Aug. 17, 1965 H. J. HARPER 3,200,508

PRESS BRAKE DIE ALIGNMENT INDICATOR DEVICE

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FIG. 1.

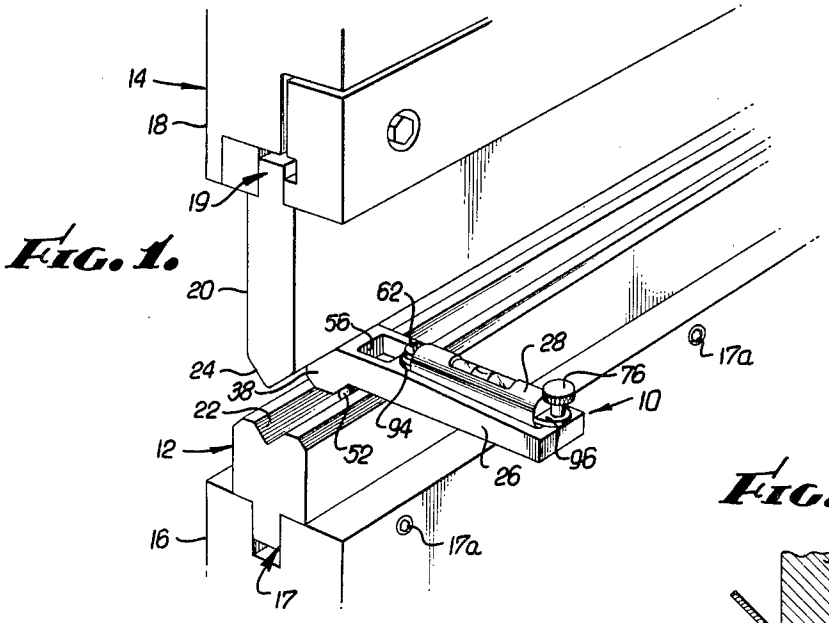


FIG. 3.

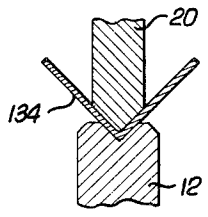


FIG. 2.

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FIG. 4.

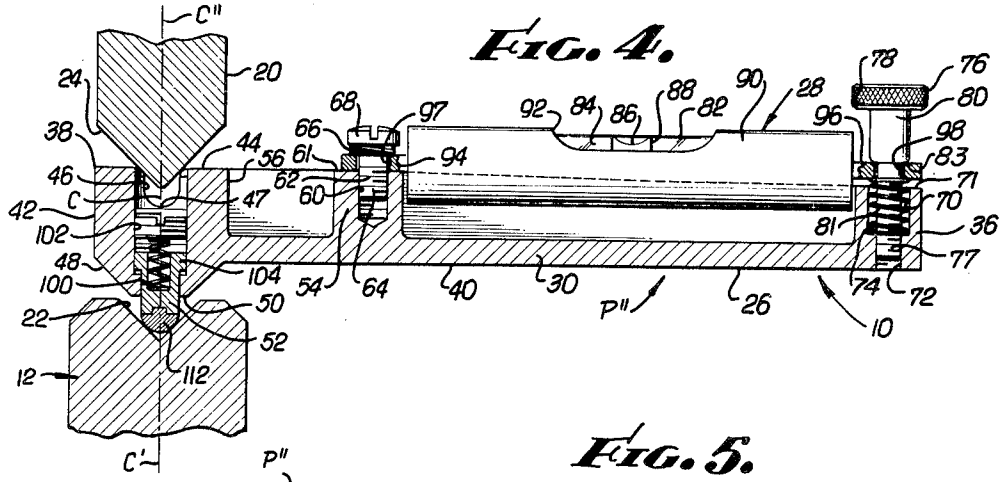


FIG. 5.

