March 2, 1971 C. C. HALBERSTADT 3,567,270

VARIABLE PRESSURE GRAB HAND

Filed Aug. 6, 1969

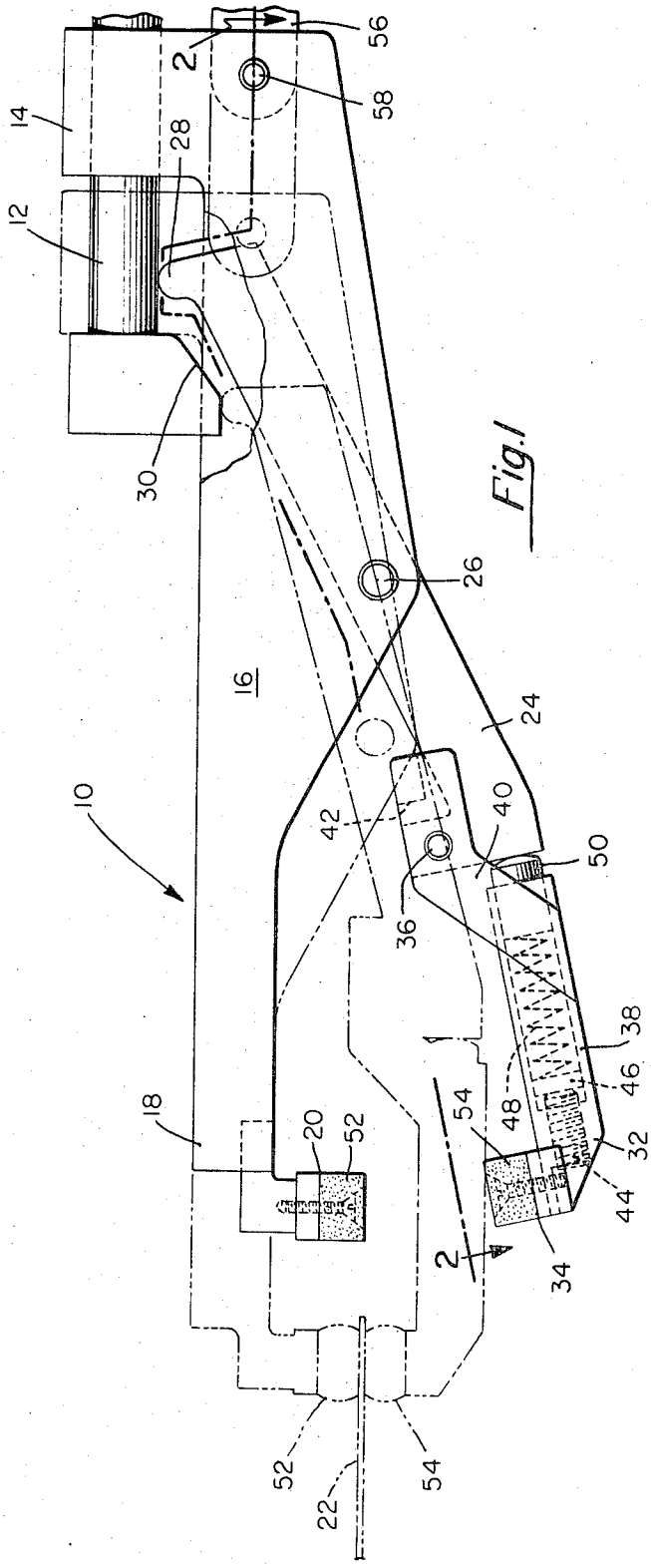


Fig. 1

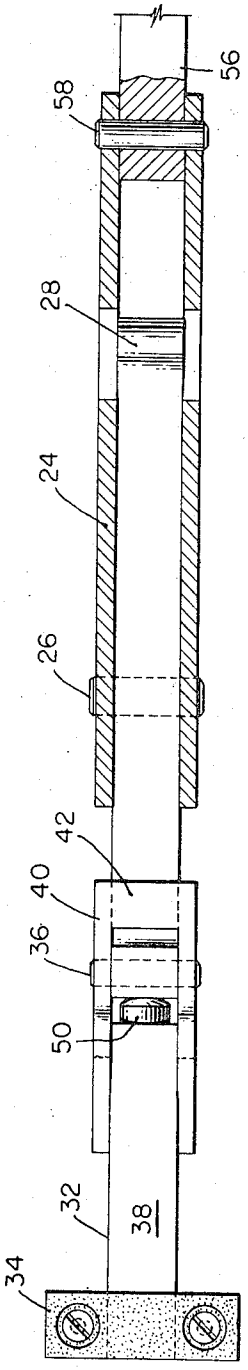


Fig. 2

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United States Patent Office 3,567,270
Patented Mar. 2, 1971

