

[54] **DEVICE FOR THE LATERAL ADJUSTMENT AND ADJUSTMENT IN HEIGHT OF THE RAM BEARER ON PRESSES FOR NONCUTTING METAL SHAPING**

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[22] Filed: **Nov. 3, 1971**

[21] Appl. No.: **195,137**

[30] **Foreign Application Priority Data**

Nov. 3, 1970 Germany..... 2053930

[52] U.S. Cl..... 72/447, 10/24, 72/462

[51] Int. Cl..... B21j 13/02

[58] Field of Search ..... 72/446, 447, 462, 448; 10/24, 11 R

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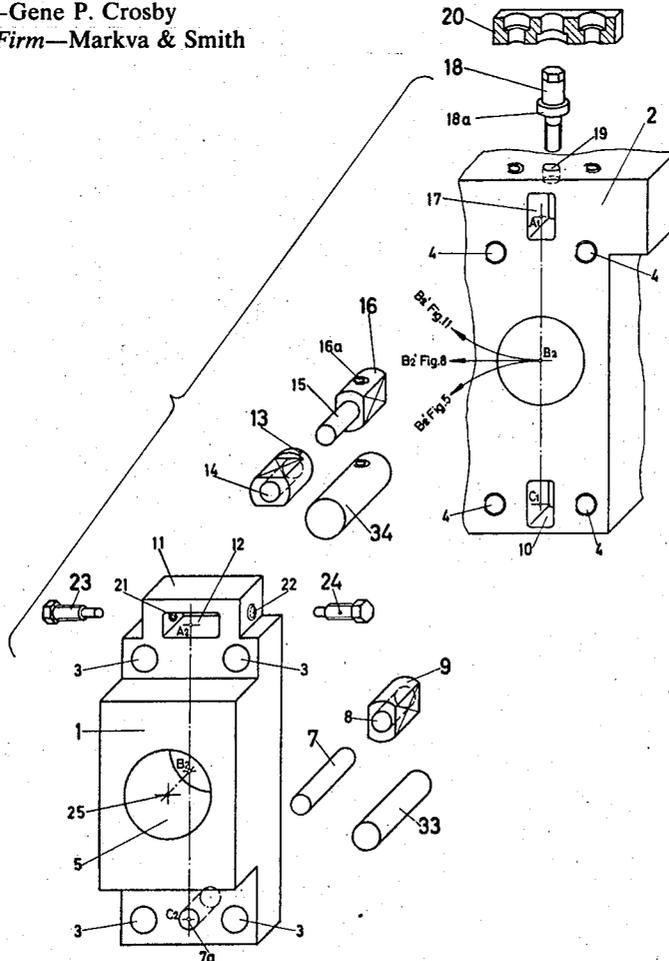
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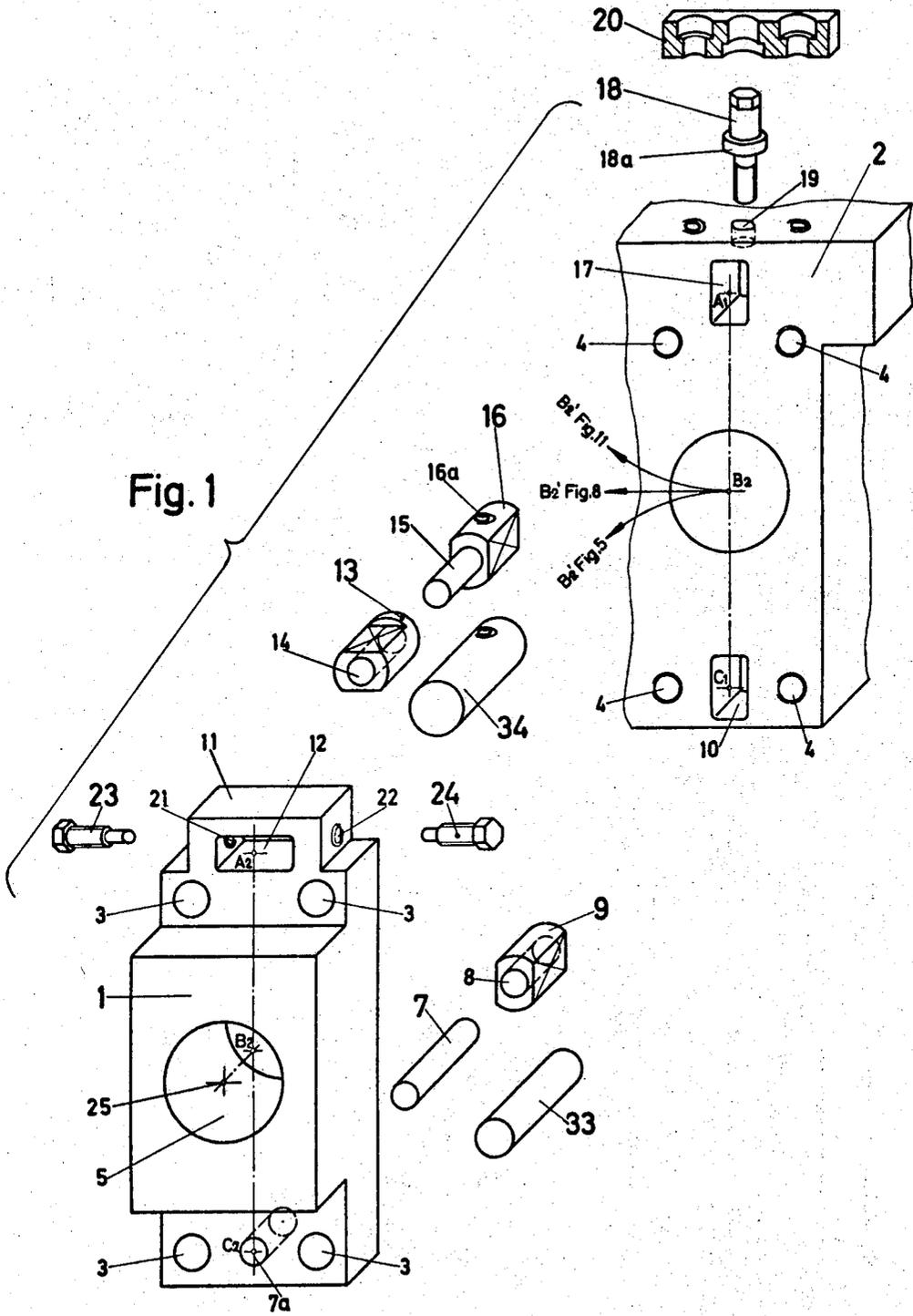
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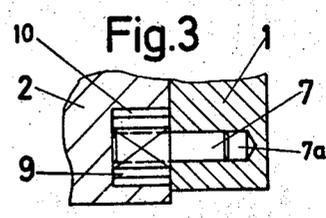
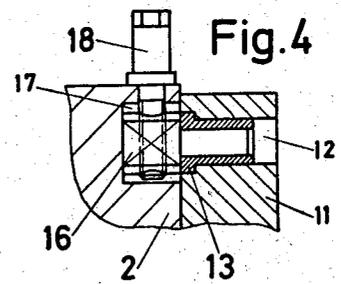
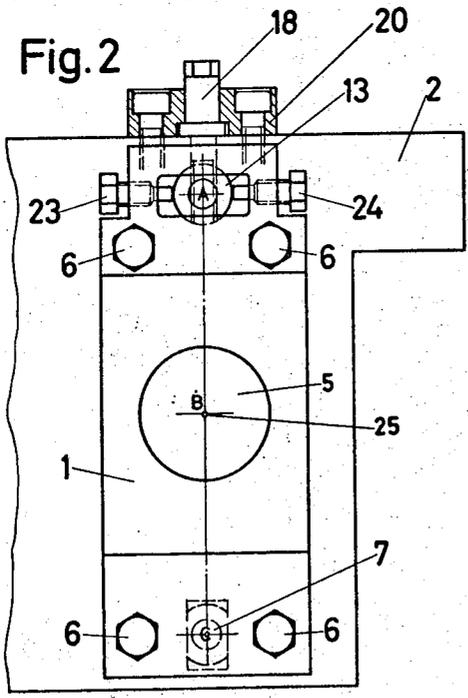
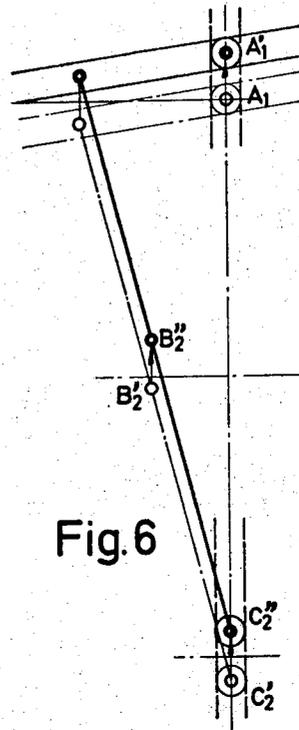
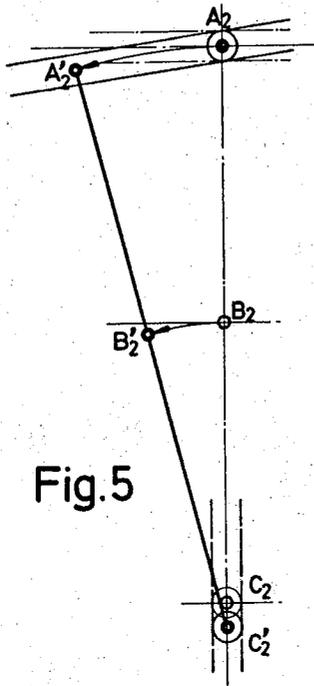
[57] **ABSTRACT**