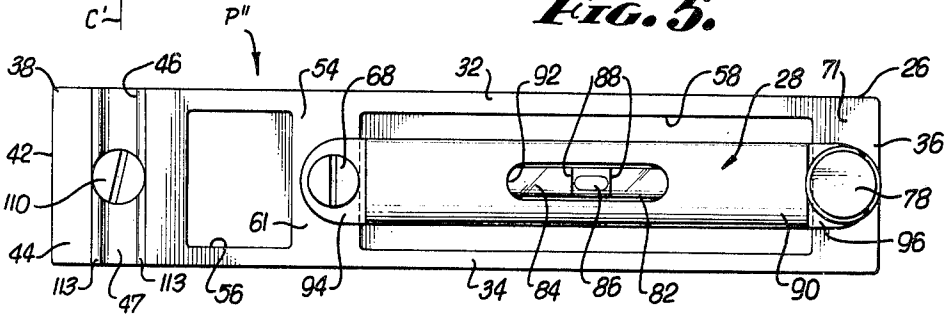


FIG. 6.

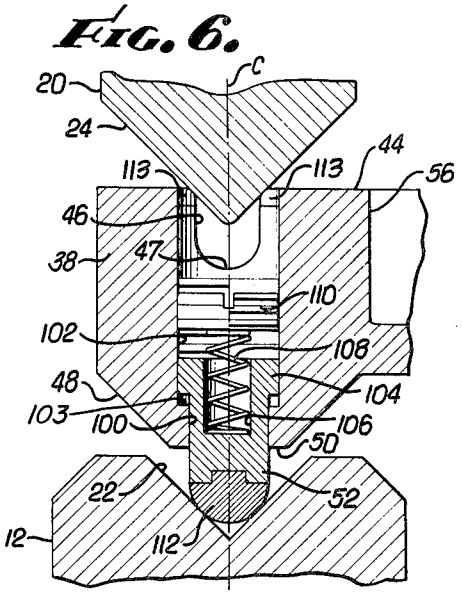
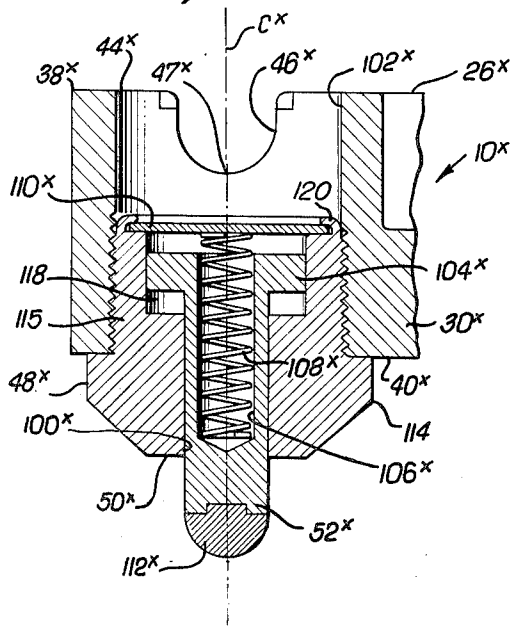


FIG. 7.



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PRESS BRAKE DIE ALIGNMENT INDICATOR DEVICE

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11 Claims. (Cl. 33—185)

The present invention relates to press brakes, and more particularly to an alignment indicator devices for press brake dies.