3,567,270

VARIABLE PRESSURE GRAB HAND

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Filed Aug. 6, 1969, Ser. No. 847,864
Int. Cl. B66c 1/00
U.S. Cl. 294—104 4 Claims

ABSTRACT OF THE DISCLOSURE

A cam operated grab hand for grasping and holding a work piece for removal of the work piece from a metal working machine. One finger of the grab hand is mounted on and movable with a control arm and the other finger is pivotally secured to the first finger for being pivoted into engagement therewith by a cam secured to the control arm. A spring biasing means may be adjusted to vary the pressure of the grip applied to the work piece by the pivotal engagement of the second finger with the first.

BACKGROUND OF THE INVENTION

This invention relates to work handling apparatus and more particularly to a cam actuated mechanical grab hand for seizing a work piece and removing the work piece from a work station on a production line to the next station on the line.

Mechanical grab hands are used on production lines to remove work pieces from dies or other work stations where strength or safety factors require such substitution for manpower. Many of the prior art grab hands exerted a fixed gripping force on the article or work piece to be transferred which often marred the work piece. An object of this invention is to provide a grab hand that may be adjusted to grip a work piece with a predetermined force.

SUMMARY OF THE INVENTION

The apparatus of this invention is a grab hand that may be moved on a support arm into a working position from a stored or retracted position. An actuating arm moves the grab hand on the support arm to effectively open and close the gripping fingers by moving a cam follower on one of the fingers along a cam secured on the support arm. One of the fingers includes an adjustable spring biasing means to control the pressure exerted by the fingers on the work piece while in the working position. A resilient material such a rubber or polyurethane foam may be secured to the gripping surfaces of the fingers to prevent marring the work piece during the gripping and moving thereof.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side view of the grip hand of this invention in the open position, phantom lines are used to illustrate the grab hand in closed or working position holding a work piece.

FIG. 2 is a view, in the direction of the arrows substantially along the line 2—2 of FIG. 1 showing the finger having adjustment means thereon.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings, as seen in FIGS. 1 and 2, the preferred embodiment of this grab hand, indicated generally by the numeral **10**, includes a support arm **12** which may be fixed or movable between a receiving and delivering position, as desired.

The grab hand **10** is slidably supported on the support arm **12** by one end **14** of the rigid finger **16**. The other end **18** of the finger **16** is provided with a gripping block **20** for contacting the work piece **22**. The other finger **24** is pivotally secured to the rigid finger **16** by pivot pin **26**

for movement there about. The pivotal finger **24** has a cam follower **28** on the end adjacent the support arm **12** for contacting a cam **30** secured to the support arm **12**. The other end **32** of pivot finger **24** is provided with a gripping block **34** for contacting the work piece **22**. The cam **30** is secured to support arm **12** for movement therewith and for contacting cam follower **28** for pivoting finger **24** about pivot pin **26** thereby securing the work piece **22** between the gripping blocks **20, 34**.

The end **32** of finger **24** is pivotally secured to the main portion of the finger **24** by pivot pin **36**. The end **32** includes the gripipng block **34** secured to a hollow cylinder **38** and a yoke structure **40** with one end secured to the cylinder **38** and the pivot pin **36** journaled in the arms of the yoke for pivotallly supporting the end **32**. Extending between the arms of the other end of the yoke **40** is a stop bar **42** for contacting the main portion of the finger **24** for limiting the clockwise rotation of the end **32** about pivot pin **36**, as viewed in FIG. 1. The hollow cylinder **38** contains a spring biasing unit including an adjustment screw **44** threadably mounted in the cylinder and engaging a pusher **46** which supports one end of a spring **48** with the other end of the spring bearing against a spacer plug **50** which extends from the end of the cylinder **38** and bears against the adjacent end at the main portion of finger **24**.