Apparatus is disclosed for positioning a ram bearer in relation to a press slide. A first guide means is located on a first terminal section of a ram bearer and a second guide means is located on a second terminal section opposite the first terminal section of the ram bearer. The first guide means is pivotally connected at one end thereof to the ram bearer and slidably connected at the other end thereof to the press slide. The second guide means is pivotally connected at one end thereof to the ram bearer and slidably connected at the other end thereof to the press slide. The slidably connected end of the first guide means is shiftable in a direction transverse to the axial direction of the ram. First adjusting means is provided for laterally fixing the pivotally connected end of the second guide means with respect to the ram bearer about the pivot connection of the first guide means. The slidably connected end of the second guide means is shiftable in a direction transverse to the axial direction of the ram. Second adjusting means are provided for locating the slidable connections of the first and second guide means in a predetermined disposition on the press slide.

16 Claims, 12 Drawing Figures







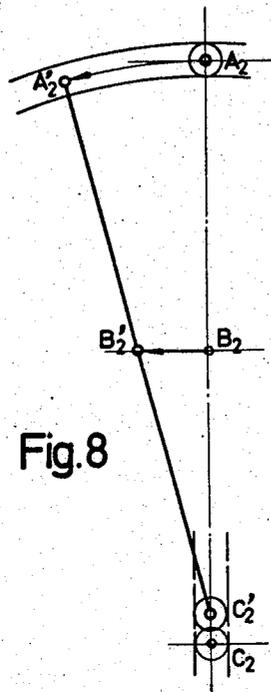


Fig. 8

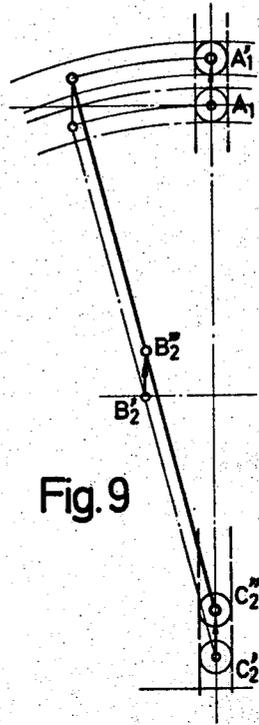


Fig. 9

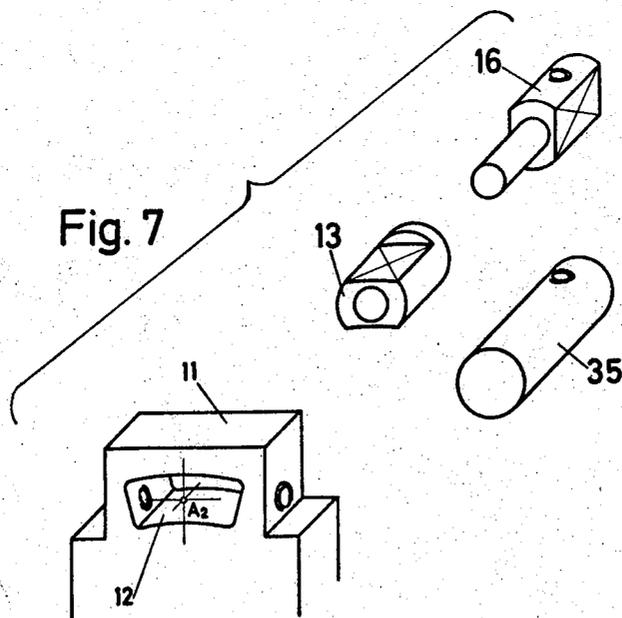


Fig. 7

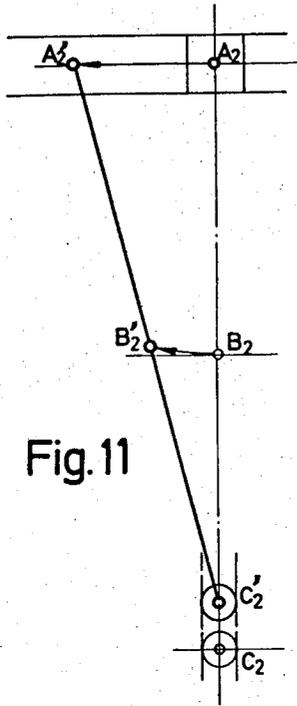


Fig. 11

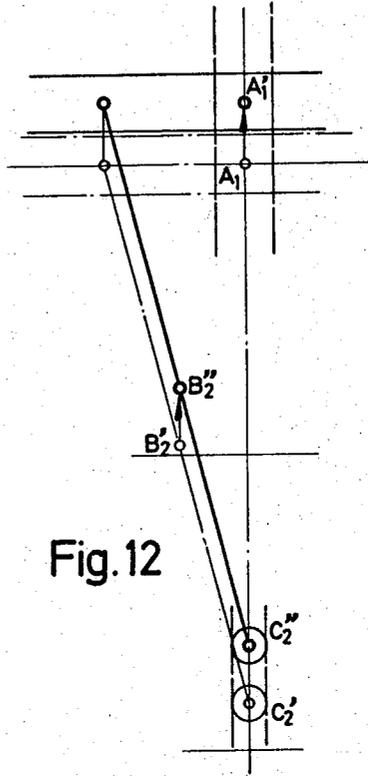


Fig. 12

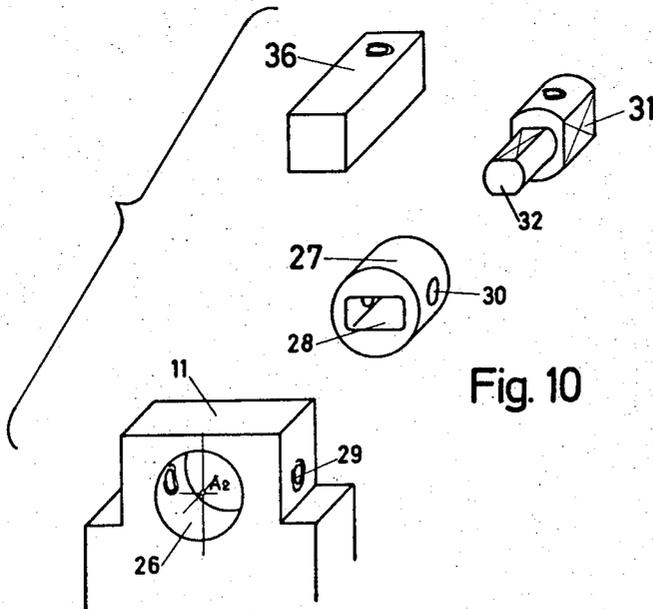


Fig. 10

# DEVICE FOR THE LATERAL ADJUSTMENT AND ADJUSTMENT IN HEIGHT OF THE RAM BEARER ON PRESSES FOR NONCUTTING METAL SHAPING

## BACKGROUND OF THE INVENTION

The present invention relates to a device for the lateral adjustment and for the adjustment in height of the ram bearer on presses for noncutting metal shaping. At the same time, the ram bearer carrying the operating ram has been attached releasably on a reciprocating press slide and has been disposed in such a way that the ram at every forward stroke of the press slide strikes a bottom die disposed coaxially to said ram.

In the case of presses for noncutting reshaping of metals it is of particular importance among other things and in view of achieving die stampings which are correct as to mass and form, that the axis of the press die is aligned with the axis of the die up to a few hundredths of a millimeter. Therefore, it is necessary that at least one of the press tools—generally speaking the press die—is adjustable in its position.