Press brakes are well-known in the sheet metal industry. One of their important uses is in the formation of right angle bends in metal. This type of metal forming operation requires the use of a female V die which is installed in the press brake bed. A male V die or punch is disposed in the brake and guided by gibs for travel in a plane toward the female die and to mate exactly therewith so that the metal to be formed will be precisely bent. If the dies are not aligned, the metal tends to slide when the punch descends, resulting in irregular and non-uniform bends. The V dies which are known for the purpose may be of various lengths, and various sizes of openings. As the length increases, there is a greater likelihood for the bends to become more inaccurate. It is essential, therefore, that the plane of the gibs and punch travel coincides exactly with the plane passing through the female die. Consequently, when such a female die is installed in the machine, the die must be manually adjusted, so as to be in exact vertical alignment with the press brake punch. The adjustment of alignment is ordinarily accomplished through the use of adjustment screws which are located in the press brake bed and which bear on either side of the female die for affixation thereof to the bed. In one conventional method the female die is loosened completely from the bed by loosening all the adjusting screws. The punch is brought into position on the female die under a force so that the male V mates with the female V. The screws are then tightened. This method is deficient because it is impossible to tighten the screws on both sides of the female die in such a way that the forces exerted by opposing screws are equal. When the punch is moved from engagement with the female die, the bed will move out of adjustment as the forces between the opposing screws equalize. In a second conventional method the adjusting screws are also loosened. The punch is lowered into very close proximity with the female die. Each end is then visually aligned. A feeler gauge, which is a clearance checking device, is then applied at several adjusting points intermediate the ends at both the front and back of the machine. The screws are tightened after each adjustment. This method also has several deficiencies. For a ten foot press brake a skilled man must take one hour for the adjustment. Furthermore, even when the adjustment is made, the accuracy is undependable. As a consequence, it has often happened that the sheet metal parts formed above, in the area of the center of the die, shown kinks and die marks. The latter are indicative of the skidding action of the punch in forcing itself into alignment with the die. Furthermore, it has been difficult to control the close tolerances necessary in producing bends of the correct size and angle.

A further problem arises from the peculiar construction of a press brake. A camber or slight curve must be built into the bed and, consequently, the female die, so that there is a slight bow imparted thereto. This camber causes 0.020 inch less clearance between the male and female dies in the center than at the ends. The purpose of the camber is to insure an even distribution of the force applied by the punch as it strikes the female die along the entire length of the tool. A lack of camber results in the creation of uneven bending forces which extend from the

center to the ends of the brake. These uneven forces cause an improperly bent product to be formed. However, the presence of the camber increases the difficulty of aligning the dies. In fact, no satisfactory method exists whereby the dies may be aligned throughout the full length of the machine.

The present invention overcomes these disadvantages and takes into consideration the camber. It comprises a simple tool which compares the punch plane with the female die plane so that the planes may be brought into coincidence. In one embodiment, the invention comprises a trough-shaped element or groove having an axis and a spring loaded pin centered on the axis. The pin is disposed to rest within the female die. The trough-shaped element is disposed to contact the punch in such a manner that the V enters within the trough but does not touch the bottom thereof. In operation, the punch is slowly lowered toward the female die onto which the indicator has been placed until the punch contacts the upper edges of the trough. If the dies are in alignment, i.e., their respective planes coincide, these planes will lie along the axis of the indicator. If the dies are not in alignment, however, the respective planes will be disposed parallel to one another. Use of the device will indicate that the axis is askew with respect to the planes so that it will intersect both planes at an angle. This situation is shown visually by means of a bubble-type level tube. The bubble tube level is preadjusted with respect to the indicator. When the bubble is centered within the level, both planes will pass through the axis and consequently be co-planar. If an angle exists between the axis and the planes, which angle indicates that the planes are parallel, rather than coincidental, the bubble will not be centered within the level. Movement of the female die with respect to the punch will cause the indicator to pivot and the bubble to center. At this point the plane of the female die will coincide with the plane of the punch and both planes will pass through the axis of the indicator.

The level must be preadjusted with respect to the indicator because a press brake is not always installed so that the gibs and the plane of travel of the punch is truly vertical. Consequently, the level must be preadjusted with respect to a true vertical in order to take advantage of the principle of a spirit level. To this end, the indicator is formed with a machined surface arranged exactly parallel or normal to the indicator axis. When this indicator surface is placed against a vertical machined surface on the press brake or, preferably, the ram gib, the indicator axis will be disposed exactly parallel to the vertical travel of the press brake ram and punch. While the indicator is held in this position, the level is adjusted with respect to the indicator to center the bubble. In effect, if the axis of the level were compared to the indicator axis, the angle therebetween would indicate the angle of inclination from which the plane of ram travel varies from a true vertical.

