Feb. 15, 1966 G. G. F. SMEETS 3,234,839

MULTIPLE HEAD PUNCH HOLDER

Filed April 27, 1964

2 Sheets-Sheet 1

FIG. 1.

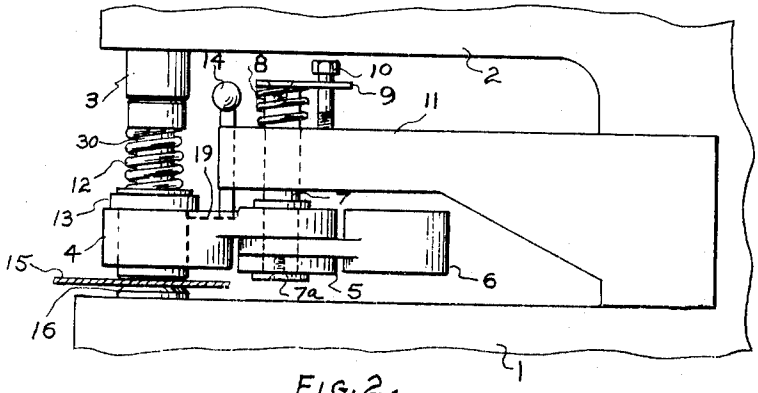


FIG. 2.

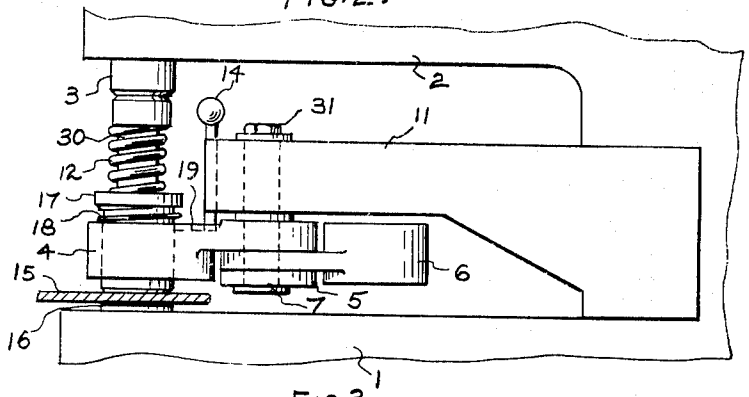
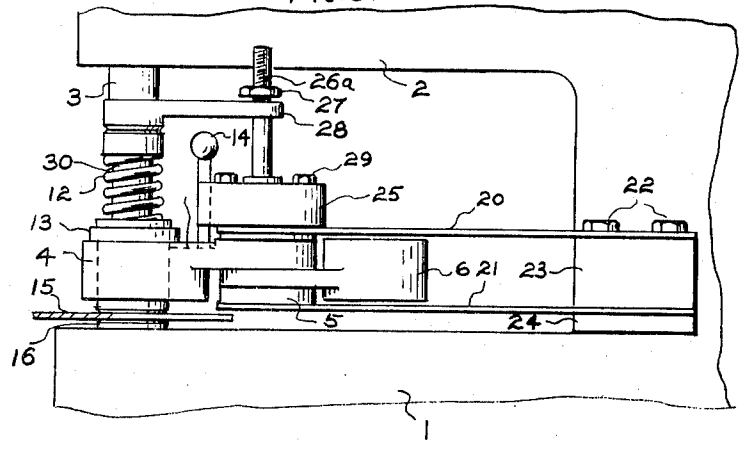


FIG. 3.



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FIG. 4.

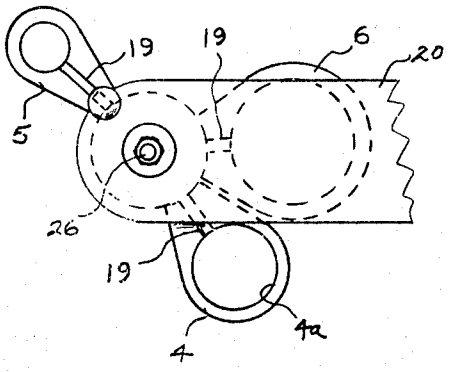
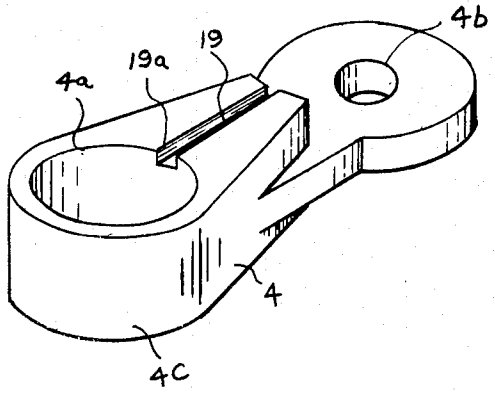


FIG. 5.