According to a known adjusting arrangement of this type, the upper part of the ram bearer is guided by a sliding pad lying in an inclined guide path. This results in an undesirable error as to height in the case of the lateral adjustment and in the case of the adjustment as to height it results in an undesirable lateral deviation, so that the precise position of the axis of the ram can be achieved only by way of a time consuming adjusting process. The aligning time of the press tool will be prolonged thereby and the manufacture of the inclined guide paths of the adjusting slits makes machining more expensive.

## SUMMARY OF THE INVENTION

The device constituting the object of the present invention eliminates these disadvantages and permits a relatively quick adjustment of the position of the ram bearer with a precision which in every case lies within the permissible drop stamping tolerances. This device according to the invention is characterized in that the ram bearer has a swiveling peg directed toward the press slide at a terminal section of the said bearer, the part of the swiveling peg facing away from the ram bearer projecting into a perpendicular groove of the press slide and being guided in it perpendicularly slidably, and in that a guide element, which can be lifted and lowered by means of an adjusting element and which is slidable in a second perpendicular groove of the press slide, projects into the other terminal section of the ram bearer, opposite which one guide element of the terminal sections of the stamp bearer per force can be swung to both sides.

In the case of a special embodiment of this device, the above mentioned swiveling peg is attached to the lower part of the ram bearer and the upper part of the ram bearer has a slit into which one end of the guide projects, whereby in the two oppositely located limiting walls of the slit each time an adjusting screw pointing toward the above mentioned end of the guide element is disposed for the purpose of adjusting the upper part of the ram bearer.

Preferably the above mentioned guide slit has a cross section practically of a parallelepiped shape.

In order to avoid completely any error in height occurring during lateral adjustment, the upper and lower

limiting surface of the guide slit has been curved in such a way that, upon lateral swinging of the upper part of the ram bearer, a horizontal shifting of the ram axis results.