The pin is spring loaded to make allowance for the camber. In general practice, the indicator is slid along the entire length of the press brake between the punch and the female die. Because the clearance between the punch and the female die varies slightly, the spring allows the pin to move in conformity with the varying clearance. The spring is also a safety feature which operates to impart a resilience or "give" to the indicator in case the punch is lowered too closely to the female die; otherwise, the indicator might be crushed.

It is, therefore, an object of the present invention to provide a press brake die alignment indicator device.

Another object of the invention is to provide a press brake die alignment indicator device which enables adjustment of the alignment of press brake dies to extremely close tolerances.

Another object of the invention is to provide a press brake die alignment indicator device which enables adjustment of the alignment of press brake dies throughout their entire length.

Another object of the invention is to provide a press brake die alignment indicator device which is of comparatively simple construction.

Another object of the invention is to provide a press brake die alignment indicator device which provides ease of operation.

Another object of the invention is to provide a press brake die alignment indicator device for indicating the alignment of press brake dies from but one side of the machine.

Another object of the invention is to provide a press brake die alignment indicator device for rapid adjustment of the alignment of press brake dies.

These and other objects of the invention will become more apparent from the following description thereof, read in conjunction with the accompanying drawings, in which:

FIG. 1 is a view in perspective, being partly broken away, of the press brake die alignment indicator device of the invention, the latter being shown in operative position for use in indicaitng the alignment as between a female press brake die and the punch cooperative therewith;

FIG. 2 is an enlarged end elevation, being partly in section, of the apparatus of FIG. 1, the indicator device being also shown diagrammatically in a preliminary position for the adjustment thereof, the female die and punch being shown in positions of misalignment;

FIG. 3 is a fragmentary vertical cross-section of the press brake of FIGS. 1 and 2, a sheet of metal being shown in position after having been formed into a right angle bend by said press brake;

FIG. 4 is a view similar to FIG. 2, but being in cross-section, and showing the positions of the elements of the apparatus when the female die and punch are in alignment;

FIG. 5 is a further enlarged top plan of the die alignment indicator device of the invention;

FIG. 6 is a still further enlarged vertical section of a portion of the apparatus of FIG. 4; and

FIG. 7 is a view similar to FIG. 6, but illustrating a modified form of the invention.

Referring to the drawings, and particularly to FIG. 1, a press brake die alignment indicator device **10**, constructed in accordance with the invention, is shown, located in operative position for use with a female die **12** of a press brake **14**. The press brake **14** may be of any conventional structure, and is provided with a bed **16** upon which the die **12** is mounted, the latter being clamped to the bed **16** in conventional manner as shown at **17**. Conventional positioning screws **17***a* (see also FIG. 2) are provided for horizontal lateral adjustment of the position of the die **12** on the bed **16**. A ram **18**, adapted for downward movement toward the bed **16** under controlled pressure, is mounted thereabove. A punch **20** is mounted in conventional manner by clamping to ram **18**, as shown at **19** (see also FIG. 2). The punch is adapted to cooperate with die **12**, as will be more fully described hereinafter.

The die **12** is provided with a generally upwardly-opening V-shaped groove **22** while the punch **20** is provided with a downwardly-directed V-shaped entrance portion **24**, adapted to enter and mate with the groove **22**.

The indicator device **10** is constructed of an elongate body member **26**, which serves as mounting means for a level indicator tube **28** (see also FIGS. 4–5).

The body member **26** includes a flat bottom wall **30**; two opposite side walls **32** and **34**, extending upwardly from the bottom wall **30**; an outer end wall **36**; and an enlarged inner end portion **38**. The bottom wall **30** provides the body member **26** with a flat, machined bottom surface **40**. Enlarged inner end portion **38** is likewise machined and flat to provide an inner end surface **42** and

extends perpendicularly to the bottom surface **40**. The upper surface **44** of the enlarged inner end portion **38** is flat, and extends generally parallel to the bottom surface **40**.

A centrally positioned groove **46** extends transversely across the inner end portion **38** at the upper surface **44** of the latter. (See also FIG. 6.) As may be seen, the base **47** of the groove **46** is rounded. Opposite the groove **46**, there is provided at the lower side of the inner end portion **38** a shoulder or projection **48** of truncated pyramidal shape, having a flat lower end surface **50**, from which projects a downwardly-extending pin **52**.