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3,234,839

MULTIPLE HEAD PUNCH HOLDER

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15 Claims. (Cl. 83—549)

This invention is directed to a sheet metal working machine and more particularly to a multiple head punch holder facilitating the rapid substitution of punches radically different in size.

Multiple punch holders have been used and they take the form of a rotating turret which comprises a large disc with a number of punch holders in its periphery. The machine incorporating such a turret holder must be specially made in order to provide the large throat necessary for the rotatable disc punch holder.

The present invention overcomes the disadvantage of known multiple punch holder devices in that a special machine need not be used. Use is made of a multiple punch holding mechanism wherein the mechanism is made up of a plurality of separate holders, each journalled on a shaft secured to the press machine, and in the form of swingable arms having predetermined punch holding openings therein. The swingable punch holding arms are selectively lockable in a predetermined position whereat the punch ram may contact the pressure head of a mounted punch to perform a punching operation. The punch holding arms are keyed to provide proper punch orientation.

In one embodiment of the invention the punch holders are mounted at the ends of flexible arm members, the pressure of the ram during punching ensures the orthogonal position of the punch with respect to the sheet being punched. A rugged construction is therefore not required resuting in an economical multiple punch holder device.

The invention will now be described with reference to the figures of the drawing in which similar parts are similarly designated and wherein;

FIGURES 1, 2 and 3 show three embodiments of the invention incorporated in a machine press,

FIGURE 4 is a plan view of the multiple punch holding mechanism proper, and,

FIGURE 5 is an enlarged view of one of the punch holder units removed from the multiple holder.

Referring now to FIGURE 1 a machine press, shown only in part, comprises a table **1** and an overhanging ram support and guide **2** in which ram **3** is journalled for vertical movement. A further supporting member **11**, which may be integral with member **2**, is journalled to accept a shaft **7** having a flanged head **7***a* at its lower end and a support arm **9** secured to its upper end. Shaft **7** is biased in the upward direction by means of a helical spring **8**. The vertical movement of shaft **7** is limited by a bolt **10** which passes through arm **9**.

On the lower end of shaft **7** three punch-assembly holding arms **4**, **5** and **6**, shown more clearly by FIGURES 4 and 5, are journalled for individual swinging movement in a horizontal plane so that any selected arm may be positioned in alignment with ram **3** and a die member **16**. In FIGURE 1 arm **4** is shown in alignment with ram **3** and provided with a punch assembly comprising a punch guide **13**, a punch **30** and a stripper spring **12**. A vertically movable locking pin **14**, to be described more fully with reference to FIGURES 4 and 5, locks the selected arm **4** in position.

In operation, the punch is moved downward by ram **3** to clamp a sheet **15**, to be punched, between guide **13** and the die **16**. The ram continues downward to perform the punching operation compressing spring **12** and moving lift arm **9** down on shaft **7** and compressing spring **8**. Upon release of the pressure by ram **3**, spring **12** performs the stripping action and lift arm **9**, with the assistance of spring **8**, raises the punch assembly off sheet **15** to release same.

The embodiment shown in FIGURE 2 differs from that shown in FIGURE 1 in that shaft **7** is shortened and does not slide vertically in member **11**. In this embodiment the punch guide **17** is vertically movable in the holder arm **4** and normally is maintained in a raised position by means of a spring **18** so that sheet **15** may be readily inserted or removed from between guide **17** and die **16**.

Referring now to FIGURE 3, a pair of elongated, overlying, sheet-like, flexible arms **20**, **21** are spaced at one end by a spacer element **23** and mounted on the press table by means of bolts **22** and a further spacer **24**.

At the other ends of the flexible arms **20**, **21**, a shaft **26** is secured by means of a tight fitting encircling member **25** which is secured to the upper arm **20** by bolts **29**. Shaft **26** passes through arm **20** and is secured by means, not shown, to arm **8**. Shaft **26** is provided with upper threaded portion **26***a* upon which is threaded a nut **27** securing a lift-arm **28** against vertical removal from shaft **26**. Lift arm **28** is free to slide vertically on shaft **26** limited in movement by member **25** and nut **27**. The other end of lift-arm **28** is secured to the ram **3** to move vertically therewith.

Three punch holding arms **4**, **5** and **6** are journalled for horizontal swinging on shaft **26** between the ends of flexible arms **20**, **21**. Locking key **14** ensures correct alignment of the arm in use.

The punch holding arms **4**, **5** and **6** will now be described in detail with reference to FIGURES 4 and 5, it being understood that the punch holding arms are of similar construction but accommodating different ranges of punch sizes. Punch holding unit **4**, FIGURE 5, is shown provided with a bearing portion **4***b* journalled to accept shaft **7** or **26** as the case may be. The outer end **4***c*, is free to swing about the shaft from a position clear of ram **3** to a punching position wherein it is in alignment therewith.