## BRIEF DESCRIPTION OF DRAWINGS

Other objects of this invention will appear in the following description and appended claims, reference being made to the accompanying drawings forming a part of the specification wherein like reference characters designate corresponding parts in the several views.

FIG. 1 is an exploded view of a device made in accordance with this invention with the ram bearer lifted off the press slide;

FIG. 2 is a front elevational view of the ram bearer;

FIG. 3 is a fragmentary sectional view showing details of the device made in accordance with FIGS. 1 and 2;

FIG. 4 is a fragmentary sectional view of details of the device made in accordance with FIGS. 1 and 2;

FIG. 5 is a schematic diagram showing one course of movement during the adjustment of the ram bearer;

FIG. 6 is a schematic diagram of another course of movement during the adjustment of the ram bearer of FIGS. 1 and 2;

FIG. 7 is an exploded view showing another embodiment of a device made in accordance with this invention;

FIG. 8 is a schematic diagram showing one course of movement during the adjustment of the ram bearer of FIG. 7;

FIG. 9 is a schematic diagram showing another course of movement during the adjustment of the ram bearer of FIG. 7;

FIG. 10 is an exploded view of a further embodiment of a device made in accordance with this invention;

FIG. 11 is a schematic diagram showing one course of movement during the adjustment of the ram bearer of FIG. 10; and

FIG. 12 is a schematic diagram showing another course of movement during the adjustment of the ram bearer of FIG. 10.

## DESCRIPTION OF SPECIFIC EMBODIMENTS

More specifically, the exploded view of a device made in accordance with this invention is shown in FIG. 1 with details not necessary for an understanding of the invention being left out for the sake of clarity and simplification. The ram bearer, generally designated 1, is equipped with four attaching bores 3 and is normally rigidly attached to the respective press slide 2. Attaching screws 6 are used to connect the bearer 1 and the slide 2 between the four attaching bores 3 and corresponding threaded bores 4. In these embodiments, the bearer 1 and slide 2 have parallel faces which are contiguous in the assembled combination.

During operation of the press, the press slide 2 carries out the known reciprocal movement. That is, the press die (not shown) protrudes through the bore 5 of the ram bearer 1 and strikes a bottom die (not shown) disposed coaxially to and in the path of movement of the first press die. The movement of the press die against the bottom die carries out the desired noncutting reshaping operation on the pressed part. The bottom die as well as the driving and guiding elements of

the press slide 2 have not been shown for the sake of clarity since they are not essential to the understanding of the invention.

The ram bearer bores 3 are deliberately kept larger than the diameter of the respective pertinent attaching screws 6, (FIG. 2). This size relationship between the bores 3 and screws 6 allows for the ram bearer 1 to be adjusted in its position at any time after the attaching screws 6 are released. At the same time, the difference between the diameter of the bearer bores 3 and the outside diameter of the attaching screws 6 must correspond at least to the maximum range of the desired adjustment.

The ram bearer 1 has a swiveling peg 7 located in its lower portion and directed toward the press slide 2. In this specific embodiment, the peg 7 is forced or slip fit into the corresponding bore 7a disposed in the lower terminal section of the ram bearer 1. When assembled, the swiveling peg 7 projects into bore 8 of a lower sliding pad 9. The lower sliding pad 9 is guided in a perpendicular groove 10 which is disposed in the lower part of the press slide 2. The width of groove 10 corresponds to the width of the sliding pad 9. Thus, the sliding pad 9 can execute a movement limited by the length of the groove 10. The movement of the pad 9 is perpendicular with respect to the axis of peg 7. Movement of the pad 9 occurs when there is relative parallel movement between bearer 1 and slide 2 upon the release of screws 6.

The middle portion 1a of the ram bearer 1 juts outwardly on the front side thereof. The press die (not shown) projects through the bore 5 that extends through the middle portion 1a.

The ram bearer head 11 is somewhat narrower and laterally displaced with respect to the lower body portion of the ram bearer 1. The ram bearer head 11 constitutes a second terminal section and includes a continuous slit 12 having a rectangular cross section. The second terminal section is opposite the first terminal section of the bearer 1. The front portion of the bushing 13 is flattened on both sides thereof so that when the ram bearer 1 is assembled, the front portion projects into the continuous slit 12. Bushing 13 has a continuous axial bore 14. An upper sliding pad 16 includes a peg 15 which engages the axial bore 14.

The shape and dimension of the upper sliding pad 16 has been so selected that the pad 16 will fit into a perpendicular groove 17 located in the press slide 2. The pad 16 is shiftable in the groove 17 in a direction perpendicular to the axis of the pad 16. This perpendicular shifting of the upper sliding pad 16 is effected via an adjusting screw 18 that projects through bore 19 of the press slide 2. The adjusting screw 18 can be screwed into the threaded bore 16a located in the sliding pad 16. The adjusting screw 18 rests with the collar 18a on the upper surface of the slide 2.