The gripping blocks **20, 34**, may be provided with a resilient gripping pad **52, 54**, respectively, of a yieldable material such as rubber or polyurethane foam to protect the surfaces of the work piece. The adjustment screw **44** may be used to increase or decrease the clamping pressure between the gripping blocks **20, 34** by compressing spring **48** to increase the pressure or expanding the spring to decrease the pressure.

The grab hand is operated by an actuating arm **56** connected to a power source (not shown). The actuating arm **56** is pivotally connected to the end **14** of finer **16** by a pivot pin **16** for providing the power to slide the grab hand on the support arm **12**.

In operation of this grab hand, the support arm **12** positions the grab hand **10** adjacent the work piece **22**, the actuating arm **56** then moves the grab hand along arm **12** toward the cam **30**. As the cam follower **28** passes over the cam **30**, the finger **24** is pivoted about pivot pin **26** bringing gripping block **34** into contact with the work piece **22**, thus, moving the work piece **22** into contact with gripping block **20** and securing the work piece **22** between the blocks **20, 34**, as shown in phantom lines of FIG. 1. It is to be noted that as the work piece **22** is secured between the blocks **20, 34**, the end **14** has contacted the cam **30** secured on the end at arm **12** and also acting as a stop to limit movement of the grab hand in the direction of the work piece **22**. The support arm **12** then moves the grab hand **10**, work piece **22** and actuating arm **56** to a desired position and then the actuating arm **56** is moved away from the cam **30** and such movement moves the cam follower **28** back along cam **30** and pivoting the arm **24** for moving gripping block **34** from contact with the work piece **22**, thus releasing the work piece **22**.

This novel grab hand may be used to hold a work piece in a fixed position if the support arm remains fixed, or to move a work piece along a production line from a receiving to a delivering position if the support arm is moveable therebetween.

I claim:

1. A work piece handling apparatus for grasping and transporting a work piece including a grab hand, a support arm for supporting said grab hand having a receiving position and a delivery position, and being moveable therebetween, and a power source for actuating said grab hand and moving said support arm between said positions; said grab hand having a gripping position and a release position and being moveable therebetween on said support

arm; a cam means for moving said grab hand between said gripping and receiving positions; said grab hand including a first rigid finger having one end slidably supported on said support arm, a gripping block on the other end for engaging a work piece at said gripping position, and a pivotal connection intermediate said ends; a second finger pivotally connected to said first finger at said pivotal connection, said second finger having a rigid portion and a pivotal end portion, a pivot pin journaled on one end of said rigid portion for pivotally connecting said pivotal end portion to said rigid portion, said pivotal end portion having a gripping block on the end most remote from the joint connected to said pivot pin, spring means biasing said pivotal end portion about said pivot pin towards said first finger and stop means limiting pivotal movement of said pivotal end portion toward said first finger, said rigid portion being pivotally connected to said first finger intermediate the ends thereof at said pivotal connection for moving said second finger gripping block into engagement with a work piece at said gripping position, and resilient means cushioning the contact of said gripping blocks with the work piece.

2. The handling apparatus as claimed in claim **1** wherein said cam means includes a cam secured to said support arm and a cam follower on the end of said second finger rigid portion opposite said pivot pin for cooperating with said cam for moving said second finger about said pivotal

connection whereby the work piece is secured between said gripping blocks in said gripping position and moved to the release position when said cam follower is not contacting said cam.

3. The handling apparatus as claimed in claim **1** wherein said spring biasing means includes a spacer block slidably mounted on said pivotal end portion, a spring mounted on said pivotal end portion and engaging said space block for urging said spacer block against said rigid portion, and adjustment means contacting said spring for adjusting the force exerted by said spring on said spacer block.

4. The handling apparatus as claimed in claim **3** wherein said stop means includes a stop bar secured to said pivotal end portion for contacting said rigid portion for limiting pivotal movement of said end portion in the direction said spring means biases said end portion.

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