A transverse wall **54** extends between the side walls **32** and **34**, being located intermediate the end wall **36** and the inner end portion **38** to divide the body member **26** into a forward cavity **56** of comparatively short length and a rearward cavity **58** of comparatively great length. A centrally located threaded bore **60** extends vertically through a substantial portion of the wall **54**, opening at the upper end surface **61** of the latter. The bore **60** receives inserted therein a mounting screw **62** which is threaded adjacent its inner end, as shown at **64**. The mounting screw **62** is adapted to carry a flat spring **65** adjacent the screw head **68**.

A centrally located bore **70** of comparatively large diameter extends vertically through a substantial portion of the end wall **36**, said bore **70** opening at the upper surface **71** of said wall **36**. The bore **70** is in longitudinal alignment with the bore **60** in the transverse wall **54**. A threaded bore **72** coaxial with and communicating with the bore **70**, but being of smaller diameter than the latter, extends through the remainder of the wall **36** and also through the bottom wall **30**. An abutment **74** is disposed between and joins bores **70** and **72**. An adjustment screw **76** extends through the bore **70** and is provided with a threaded inner end **77** which is inserted in the bore **72**. At its outer end, the screw **76** is formed with a knurled, circular head **78** and adjacent thereto with an enlarged shank portion **80**. A shoulder **83** is provided on the lower part of portion **80**. A coil spring **81**, mounted about the threaded end of screw **76**, is positioned within the bore **70**, the spring resting on the abutment and extending a short distance above the upper surface **71** of the end wall **36**.

The level indicator tube **28** may be of any conventional structure, and is preferably of the spirit level type. As shown, the indicator tube **28** provides a glass tube **82** containing spirit **84** and having a bubble **86** therein. The glass tube **82** is provided with appropriate markings **88** on the upper surface thereof for indicating the correct location of the bubble **86** when the tube **82** is in a level position. The tube **82** is mounted within an outer protective covering **90**, which may be of metal or other suitable material. The outer covering **90** is formed with an opening **92**, which enables observation of the tube **82** at the area of the markings **88**.

The holder **90** bears at its opposite ends two axially projecting mounting collars **94** and **96**, respectively. The level indicator tube **28** is of such length that it may be partially inserted into the rearward cavity **58** of the body member **26**, with the mounting collars **94** and **96** seated on the upper end surfaces **61** and **71** of the walls **54** and **36**, respectively. The collars **94** and **96** are provided with two circular openings **97** and **98** through which pass the shanks of the mounting screw **62** and adjustment screw **76**, respectively. Flat spring **66** is located between the collar **94** and the mounting screw head **68** while the collar **96** is positioned between the coil spring **81** and shoulder **83** of enlarged shank portion **80** of the adjustment screw **76**. When screw **76** is rotated, tube **28** will pivot about mounting screw **62** to allow relative adjustment of the tube with respect to body member **26**.

A centrally located and relatively short vertical bore **100** extends through a portion of the projection **48** of the enlarged inner end portion **38**, said bore **100** opening at the lower end surface **50**. A counterbore **102** is formed

within end portion 38 coaxially with, but adjacent to, bore 100 and extends therefrom to base 47 of the groove 46. The counterbore is provided with a diameter greater than that of the bore to produce a shoulder 103, consequently effecting a stepped, through passage-way from groove 46 to surface 50, and is threaded adjacent the base along approximately one-half of its length. The pin 52 at its inner, or upper, end is provided with an enlarged circular head 104, reciprocally fitted and positioned within the counterbore. The lower part of pin 52 extends through the bore 100 in close sliding relationship therewith. An axial bore 106 extends through the head 104 for a substantial distance into the body of the pin 52. A load spring 108 is seated at one end within the bore 106 and bears at its opposite end against an abutment screw 110 threadedly inserted within the bore 102.