By a tightening movement of the adjusting screw 18, the sliding pad 16 is pulled upwardly along with any parts connected to the pad 16. A releasing movement of the adjusting screw 18 results in a corresponding lowering movement of the sliding pad 16 and any parts connected therewith. The adjusting screw 18 has been secured on the press slide 2 against any axial shifting by means of the covering hood 20. The pad 16 along with the ram bearer 1 and the lower sliding pad 9 move in a direction perpendicular to the axial direction of the swiveling peg 7, bore 5 and peg 15.

Threaded bores 21 and 22 are located in two opposing walls of the ram bearer head portion 11. Adjusting screws 23 and 24 can be screwed in the bores 21 and 22, respectively, to place the bushing 13 in the desired location within the continuous slit 12. That is, relative movement between the slit 12 and bushing 13 is effected by manipulation of screws 23 and 24. The upper sliding pad 16 is shown in its assembled state in FIG. 4 wherein the bushing 13 projects into the ram bearer slit 12. The ram bearer 1 is shiftable with respect to the slide 2 through the operation of the adjusting screws 23 or 24 with the bushing 13 acting as a support.

The adjusting process of the ram bearer 1 will now be described by reference to FIGS. 1, 5 and 6. First, it is assumed that the position of the ram (not shown) requires a lateral correction thereby making it necessary to shift the ram bearer 1 toward the left (as viewed by the observer). First, all of the attaching screws 6 as shown in FIG. 2 are released so that the ram bearer 1 can be freely shifted within the maximum adjusting range provided by the assembly of this invention. Then it is simply necessary to release the adjusting screw 24 disposed on the right side of the ram bearer 1 as shown in FIG. 1. The left hand adjusting screw 23 is then screwed inwardly until the axis 25 of the ram has achieved the desired position. By screwing the adjusting screw 23 inwardly, the ram bearer 1 shifts to the left.

The precise movement of the ram bearer 1 occurring during this adjustment can be seen in FIG. 5. The three characteristic points which lie in the axis of the slot 12, in the axis 25 of the ram and in the axis of the swiveling peg 7, as well as in the vertical plane passing through the front surface of the head or terminal section 11 of the ram bearer 1 are designated in their starting positions by  $A_2$ ,  $B_2$  and  $C_2$ , respectively, and in their terminal position by  $A_2'$ ,  $B_2'$  and  $C_2'$  respectively. The points lying in the perpendicular front plane of the press slide 2 and corresponding to points  $A_2$  and  $C_2$  are correspondingly designated by  $A_1$  and  $C_1$ . However, point  $B_2$  in FIG. 1 has been shown once more on slide 2 to illustrate the movements occurring. The upper sliding pad 13 has been symbolized by a circle in FIGS. 5 and 6 for the sake of clarity and simplicity.

There is a basic problem underlying the adjusting process as described and shown in FIG. 5. The shifting point  $B_2$  corresponding to the ram axis 25 moves horizontally toward the left along a certain path as shown in FIG. 5. When the adjusting screw 23 is tightened, the upper ram portion 11 is forced away from the bushing 13. Thus, a swinging movement of the bearer 1 is executed around the point  $C_2$ . At the same time, point  $C_2$  corresponding to the axis of the swiveling peg 7 moves slightly downwardly with the lower sliding pad 9. Slot 12 assumes an oblique position and the axis of bushing 13 remains locally fixed with respect to the press slide 2. That is, bushing 13 merely turns slightly on peg 15 of the sliding pad 16 and the distance between point  $A_2$  and  $C_2$  represents an unchangeable value. Therefore, when any lateral adjustment as described hereinabove is made, there is a slight error  $\delta$  with respect to the height as shown in FIG. 5. This error  $\delta$ , however, always lies within the permissible drop stamping tolerances.

The adjustment of height in the device of this invention is shown in FIG. 6. The adjusting screw 18 may be tightened or released as described hereinabove even

while the ram would be disposed in the oblique position resulting from the movement as described with respect to FIG. 5. That is, the ram bearer 1 will move purely in a direction perpendicular to the axis or the ram so that in no case will lateral deviations occur. By tightening screw 18, relative movement to positions  $A_2''$ ,  $B_2''$  and  $C_2''$  is effected as shown in FIG. 6. Therefore, it is possible to achieve a perfect adjustment as to height without being subject to any kind of lateral errors. While there is a slight deviation as to height when a lateral adjustment is made, this slight deviation may be compensated for by a simple adjustment to the height as described hereinabove. A gradual time consuming adjustment as is necessary in prior art devices to obtain the desired final position of the ram axis 25 is no longer required.

