the bosses 65 serve as stops to prevent locking of the jaws in workpiece securing position such as shown in FIG. 3.

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

I claim:

1. An improved toggle action jaw type gripper comprising a body having an elongated guide slot therein; an inner jaw including a pair of spaced apart parallel arms pivotally mounted within and upon said body and projecting therefrom; a pivot link at one end interposed between said arms and pivotally connected thereto, and intermediate

4

its ends, pivotally mounted on said body and projecting therefrom;

an outer jaw including a pair of spaced apart parallel arms disposed upon opposite sides of said pivot link and pivotally connected thereto;

a pair of arm plates within the body projecting therefrom and intermediate their ends pivotally mounted on said body;

pin and slot connecting means between one end of said arm plates and said outer jaw arms whereby pivotal movement of said arm plates effects corresponding pivotal clamping movements of said outer jaw arms; actuating means for opening and closing said inner and outer jaws including a clevis mounted for reciprocating movement in said body guide slot; and

link means pivotally connected at their one ends to said clevis and at their other ends pivotally connected respectively to said inner jaw arms and to said arm plates.

2. In the gripper of claim 1, the respective arms of said inner and outer jaws being coplanar and arranged upon opposite sides of said pivot link.

3. In the gripper of claim 1, the pivot mounting of said inner jaw arms to said body including a pivot bolt extending through said body, which serves also as the pivot mounting for said arm plates;

and spacers on said pivot bolt outwardly of said arm plates and nested in said body guide slot.

4. In the gripper of claim 1, the pivotal connection between said pivot link and said inner jaw arms including a pivot pin extending therethrough;

and spacers on the outer ends of said pivot pin, coplanar with said arm plates respectively and filling the space between said body and said inner jaw arms.

5. In the gripper of claim 1, said clevis having a T-shaped slot adapted to receive the similarly shaped end of the piston rod of a power cylinder; to thereby permit rapid disconnection of the gripper assembly from the power cylinder, and also permit relative rotation of said gripper assembly with respect to such power cylinder.

6. In the gripper of claim 5, wherein an apertured flange is provided on said body adapted for mounting a power cylinder.

7. In the gripper of claim 1, said pin and slot means including opposed elongation slots extending along and through said outer jaw arms;

and a transverse pin guidably extending through said slots and at its end, secured to said arm plates.

8. In the gripper of claim 1, stop bosses on said arm plates adjacent their pivotal mounting retainingly engagable with said clevis on forward closing movements thereof in said body, preventing the clevis pivotal connection to said link means passing dead center with respect to the pivotal connections of said inner jaw arms and said arm plates with said link means and thus, preventing the jaws from locking in closed position.

References Cited

UNITED STATES PATENTS

3,371,957	3/1968	Blatt	294—88
3,482,831	12/1969	Blatt	269—32

EVON C. BLUNK, Primary Examiner

J. D. CHERRY, Assistant Examiner

U.S. Cl. X.R.

269—239; 294—88, 104