The pin 52 at its outer end is provided with a hemispherically shaped carbide tip 112, the latter being mounted on said pin 52 in a conventional manner. The edges of the groove 46 are also carbide-tipped, as best seen at 113. It will be noted that a common center line C extends through the respective centers of the tip 112 and the groove base 47, said center line C comprising the axis of the bore 100 and counterbore 102. The center line C is parallel to the surface 42, and perpendicular to the surface 40.

In the operation of the press brake die alignment indicator device 10 of FIGS. 1–6, said device is at first adjusted to the level of the press brake 14. To this end, the body member 26 is placed in the position shown diagrammatically at P in FIG. 2, wherein the flat inner end surface 42 of the enlarged inner end portion 38 is in abutment with a machined vertical surface of the die 12. Alternatively, said inner end surface 42 may be placed in abutment with any other parallel machined surface of the press brake 14 which is parallel to the plane of movement C″ of punch 20. As an additional alternative, the flat machined bottom surface 40 of the bottom wall 30 of the body member 26 may be placed flat on the bed 16, or on any other machined horizontal surface which is normal or perpendicular to the plane of movement of the punch. The level indicator tube 28 is then adjusted by rotation of the adjustment screw 76 so that the bubble 86 lies between the markings 88. The knurled head 78 facilitates the rotation of the adjustment screw 76. It will be noted that the manner of mounting of the level indicator tube 28 on the body member 26 enables some degree of pivotal movement of the former, as a consequence of rotation of the screw 76. As a result, the level indicator tube 28 can be pivoted into a position in which it is level, as indicated by the centering of the bubble 86. The purpose of the level tube adjustment is to compensate for any angular deviation of the press brake from a true horizontal or vertical. As will become hereinafter obvious, the location of bubble 86 with respect to markings 88 will indicate the disposition of punch 20 with female die 12. Consequently, it is essential to adjust the position of tube 28 with respect to the remainder of device 10 as indicated by the position of the press brake since the plane of movement of the punch may not be in a true vertical plane.

When the body member 26 is in the position P, the flat surface 42 will lie parallel to the direction or plane of travel of the punch 20. This results from the fact that direction of travel of the punch 20 is parallel to any vertical surface of the press brake 14 which may be used together with the flat inner end surface 42 of the enlarged inner end portion 38 during the adjustment of the indicator device 10. It is obvious, of course, that the direction or plane of punch travel is also perpendicular to any horizontal surface of the press brake 14, which may be used for the same purpose together with the bottom surface 40 of the bottom wall 30 of the body member 26.

As the next step in the use of the indicator device 10, the body member 26 is brought into the position shown at P′ in which the pin 52 is inserted in the groove 22 of the die 12 and the entrance portion 24 of the punch 20 is lowered into the groove 46 under a small force. Since device 10 tends to fall or pivot about groove 22 because of the device's unbalanced weight, the force exerted by the punch is preferably limited to that necessary to balance the unbalanced weight. Consequently, there would be little likelihood of damage to the device or of misalignment due to stresses placed on the device by too great an exerted force. Furthermore, because of the inclusion of spring 108, any undue stresses are absorbed thereby. When the level of the indicator tube 28 is in a position such as shown at P′, in which the bubble 86 lies outside the markings 88 on the glass tube 82, an indication is given that the punch 20 and the groove 22 of the die 12 are not vertically aligned. This misalignment may best be seen in the drawings from the location of the parallelly positioned center planes C′ and C″ of the die 12 and punch 20, respectively, the center lines not being in alignment. Since pin 52 is coaxial with groove or trough 46 along axis C, the axis will be disposed at an angle from planes C′ and C″. This angular disposition is reflected by the lack of centering of bubble 86 with respect to markings 88. When in such postion of misalignment, the groove 22 will receive the downwardly moving punch 20 off-center. Any metal being formed in the operation may show kinks and die marks, as the punch 20 tends to force the die 12 into a position of alignment.