In a further embodiment of this invention as shown in FIG. 7, it is possible to completely avoid the slight deviation as to height which occurs in the lateral adjustment as described hereinabove. The surface of the slit 12a is provided with a curvature so that when bushing 13a glides therealong, the point  $B_2$  representing the axis 25 of the press die will move on a horizontal line. The specific movement in accordance with the embodiment of FIG. 7 is shown in FIG. 8. The upper and lower limiting surfaces of slit 12a are slightly curved as shown in FIG. 7. When the ram bearer 1 is shifted so that the slot axis  $A_2$  moves to the left as shown, the shifting point  $B_2$  moves horizontally toward the left. At the same time, the lower terminal point  $C_2$  of the straight line  $A_2-C_2$  moves upwardly in a movement that is perpendicular to the direction of the ram axis 25. The upper terminal point or slot axis  $A_2$  of the straight line  $A_2-C_2$  describes the desired curve line which is to be made the basis of the form of the slit 12a. As in the earlier embodiment described hereinabove, any vertical adjustment may be made without any lateral deviation or error. Relative movement effected by screw 18 is shown in FIG. 9.

A third embodiment of the construction made in accordance with this invention is shown in FIG. 10. The ram bearer head 11b has a bore 26 in which a circular-cylindrical bushing 27 can be inserted. Bushing 27 has a continuous hole 28 having a rectangular cross section. Two threaded bores 29 and 29b are disposed in the ram bearer head 11b and face each other. Two bores 30 and 30b are located in the walls of the bushing 27 and are larger than the outside diameters of the threaded bores 29 and 29b, respectively. In the assembled position of bushing 27, threaded bores 29 and 29b align with bores 30 and 30b, respectively, and are held by two adjusting screws (not shown) in this mutual position.

A sliding pad 31 has a peg 32 which can be inserted in the continuous bushing hole 28. The height of the peg 32 corresponds to that of bushing hole 28 and is laterally movable therein. The adjusting screws (not shown) fit into the threaded bores 29 and 29b and correspond to screws 23 and 24 as shown in FIG. 1. Thus, in the assembled state of the device made in accordance with this embodiment, the adjusting screws penetrate both threaded bores 29 and 29b as well as the larger bores 30 and 30b. The adjusting screws are seated inside bushing 27 on the rounded flanks of peg 32. The peg 32 has flattened portions corresponding to the flattened portions of bushing 13 in the embodiment shown in FIG. 1.

By releasing the right hand screw and tightening the left hand screw, the ram bearer head 11b is shifted to the left. The resulting turn of bushing 27 within bore 26 is absorbed by the difference in the diameter of the adjusting screws and the larger bores 30 and 30b. Point  $A_2$  in this case moves on a horizontal line as illustrated in FIG. 11. Consequently, point  $C_2$  is lifted slightly and a slight deviation  $\delta$  occurs with respect to the height or vertical direction. This vertical deviation, however, also lies within the permissible drop stamping tolerances. Any vertical adjustment as shown in FIG. 12 with this embodiment may again be made without any lateral error or deviation. This movement shown in FIG. 12 is a complete accord with the embodiments having vertical movement as shown in FIGS. 6 and 9.

A further embodiment of the invention is shown in the use of a single part 33 in FIG. 1 instead of the two combined parts 7 and 9. An assembly equipped with such a simplified part would be perfectly capable of functioning even though combined parts 7 and 9 were used in the first specific embodiment. The use of combined parts 7 and 9, however, result in a lower pressure per unit area occurring thereon than in the use of the single part 33.

It is further possible to substitute a single peg 34 which would be perpendicular with respect to the ram bearer 1 and the slide 2 in place of the combination of two parts 13 and 16. As shown in FIG. 7, the parts 13a and 16a may be replaced by a single peg 35. In the embodiment as shown in FIG. 10, the sliding pad 31 may be replaced by a square insert 36. Basically, it is altogether possible to reverse the arrangement shown in such a way that the swiveling peg 7 would be disposed in the upper portion of the ram bearer 1 and the adjusting screws 23 and 24 in the lower part of the ram bearer 1.

While the device for the lateral adjustment and adjustment in height of the ram bearer on presses for non-cutting metal shaping has been shown and described in detail, it is obvious that this invention is not to be considered as being limited to the exact form disclosed, and that changes in detail and construction may be made therein within the scope of the invention, without departing from the spirit thereof.