The punch holder **4** is provided with a punch holding aperture **4***a*. A key slot **19** is provided in the upper surface of **4***c* and the vertically movable locking device **14**, shown in FIGURES 1, 2 or 3, is utilized to lock the punch holding aperture in axial alignment with ram **3**. Locking device **14** is journalled for vertical movement in members **11** or **25** and is provided with a key foot which fits snugly into slot **19**. Key **14** is preferably biased downward, for instance, by a helical spring, not shown, so that when the punch holding aperture is in axial alignment with ram **3** the key snaps into slot **19** to lock the unit in this position.

The slot portion **19***a* which is an extension of slot **19** may be utilized for orientation of the punch guide **13** or **17** shown in the embodiments of FIGURES 1, 2 or 3. Other orientation means may also be employed.

Punch holding arms **5** and **6** are of similar construction to that of arm **4**. It will be evident that the punch holding units **4**, **5** and **6** can be readily selected and aligned with the ram **3** and die **16**, the units not in use being stored in an out of the way position as shown.

While specific embodiments of the invention have been shown, various modifications may be made which do not depart from the spirit and scope of the invention as defined in the appended claims. For instance, the swingable arms may be mounted above flexible arm **20** or below flexible arm **21** by means of an extension of shaft **13**.

What is claimed is:

1. A multiple punch head assembly comprising a plurality of punch holding arm units swingably journalled at

one end in stacked relationship on a shaft provided therefor, punch guide accommodating apertures provided in the other ends of said arms, and means to selectively lock said punch holding arm units in a predetermined angular orientation with respect to said shaft.

2. The multiple punch head assembly as claimed in claim 1 wherein said arms accommodate different punch guide sizes.

3. A multiple punch head assembly comprising a plurality of punch holding arms each journalled at one end to pivot in a plane about a common shaft and provided at the other end with a punch guide accommodating aperture in the said plane, a slot provided in one surface of each arm and locking means, cooperating with the slot of a selected arm to maintain it in a predetermined angular position with respect to said shaft.

4. The multiple punch head as claimed in claim 3 wherein said arms accommodate different punch guide sizes.

5. A multiple punch head assembly comprising a pair of flat elongated flexible arms secured in spaced overlying relationship, means for providing securement of said arms, at one common end thereof, to the table of a machine press, a shaft passing between and securing the other ends of said arms in spaced relationship, a plurality of punch holding arms swingably journalled at one end in stacked relationship on said shaft, punch guide accommodating apertures provided in the other ends of said arms, and means to selectively lock said punch holding arm units in a predetermined angular orientation with respect to said shaft.

6. The multiple punch head assembly as claimed in claim 5 wherein said arm units accommodate different punch guide sizes.

7. The machine press as claimed in claim 5, wherein said flexible arms are biased to lift the multiple punch head assembly clear of the said die between punching operations.

8. The machine press as claimed in claim 5 wherein the multiple punch head assembly is raised by and in conjunction with the raising of the ram after a punching operation the means utilized comprising an arm secured at one end to the ram and having its other journalled for limited vertical movement on an extension of said shaft.

9. In a machine press, a multiple punch head assembly comprising a pair of flat elongated flexible arms secured at a common one of their ends in spaced overlying relationship, a shaft passing between orthogonally to the flat surface of and spacing the other ends of said flexible members, a plurality of punch holding arm units journalled at one of their ends for pivotal movement about and in stacked relationship on said shaft, a punch guide holding aperture provided in the other end of each punch holding arm unit, means to selectively and individually lock each punch holding arm unit in axial alignment with respect to a die holding unit, and ram means axially aligned with the axis of said die holding unit for applying punching pressure to a punch when held in a selectively positioned punch holding arm unit.

10. The machine press as claimed in claim 9, wherein said flexible arms are biased to lift the multiple punch head assembly clear of the said die between punching operations.

11. The machine press as claimed in claim 9, wherein the multiple punch head assembly is raised by and in conjunction with the raising of the ram after a punching operation the means utilized comprising an arm secured at one end to the ram and having its other end journalled for limited vertical movement on an extension of said shaft.

12. In a machine press having a work table, a ram and a die, a multiple punch head assembly comprising a plurality of punch holding arms each journalled at one end to pivotably rotate in a plane above said work table and about a common shaft secured with respect to said press, a punch guide accommodating aperture provided in the other end of each arm, locking means provided to selectively secure one of said arms against rotation about said shaft and in a position in alignment with said ram and die.

13. The machine press as claimed in claim 12 wherein said shaft is resiliently secured to allow axial movement thereof towards and away from said work table.

14. The machine press as claimed in claim 12 wherein a punch-guide is resiliently supported in said punch-guide accommodating aperture.

15. The machine press as claimed in claim 12 wherein said locking means comprises a locking pin secured for movement orthogonally to said plane adjacent said shaft and biased towards said arms and slot means provided on each arm with which said pin cooperates selectively to provide locking the selected arm against rotation.

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