The die 12 may then, through adjustment from but one side of the machine of the positioning screws 17*a*, be shifted in position in the direction in which the bubble 86 moves toward, and is centered between, markings 88. When this has been accomplished, the level indicator tube 28 will be in the position P″ shown in FIGS. 4–5. The die 12 and punch 20 will then be in alignment and will have center planes C′ and C″ coinciding with each other. The planes will also coincide with the center line C of the bores 100 and 102 and of groove or trough 46 and pin 52.

The above-described alignment operation is repeated at any desired number of points along the length of the die 12. Accurate alignment with the punch 20 throughout the length of the die 12 is thus assured.

As the body member 26 changes position while under the pressure exerted by the punch 20 on the inner end portion 38, the tip 112 of the pin 52 will to some extent "roll" within the groove 22. A corresponding rolling movement will occur at the carbide-tipped edges 113 of the groove 46, in contact with the punch 20. The spring-loaded mounting of the pin 52 for reciprocation within the bore 100 and counterbore 102, provides compensation for camber, such as is commonly machined into most press brake beds. The spring loading also allows for slight variations in shut height.

Referring to FIG. 3, a metal plate 134 is shown in position in the groove 22 of the die 12, having been bent into a right angle through operation of the punch 20.

The body member 26 is preferably in the form of a casting, with the surfaces 40 and 42, and the various bores being accurately machined. The level indicator tube 28 may be of any conventional type, the selection thereof depending to some extent upon the degree of accuracy of indication desired. The groove 46 may be of other than rounded shape (e.g., of V shape), provided that the desired "rolling" action of the pin tip 112 is permitted. The abutment screw 110 may, if desired, be replaced by other means, such as, e.g., a plug or shoulder, which will provide an abutment surface for the outer end of the spring 108. Said spring 108 may be replaced by any other means, such as, e.g., a leaf spring, or a rubber cushion, which will enable flexible change of position of the pin 52 along the line of the axis of the latter.

Referring to FIG. 7, a press brake die alignment indicator device 10*x*, representing a modification of the invention is shown. Except where otherwise described, all of the elements of the device 10*x* are identical with those

of the device **10** of FIGS. 1–6. The inner end portion **38***x* of the body member **26***x* of the indicator device **10***x* is of the same depth as the remainder of said body member **26***x*. Said inner end portion **38***x* is formed with a threaded bore **102***x* of comparatively large diameter. The latter at its lower end opens at the bottom surface **40***x* of the bottom wall **30***x*. Said bore **102***x* extends through to the upper surface **44***x* of the body member **26***x*. A cartridge **114** is provided, bearing a downwardly-extending pin **52***x*. The cartridge **114** has an externally-threaded cylindrical body portion **115** inserted within the bore **102***x*, and a shoulder **48***x* at the lower end of said body portion **115**, and lying in abutment with the bottom surface **40***x* of the bottom wall **30***x*. The body portion **115** is hollow, providing an inner cylindrical chamber **118**. The shoulder **48***x* is formed with an axial bore **100***x* therethrough, communicating with the chamber **118**. The pin **52***x* extends through the bore **100***x*, with the head **104***x* being positioned for reciprocating movement within the chamber **118**. The pin **52***x* is provided with an axial bore **106***x*, having mounted therein a load spring **108***x*. The spring **108***x*, at its outer end bears against an abutment plate **110***x* which is secured to body portion **115** by inwardly bent upset flanges **120**.

The inner end portion **38***x* of the device **10***x* is at its upper surface **44***x*, formed with a transversely-extending groove **46***x*. The groove **46***x* has a rounded base **47***x*. A common center line C*x* extends through said base **47***x* and the axis of the pin **52***x*.

Any desired number of cartridges similar to the cartridge **114** may be provided for use with the indicator device **10***x*. Each such cartridge may bear a pin of a different size than the pin **52***x*. Each such cartridge may also vary in the size of the shoulder thereof. Thus, the indicator device **10***x* may be readily adapted for use with dies of various sizes and shapes, simply through replacement of the cartridge **114** by a cartridge bearing a pin **52***x* suitable to the particular need.