I claim:

1. In an assembly having a press slide and a ram bearer releasably secured to the slide wherein the ram bearer is used for carrying the axially movable ram on a press and relative parallel movement between the bearer and slide may be effected for positional adjustment, the combination comprising:

- a. first guide means pivotally connected at one end thereof to a first terminal section of the ram bearer and slidably connected to the other end thereof to the press slide,
- b. the slidably connected end of the first guide means being shiftable in a direction transverse to the axial direction of the ram,
- c. second guide means pivotally connected at one end thereof to a second terminal section opposite said first terminal section of the ram bearer and slidably connected at the other end thereof to the press slide,
- d. first adjusting means for laterally fixing the pivotally connected end of the second guide means with

- respect to the ram bearer about the pivot connection of the first guide means,
- e. the slidably connected end of the second guide means being shiftable in a direction transverse to the axial direction of the ram, and
- f. second adjusting means for locating the slidable connections of the first and second guide means in a predetermined disposition on the press slide.
2. The combination as defined in claim 1 wherein said first guide means includes a peg member pivotally mounted at one end to the first terminal section located on the lower portion of the ram bearer and said second guide means includes a guide slit formed in the second terminal section located at the upper portion of the ram bearer and a guide element pivotally mounted within said guide slit, said first adjusting means including adjusting screws adapted to establish the position of the guide element with respect to two facing limiting walls of the guide slit.
3. The combination as defined in claim 2 wherein the guide slit has a parallelepiped shaped cross section.
4. The combination as defined in claim 2 wherein the guide slit includes upper and lower limiting surfaces having a curved structural configuration so that upon a lateral swiveling of the upper terminal section of the ram bearer, a horizontal shifting of the axis of the ram occurs about the pivot connection of the first guide means.
5. The combination as defined in claim 2 wherein the guide element disposed within said guide slit has the shape of a roller and is slidably disposed at the other end thereof in the press slide.
6. The combination as defined in claim 2 wherein the guide element comprises a bushing member which projects into the guide slit of the ram bearer and a shiftable element slidably connected to said press slide.
7. The combination as defined in claim 6 wherein said guide slit has an upper and lower limiting surface and said bushing has a flat side located on either side thereof for disposition against the upper and lower limiting surfaces for the purpose of decreasing the surface pressure per unit area.
8. The combination as defined in claim 1 wherein said second guide means includes a cylindrical bore located in said second terminal section and a cylindrical peg rotatably mounted therein, said cylindrical peg including an axial continuous opening having a rectangular cross section, said second terminal section of the ram bearer including adjacent walls with threaded bores disposed therein, said cylindrical peg having bores to be registered with said threaded bores and extending through the wall of the cylindrical peg so that adjusting screws may be placed in the threaded bores and project into the continuous opening to laterally shift the ram bearer with respect to the slidably connected end of the second guide means attached to the press slide.
9. In an assembly having a press slide element and a ram bearer element releasably secured to the press slide element wherein the ram bearer element is used

- for carrying the axially movable ram on a press and relative parallel movement between the bearer element and slide element may be effected for positional adjustment, the combination comprising:
- a. first guide means pivotally connected at one end thereof to a first terminal section of one of said elements and slidably connected at the other end thereof to the other said element,
- b. the slidably connected end of the first guide means being shiftable in a direction transverse to the axial direction of the ram,
- c. second guide means pivotally connected at one end thereof to a second terminal section of one of said elements and slidably connected at the other end thereof to the other said element,
- d. first adjusting means for laterally fixing the pivotally connected end of the second guide means with respect to the element to which it is connected and about the pivot connection of the first guide means,
- e. the slidably connected end of the second guide means being shiftable in a direction transverse to the axial direction of the ram, and
- f. second adjusting means for locating the slidable connections of the first and second guide means in a predetermined disposition on the other said element.
10. The combination as defined in claim 9 wherein said first guide means includes a peg member pivotally mounted at one end to the first terminal section located on the lower portion of said element and said second guide means includes a guide slit formed in the second terminal section located at the upper portion of said element and a guide element mounted within said guide slit, said first adjusting means including adjusting screws adapted to establish the position of the guide element with respect to two facing limiting walls of the guide slit.
11. The combination as defined in claim 10 wherein the guide slit has a parallelepiped shaped cross section.
12. The combination as defined in claim 10 wherein the guide slit includes upper and lower limiting surfaces having a curved structural configuration.
13. The combination as defined in claim 10 wherein the guide element disposed within said guide slit has the shape of a roller and is slidably disposed at the other end thereof in the press slide.
14. The combination as defined in claim 10 wherein the guide element comprises a bushing member which projects into said guide slit and a shiftable element slidably connected to said other element.
15. The combination as defined in claim 14 wherein said guide slit has an upper and lower limiting surface and said bushing has a flat side located on either side thereof for disposition against the upper and lower limiting surfaces for the purpose of decreasing the surface pressure per unit area.

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16. The combination as defined in claim 9 wherein said second guide means includes a cylindrical bore located in said second terminal section and a cylindrical peg rotatably mounted therein, said cylindrical peg including an axial continuous opening having a rectangular cross section, said second terminal section including adjacent walls with threaded bores disposed therein, said cylindrical peg having bores to be registered with

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said threaded bores and extending through the wall of the cylindrical peg so that adjusting screws may be placed in the threaded bores and project into the continuous opening to laterally shift said one of the elements on which said second terminal section is disposed with respect to the slidably connected end of the second guide means.

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