The operation of the indicator device **10***x* is, apart from the cartridge feature, identical with that described above for the indicator device **10**.

Although the invention has been described with reference to particular embodiments thereof, it will be realized that various changes and modifications may be made therein, without departing from the spirit of the invention or the scope of the appended claims.

I claim:

1. An alignment indicator device for a punch and a die of a press brake, comprising level indicator means, mounting means for said level indicator means, said mounting means adapted for adjustment of said level indicator means to a frame of reference on the press brake, and a member having an axis and yieldably mounted on said mounting means for flexible change of position along the axis, said member having a tip adapted for positioning and for insertion in an opening of the die for relating the die to the axis, said mounting means being adapted for contact under a small force by the punch when said member is inserted in the opening to relate the punch to the axis, said mounting means and said member adapted to permit change of position of said mounting means when the die is moved with respect to the punch, said level indicator means adapted to indicate the accuracy of alignment of the die with the punch, as represented by the position of said mounting means.

2. A press brake die alignment indicator device in accordance with claim **1**, said mounting means provided with a groove having a base in alignment with said tip of said pin.

3. A press brake die alignment indicator device in accordance with claim **1**, said mounting means provided with a flat surface adapted for aiding the adjustment, the axis of said member having a predetermined relationship to said flat surface.

4. A press brake die alignment indicator device in accordance with claim **3**, said level indicator means having one end portion adapted for pivotal movement with respect to said mounting means and another end portion opposite said one end portion and adapted for adjustment of the pivotal position of said level indicator means with respect to said mounting means, whereby the adjustment may be affected.

5. A press brake die alignment indicator device as in claim **1**, said mounting means including an elongate body member for mounting said level indicator means, said body member having an end portion formed with a bore, and said member comprising a pin projecting from the bore.

6. A press brake die alignment indicator device according to claim **5**, said end portion formed with a counterbore communicating with the bore, a spring load abutment member positioned in the counter-bore, and a spring having opposite ends bearing against said pin and said abutment member, respectively to provide for the flexible change of position.

7. A press brake die alignment indicator device, comprising level indicator means, mounting means including a body member for said level indicator means, said body member having an end portion formed with a threaded bore, an externally threaded cartridge adapted for insertion in the bore, and a pin having an axis and mounted on said cartridge for flexible change of position along the axis, said pin having a tip adapted for positioning and for insertion in the opening of a die of a press brake, said body member adapted for contact by a punch of the press brake when said pin is inserted in said opening for relating the axis with both the die and the punch, the mounting means and said pin adapted to permit change of position of said mounting means when the die is moved relative to the punch, said level indicator means adapted to indicate the accuracy of alignment of the die with the punch, as represented by the position of said mounting means.

8. An indicator for comparing coincidence and parallelism of a pair of planes in a press brake provided with a punch movable through one of the planes and a die disposed along the other of the planes: including an element provided with an axis and disposed for contact by the punch for relating the punch plane with the axis; a member yieldably secured to said element, disposed along the axis, and arranged for contact by the die for relating the die plane with the axis; and a sensing mechanism adjustably secured to said element and adjustably related to the axis, for indicating the coincidence and the parallelism of the pair of planes.

9. An indicator as in claim **8** further including a surface associated with said element and related to the axis for aiding adjustment of said mechanism when compared with the planes.

10. An indicator as in claim **8** wherein said element includes a pair of edges centrally disposed about the axis, said edges adapted to contact the punch.

11. An indicator as in claim **8** wherein said member includes a round tipped pin centered on the axis and disposed to relate the die plane to the axis.

References Cited by the Examiner

UNITED STATES PATENTS

128,513	7/72	Traut	33—214
820,028	5/06	Traut	33—214
1,211,882	1/17	Schade	33—214
1,515,239	11/24	Cook	33—214
1,686,318	10/28	Gallasch	33—181
1,822,740	9/31	Loeser et al.	33—214
2,184,449	12/39	Bell	33—181
2,472,241	6/45	Wilson	33—185
2,921,377	1/60	Hahl	33—181

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